



# Graduate Catalog

2011-12

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**Make Your Mark on the World**

Published by  
**Delaware State University**  
**School of Graduate Studies and Research**  
**Dover, Delaware 19901**  
**302-857-6800**

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*Delaware State University is an Equal Educational and Employment Opportunity/Affirmative Action Institution.*

*The provisions of this publication are not being regarded as an irrevocable contract between the student and Delaware State University. The University reserves the right to revise any provision or regulation at any time within the student's term of enrollment, if it is deemed advisable. Advance notice of any changes is given whenever possible.*

*The University reserves the right to refuse admission or to revoke admission to any applicant.*

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Revised October 2011

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Students at Delaware State University are responsible for knowing and complying with all requirements for their respective degrees as well as the policies and procedures governing graduate study as outlined in this document, the Delaware State University Student Handbook, and the specific graduate program handbook (if applicable).

Delaware State University reserves the right to make changes in the course offerings, degree requirements, charges and regulations, and procedures contained herein as educational and financial considerations require, subject to and consistent with established procedures and authorizations for making such changes.



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## **A MESSAGE FROM THE PRESIDENT, DR. HARRY L. WILLIAMS**

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Greetings:

As you embark upon your newest academic journey here at Delaware State University, you will be exposed to excellence in advanced studies that distinguishes our graduate and doctoral programs. As you delve into your chosen graduate programs of study, you will come into contact with DSU's world-class faculty and researchers who have already made their marks on the world and will guide you toward the same successful outcomes.

We are proud of all that we have to offer, as well as the state-of-art facilities in which you will work and study while at Delaware State University.

This *Graduate Studies Catalog* encompasses useful information that will assist you from the admission process, to course selections and on to graduation. Refer to it often and use it wisely.

Welcome to the Delaware State University family – a very smart choice! For some of you, it is a continuation from your undergraduate experience here. For others, this graduate or doctoral enrollment represents your first involvement as a student with this institution. Whichever the case may be, it is my hope that your experiences here will be fruitful throughout your advanced studies and continue long after you achieve your degrees.

## **CORRESPONDENCE**

Please address all inquiries and correspondence concerning applications and admission to the School of Graduate Studies and Research, Delaware State University, 12 N. DuPont Highway, Dover, Delaware 19901-2277; telephone (302) 857-6800; fax (302) 857-6503.

Address requests for summer school sessions and transcripts from Delaware State University to the Registrar, Delaware State University, 12 N. DuPont Highway, Dover, Delaware 19901-2277; telephone (302) 857-6375; fax (302) 857-6379.

Address requests for Adult and Continuing Education information to the Office of the Adult and Continuing Education Delaware State University, 12 N. DuPont Highway, Dover, Delaware 19901-2277; telephone (302) 857-6820; fax (302) 857-6823.

The Graduate Catalog will be produced biennially by the School of Graduate Studies and Research and the Office of the Registrar. The information in the Graduate Catalog was compiled by Dr. Michael Casson, dean, School of Graduate Studies and Research, and Mrs. Katherine Arlotta-Luke.

# THE UNIVERSITY

## MISSION STATEMENT

Delaware State University is a public, comprehensive, 1890 land-grant institution that offers access and opportunity to diverse populations from Delaware, the nation, and the world. Building on its heritage as a historically black college, the University purposefully integrates the highest standards of excellence in teaching, research, and service in its baccalaureate, master's and doctoral programs. Its commitment to advance science, technology, liberal arts, and the professions produces capable and productive leaders who contribute to the sustainability and economic development of the global community.

– *As approved by the Board of Trustees December 2011*

## VISION STATEMENT

As one of America's most highly respected Historically Black Colleges and Universities, Delaware State University will be renowned for a standard of academic excellence that prepares our graduates to become the first choice of employers in a global market and invigorates the economy and the culture of Delaware and the Mid-Atlantic Region.

## CORE VALUES

- Community
- Integrity
- Diversity
- Scholarship
- Outreach

## BASIC PHILOSOPHY AND VALUES

Delaware State University is committed to excellence and seeks to be the best in all that it does. The University believes that this uncompromising pursuit of excellence is best achieved through teamwork and shared governance.

The University is committed to providing students with a complete and high quality educational experience. The University, therefore, not only seeks to provide outstanding academic programs, but also seeks to provide students with an excellent campus life experience and opportunities to participate in well-defined and well-managed extracurricular activities.

Delaware State University is an 1890 land-grant institution committed to the philosophy on which it was founded. Thus, the mission can be simply stated as involving teaching, research and outreach.

The University is committed to providing all undergraduate students with a strong liberal arts education. This essential part of students' education serves as the foundation for studies in the major areas.

Delaware State University considers the changing needs of students as a major institutional priority. The University believes that: 1.) students must receive the education required for employment and upward mobility; 2.) more minority students must be prepared for graduate and professional education, especially in areas in which they are traditionally under-represented; and 3.) students should be exposed to new

developments in currently existing curricula using diverse teaching strategies.

Delaware State University places major emphasis on teaching quality. At the same time, the University recognizes that all faculty are obligated to expand the frontiers of knowledge in various disciplines and fields and, as appropriate, to apply that knowledge to the solution of community, regional, national and international problems. The University also believes that faculty involvement in research substantially enhances the quality of teaching and expects that students will be provided opportunities to engage in research. Through research, faculty members can continually expand their professional knowledge base and maintain the vitality of their teaching.

In addition to the primary emphasis on high quality teaching and the related missions areas of research and outreach, the University is committed to serving the surrounding the communities, the state of Delaware and the nation.

## **STUDENT LEARNING GOALS**

Delaware State University provides a wide-range of experiences designed to prepare our graduates to be

1. Competent communicators;
2. Effective inquirers, critical thinkers and problem-solvers able to use appropriate quantitative and qualitative information;
3. Ethical, collaborative and productive citizens of a complex, diverse world;
4. Independent learners able to integrate knowledge and technology to achieve personal and professional success.

Program learning goals are aligned with these learning goals. Course learning goals are aligned with the program learning goals.

## **HISTORY**

The State College for Colored Students, now known as Delaware State University, was established May 15, 1891, by the Delaware General Assembly under the provisions of the Morrill Act of 1890 by which land-grant colleges for blacks came into existence in states maintaining separate educational facilities. Through the conservative and practical planning of the Board of Trustees appointed by Governor Robert A. Reynolds, the College was launched upon its mission of education and public service on February 2, 1892. Five courses of study leading to a baccalaureate degree were offered: Agricultural, Chemical, Classical, Engineering and Scientific. A Preparatory Department was established in 1893 for students who were not qualified to pursue a major course of study upon entrance. A three-year normal course leading to a teacher's certificate was initiated in 1897. The College graduated its first class of degree candidates in May 1898.

In the 1916 to 1917 school year, the Preparatory Department was phased out, a Model Grade School was established, and a high school diploma was granted on completion of a four-year course of study. In 1923, a Junior College Division was added. Four-year curricula in the Arts and Sciences, Elementary Education, Home Economics, Agriculture and Industrial Arts were established in 1932. The College graduated the first class of bachelor's degree candidates completing one of the courses of study in June 1934.

In 1945, the College received provisional accreditation by the Middle States Commission on Higher Education (MSCHE). In 1947, the name of the institution was changed to “Delaware State College” by legislative action.

On July 1, 1993, Delaware State College turned another chapter in its history, when then-Gov. Thomas Carper signed a name change into law, renaming the College to Delaware State University. The University’s accreditation was most recently reaffirmed by the Middle States Commission on Higher Education in 2007.

The University has grown in stature as a center for teaching, research and public service. The purpose and objectives of the University have broadened in keeping up with changing times. While recognizing its historical heritage, the University provides higher education today for a diverse student population. Academic units are organized into the College of Agriculture & Related Sciences; the College of Arts, Humanities & Social Sciences; the College of Business; the Department of Education, Health & Public Policy; and the College of Mathematics, Natural Sciences & Technology.

The University offers 52 undergraduate degrees, which include unique majors such as Aviation, Computer and Information Sciences; Criminal Justice, Agriculture; Health Promotions; Hospitality & Tourism Management; Human Ecology; Management, Mass Communications; Natural Resources; Nursing; Social Work, Sport Management, along with many other tradition University-level degree programs.

The University offers 25 master’s degrees in Agriculture (Animal Science, Food Science, Plant Science), Applied Optics, Art Education, Biology (M.S. or M.A.), Biology Education, Business Administration (Finance, Information Systems, or Project Management), Applied Chemistry, Computer Science, Education (Adult Literacy and Basic Education, Curriculum and Instruction, Science Education, or Special Education), Educational Leadership, Family and Consumer Science Education, Food Science, Historic Preservation, Mathematics (Pure or Applied), Mathematics Education, Molecular and Cellular Neuroscience; Natural Resources, Nursing; Physics, Physics Teaching, Social Work, Sport Administration, Teaching, as well as Teaching English as a Second Language.

The University also has five doctoral programs in Applied Chemistry; Educational Administration, Leadership & Supervision; Interdisciplinary Applied Mathematics and Mathematical Physics; Neuroscience; as well as Optics.

The institution has national academic program accreditations from the Accrediting Council for Programs in Hospitality Administration; the Commission on Accreditation for Dietetic Education; the National Council for Accreditation of Teacher Education; National League of Nursing Accrediting Commission; the Commission on Collegiate Nursing Education; and the Council on Social Work Education. The University’s College of Business is also internationally accredited by the Association to Advance Collegiate Schools of Business.

The underpinning of the growth and development of Delaware State University has been the leadership of 10 permanent presidents, which included Wesley P. Webb (1891-1895), William C. Jason (1895-1923), Richard S. Grossley (1923-1942), Howard D. Gregg (1942-1949), Oscar J. Chapman (1950-1951), Jerome H. Holland (1953-1960), Luna I. Mishoe (1960-1987), William B. DeLauder (1987-2003), Allen L. Sessoms (2003-2008) and Dr. Harry L. Williams (2010-present). Maurice E. Thomasson served twice as acting president from 1949-50 and 1951-1952; and Dr. Claibourne Smith served as the acting president from 2008-2010.

In its 2012 listing the *U.S. News & World Report* ranked Delaware State University as 15<sup>th</sup> among 72 HBCUs in the country. As a result of the efforts of past and current presidents, administrators, faculty, staff and students, the University is well-positioned to reach new levels of prestige and respect in the new millennium.

## **THE SETTING - CAMPUS AND FACILITIES**

Delaware State University is located in Dover, Delaware, in Kent County, 45 miles south of Wilmington on the Delmarva Peninsula. The campus is adjacent to U.S. Highway 13, which provides direct access to Norfolk, Virginia; Salisbury, Maryland; Wilmington, Delaware; Philadelphia, Pennsylvania; and Camden, New Jersey. Other connecting highways in the Dover area provide access to the Chesapeake Bay Bridge; Washington, D.C.; Baltimore, Maryland; and points west. The New York metropolitan area can be reached via the Delaware Memorial Bridge and the New Jersey Turnpike, which intersect Highway 13 just south of Wilmington. The city of Dover is located on bus routes to major cities.

Dover, the capital of Delaware, is a community of approximately 36,000 people situated in the heart of the Eastern Shore within easy reach of the resort areas of Rehoboth Beach, Delaware; Ocean City, Maryland; and Cape May, New Jersey. Founded in 1703, the city of Dover features many colonial buildings and several historical sites, including the home of John Dickinson, signer of the Declaration of Independence and the Constitution of the United States.

The physical facilities at the Dover campus support various University programs. Major administrative and academic facilities are listed below.

**Administration Building** accommodates a small Café, the Office of Admissions, the Office of Student Financial Services, the Office of Student Accounts, the Records Office, the Cashier's Office, the Human Resources Office, the Office of Institutional Research & Analysis, the Office of Finance and Administration, the Payroll Office, the Institutional Advancement Office, Student ID/Photo Office, the Academic Affairs & Provost's Office and the President's Office.

**Agriculture Annex Building** is the home of the College of Agriculture and Related Sciences, and the Department of Human Ecology as well as certain offices and laboratories of the Department of Agricultural and Natural Resources.

**Alumni Stadium** serves as the site for many university activities, including football, track and field contests and other outdoor events.

**William W.W. Baker Building** is the home of the Department of Agriculture and Natural Resources.

**Bank of America Building** is the home of the College of Business, which includes the departments of Accounting, Economics & Finance and Management, as well as the Aviation Program and the Hospitality & Tourism Management Program, the Delaware Center for Enterprise Development and the SunGard IT Help Desk.

**Delaware Hall** houses the departments of Psychology and Sociology-Criminal Justice.

**Education and Humanities Building** houses the departments of Art, English & Foreign Languages, Education and Music. This facility also houses the Child Development Laboratory and the Office of the Dean of the College of Arts, Humanities & Social Sciences, the Office of Distance Education & Learning

Technologies, Counseling Services, as well as serving as the site for the University's wide-ranging cultural enrichment programs in the E&H Theatre.

**ETV Building** houses the departments of History, Political Science & Philosophy, Mathematical Sciences and Mass Communications.

**Grossley Hall** houses several classrooms, certain offices of the Athletics Department, the Office of International Affairs, the Office of University Studies & First-Year Programs and SunGard offices.

**William C. Jason Library**, a six-story structure, houses a collection of 314,133 printed volumes, and including its collection of electronic books and journals, micro books, microfiche, audio-visual volumes and bound periodicals, the library has a total holding of more than 475,033. The library is also home to the University's Student Support Services, as well as Arts Center/Gallery, which traditionally features the works of critically acclaimed artists from the United States and abroad as well as art student and faculty exhibitions.

**Loockerman Hall**, built circa 1720, is often referred to as "the birthplace of Delaware State University." It is the only building from the institution's inaugural 1891 year that still exists. Though it has undergone a massive renovation, its architectural integrity has been preserved. It is listed on the National Register of Historic Places.

**Martin Luther King, Jr. Student Center**, a three-story structure completed in 2010, is the home for the Student Government Association; *The DSU Hornet* (student newspaper); the Office of Career Services; the Copy Center, which serves the printing needs of the University; and the University Bookstore. Extramural activities for students are also held in the facility. The offices for the Vice President of Student Affairs, Career Services, Student Leadership and Activities and Judicial Affairs are also located in the building.

**Memorial Hall Complex** houses the Department of Sport Management, Physical Education Program, Office of Sports Medicine, and Varsity Strength & Conditioning Center, as well as the intercollegiate sport gymnasium.

**Luna I. Mishoe Science Center** houses offices, classrooms and facilities for the departments of Biological Sciences, Chemistry, Computer & Information Sciences and Physics.

**John R. Price Building** houses the Office of the Dean of the Department of Education, Health and Public Policy. The departments of Public & Allied Health Sciences, Nursing and Social Work are also located in this facility.

**Maurice Thomasson Center** houses the Division of Adult and Continuing Education, Office of Alumni Relations, Assessment Office, Office of Testing and Office of Title III.

**Ulysses S. Washington Cooperative Extension Center** houses the University's Cooperative Extension outreach programs that include youth development, family life education, community resource development and agriculture education. The Center is also the home of the Herbarium, which houses the most extensive collection of plants that is indigenous to the Delmarva Peninsula.

**Wellness & Recreation Center** is a 54,000-square-foot structure completed in 2009 that includes dual basketball courts with seating areas and men and women's locker rooms on the first floor. The second floor has a variety of Life Fitness weight machines and free weights as well as a running track that winds around the exercise areas and overlooks the basketball courts on the floor below. The facility also has a

swimming pool and sections for aerobic and other fitness classes.

**THE BOARD OF TRUSTEES  
OF DELAWARE STATE UNIVERSITY**

**MEMBERS APPOINTED BY THE GOVERNOR**

**EXPIRATION DATE**

Dr. Matthew Mackie	New Castle County	January 4, 2012
Mr. David G. Turner	New Castle County	January 4, 2012
Mr. Bennie L. Smith	Kent County	August 25, 2012
Dr. Calvin T. Wilson, II	Kent County	August 25, 2012
Leroy A. Tice, Esq.	New Castle County	October 17, 2014
Dr. Claibourne D. Smith	New Castle County	February 18, 2016
Mr. Wesley E. Perkins	Sussex County	September 1, 2016
Ms. Lois M. Hobbs	Sussex County	January 11, 2017

**MEMBERS APPOINTED BY THE BOARD**

Dr. A. Richard Barros, Esq.	Sussex County	August 31, 2012
Mr. José F. Echeverri, MBA	Kent County	August 31, 2012
Charles McDowell, Esq.	New Castle County	August 31, 2012
Mr. Barry M. Granger	New Castle County	August 31, 2014
Robert E. Buccini	New Castle County	August 31, 2016
Mr. James Stewart	New Castle County	August 31, 2016

**EX-OFFICIO**

The Honorable Jack A. Markell  
Governor of the State of Delaware

Dr. Harry L. Williams, president  
Delaware State University

**SCHOOL OF GRADUATE STUDIES AND RESEARCH  
ACADEMIC CALENDAR 2011 – 2012**

**Fall 2011 Semester**

**April 29 (Friday)**

Preferred date to receive completed application for graduate admission for the fall semester (International)

**June 1 (Wednesday)**

Preferred date to receive completed application for graduate admission for the fall semester (Domestic)

**September 6 (Tuesday)**

Last day to add classes

**September 7 (Wednesday)**

Last day for graduate students to file Committee and Candidacy forms to School of Graduate Studies and Research for December 2011 graduation

**September 14 (Wednesday)**

Deadline for Filing Applications & Audits for December 2011 graduation

**October 21 (Friday)**

Last day to schedule thesis or dissertation defense with School of Graduate Studies and Research for December 2011 graduation

**November 21 (Monday)**

Last day to complete thesis or dissertation defense for December 2011 graduation

**November 29 (Tuesday)**

Last day to file initial review copies of thesis or dissertations with School of Graduate Studies and Research for December 2011 graduation (Standard white, 8½ x11 inch, 20-lb. bond paper is satisfactory for initial review)

**December 9 (Friday)**

Last day to file final copies of thesis or dissertations with School of Graduate Studies and Research for December 2011 graduation

**December 16 (Friday)**

Last day to submit thesis or dissertation to the library for binding for December 2011 graduation

## Spring 2012 Semester

**September 30 (Friday)**

Preferred date to receive completed application for graduate admission for spring (International)

**November 1 (Tuesday)**

Preferred date to receive completed application for graduate admission for spring (Domestic)

**January 6 (Friday)**

Purge Date (as set by Records)

**January 10 (Tuesday)**

Last day to satisfy conditions of summer and fall 2011 provisional admission

**January 13 (Friday)**

Last day for graduate students to file Committee and Candidacy forms to School of Graduate Studies and Research for May 2012 graduation

**January 17 (Tuesday)**

Last day to add classes

**February 1 (Wednesday)**

Deadline for Filing Applications & Audits for May 2012 graduation

**March 16 (Friday)**

Last day to schedule thesis or dissertation defense with School of Graduate Studies and Research for May 2012 graduation

**April 10 (Tuesday)**

Last day to complete thesis or dissertation defense for May 2012 graduation

**April 17 (Tuesday)**

Last day to file initial review copies of thesis or dissertations with School of Graduate Studies and Research for May 2012 graduation (Standard white, 8½ x 11 inch, 20-lb. bond paper is satisfactory for initial review)

**April 27 (Friday)**

Last day to file final copies of thesis or dissertations with School of Graduate Studies and Research for May 2012 graduation

**May 4 (Friday)**

Last day to submit thesis or dissertation to the library for binding for May 2012 graduation

### **Summer 2012 Session I**

**May 11 (Friday)**

Last day to satisfy conditions of Spring 2012 provisional admission

**May 21 (Monday)**

Last day for Graduate Students to file Committee and Candidacy forms to School of Graduate Studies and Research for August 2012 graduation

**June 1 (Friday)**

Deadline for Filing Applications & Audits for August 2012 graduation

**June 8 (Friday)**

Last day to schedule thesis or dissertation defense with School of Graduate Studies and Research for August 2012 graduation

### **Summer 2012 Session II**

**July 11 (Wednesday)**

Last day to complete thesis or dissertation defense for August 2012 graduation

**July 23 (Monday)**

Last day to file initial review copies of thesis or dissertations with School of Graduate Studies and Research for August 2012 graduation (Standard white, 8½ x11 inch, 20-lb. bond paper is satisfactory for initial review)

**August 6 (Monday)**

Last day to file final copies of thesis or dissertations with School of Graduate Studies and Research for August 2012 graduation

**August 13 (Monday)**

Last day to submit thesis or dissertation to the library for binding for May 2012 graduation

## **SCHOOL OF GRADUATE STUDIES AND RESEARCH MISSION STATEMENT**

The mission of the School of Graduate Studies and Research is to provide the environment for high quality graduate education by invigorating, stimulating and supporting intellectual and professional development of students and faculty, which is consistent with the University's mission. The graduate programs offered by Delaware State University are designed to serve the needs of individuals who wish to pursue scholarship and career development beyond the baccalaureate degree.

The goals of the graduate programs are:

1. To provide advanced study in certain academic disciplines.
2. To promote inquiry that contributes toward the solution of social, economic, and educational problems and issues.

### **Vision for Graduate Education**

The Graduate School envisions in the 21<sup>st</sup> century that graduate education will accommodate more part-time students, more working adults, more minorities, more women, and more individuals who will not fit the traditional model of full-time, residential students. There will be more demand for off-campus programs, programs addressing the needs of specific clientele and courses via the Internet. The Graduate School also envisions offering additional academic programs at the master's level and the addition of doctoral programs.

### **The Graduate Council**

The basic standards for all graduate programs are determined by the Graduate Council, chaired by the Dean of the School of Graduate Studies and Research. The council is composed of the Dean of Graduate Studies, Research and Continuing Education, Academic Deans, the Director of Libraries, the Registrar, the Chairpersons of departments offering degree programs, Directors of graduate programs, four faculty members not affiliated with graduate programs, a student representative from each graduate area, and Chairperson of the Faculty Senate, the Academic Affairs Committee, and Faculty Affairs Committee.

**THE GRADUATE DEGREE PROGRAMS OF  
DELAWARE STATE UNIVERSITY**

**College of Agriculture & Related Sciences**

**Department of Agriculture**

M.S. in Agriculture  
    Concentration in Plant Science  
    Concentration in Animal Science  
M.S. in Natural Resources

**Department of Human Ecology**

M.S. in Family and Consumer Science Education  
M.S. in Food Science

**College of Arts, Humanities & Social Sciences**

**Department of Art**

M.S. in Art Education

**Department of English and Foreign Languages**

M.A. in TESL (Teaching English as a Second Language)

**Department of History, Philosophy & Political Science**

M.A. in Historic Preservation

**College of Business**

**Department of Management**

M.A. in Business Administration  
    Concentration in Finance  
    Concentration in Information Systems  
    Concentration in Project Management

**Department of Sport Management**

M.S. in Sport Administration

**Department of Education, Health & Public Policy**

**Department of Education**

Ed.D. in Educational Leadership  
M.A. in Education  
    Concentration in Adult Literacy & Basic Education  
    Concentration in Curriculum & Instruction  
    Concentration in Special Education  
M.A. in Educational Leadership  
M.A. in Science Education  
M.A. in Teaching (M.A.T)

**Department of Nursing**

M.S. in Nursing

**Department of Social Work**

M.S. in Social Work

**College of Mathematics, Natural Sciences & Technology**

**Department of Biological Sciences**

M.S. in Biological Sciences  
M.A. in Biological Sciences  
M.S. Biology Education  
M.S. in Molecular & Cellular Neuroscience  
Ph.D. in Neuroscience

**Department of Chemistry**

M.S. in Applied Chemistry  
Ph.D. in Applied Chemistry

**Department of Computer and Information Sciences**

M.S. in Computer Sciences

**Department of Mathematics**

Ph.D. in Interdisciplinary Applied Mathematics & Mathematical Physics  
    Concentration in Applied Mathematics  
    Concentration in Mathematical Physics  
M.S. in Mathematics  
    Concentration in Applied Mathematics  
    Concentration in Pure Mathematics  
M.S. in Mathematics Education

**Department of Physics**

M.S. in Applied Optics  
Ph.D. in Optics  
M.S. in Physics  
M.S. in Physics Teaching

## **POLICIES OF THE GRADUATE SCHOOL**

### **APPLICATION, ADMISSION POLICIES, DEADLINES, AND PROCEDURES**

#### **Eligibility**

For admission to graduate study, applicants must show evidence that they have earned the baccalaureate degree at an accredited college or university and possess the ability to carry out graduate work of high quality. An official transcript of all previous undergraduate and graduate work must be submitted. Applicants for degree status should have a minimum cumulative undergraduate grade point average of 2.50 (on a 4-point scale) and a scholastic average of 3.00 in their undergraduate major. They should have successfully completed specific courses at the undergraduate level in the field in which they plan to pursue a graduate degree and a minimum number of courses in a designated area approved by the specific department. For all graduate programs, official scores on the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), or the Miller Analogies Test (MAT), or other specified examinations as specifically defined by the individual department or program are required. Test scores are valid up to five (5) years from test dates. Individual departments and doctoral programs may have more rigorous standards. Applicants who have not taken the required test(s) can be admitted provisionally, but must satisfy this requirement during the first semester of graduate study in order to continue.

#### **International Students**

Non-English speaking international students applying for admission to graduate study must demonstrate a satisfactory level of proficiency in the English language. The proficiency requirement may be satisfied by meeting the criteria in any one (1) of the following categories:

1. Foreign applicants who hold the baccalaureate degree from a regionally accredited college or university within the United States are presumed to be proficient in the English language.
2. Foreign applicants who hold the baccalaureate degree or its equivalent from a foreign institution in which English is the language of instruction are presumed to be proficient in English.
3. Foreign applicants who do not meet the requirements outlined in 1 and 2 above must take the Test of English as a Foreign Language (TOEFL). Applicants should attain a score of at least 550 on the TOEFL.
4. All applicants must show evidence of medical insurance prior to admission.

Prior to acceptance, international students must place an Affidavit of Support Form on file with the Director of the Office of International Studies

#### **Application Procedures**

Application for admission to all graduate studies programs should be made to: Graduate Program, Office of Admissions, Delaware State University, EDUC00 North DuPont Highway, Dover, Delaware 19901-2277. The forms can also be obtained in the graduate student section at [www.desu.edu](http://www.desu.edu). Application procedures, supporting credentials, and requirements vary among the graduate programs. Prospective graduate students should contact their respective departments for additional requirements. A non-refundable application fee must accompany all applications submitted.

Degree-seeking applicants must submit a completed application package that includes the application, the

application fee, three letters of recommendation by persons who are acquainted with their potential for graduate study in their discipline, the standardized examination scores, one (1) official transcript from each college or university attended, and a completed essay (if required). Prospective students must arrange for the official transcript(s) and standardized examination scores to be forwarded to the above address.

### **In-State Permanent Resident**

A student with an Alien Registration Receipt Card (“Green Card”) has been given permanent residence in the United States as an immigrant, refugee, or alien and, therefore, may enroll at any University location for full- or part-time study. Tuition costs are determined by location of residency. Verification of permanent residence status is required at the time of application. Any student without appropriate identification as a permanent resident of Delaware is required to pay out-of-state tuition and fees.

To apply as a student with permanent residency status, please be prepared to submit the following:

- An application for admission signed by the student;
- SAT or ACT scores;
- Sealed original transcripts from secondary and post secondary schools attended; and
- A notarized copy of permanent resident status; temporary evidence, or actual Alien Registration Receipt Card (Green Card).

To apply as a student with residency status in the State of Delaware, please be prepared to submit the following documents to be used as verification:

- A notarized copy of your Alien Registration Receipt Card (“Green Card”);
- If dependent, proof that your parents or guardian has maintained a continuous residence in the State of Delaware for a period of twelve (EDUC) full consecutive months (verified by a deed or lease and/or W-2 Tax Forms) immediately prior to the first day of classes in the semester or session for which Delaware residency status is claimed;
- If independent, proof that you have maintained continuous residence in the State of Delaware for a period of twelve (EDUC) full consecutive months (verified by deed or lease) immediately prior to the first day of classes in the semester or session for which Delaware resident status is claimed;
- **PLEASE NOTE:** The tax return showing proof that you (or whoever claimed you as a dependent) paid taxes to the State of Delaware for one full year.
- Independent out-of-state resident who has worked in the State of Delaware for at least twelve (EDUC) consecutive months (excluding work study) may qualify for in-state residence classification (verified by W-2 Tax Forms); and
- A Voter Registration Card.

### **International Students with a Student Visa**

Students who apply to come to the U.S. for the purpose of enrolling at Delaware State University may be issued a Form I-20 A-B Certificate of Eligibility for Nonimmigrant (F-1) Student by the University after submitting the following documents:

- An application for admission signed by the student;
- Sealed official transcripts from secondary and postsecondary schools attended;
- Sealed official Test of English as a Foreign Language (TOEFL) score no more than two (2) years old; and
- If necessary, an interview, attended by the student’s local sponsor (if applicable), with the Admissions Coordinator for Transfer and International Students.

## **Application for Student Visa**

The University issues an I-20 A-B Certificate of Eligibility form to students who qualify for admission. Students present this form with other documentation to a U.S. Consulate Office in the country where they are applying for a student (F-1) Visa. Final decision on admission into the U.S. and permitted length of stay is made by the U.S. Bureau of Citizenship and Immigration Services (BCIS).

## **F-1 Transfer Students**

Students with an F-1 Visa seeking to transfer to Delaware State University from another U.S. institution must submit the following documents and meet the following criteria:

- A copy of the I-20 from the previous institution;
- An International Student Transfer Form from the institution previously attended indicating that the student is in good standing and is “in-status” as an international student;
- An application for admission signed by the student;
- Sealed official transcripts from secondary and postsecondary schools attended;
- Sealed official Test of English as a Foreign Language (TOEFL) score no more than two (2) years old; and
- If necessary, an interview, attended by the student’s local sponsor (if applicable), with the Admissions Coordinator for Transfer and International Students. However, if English is the official language of your country of origin, SAT and/or ACT test scores are acceptable. Delaware State University requires an average SAT score of 1,200 or better (given all three parts), or an ACT composite score of seventeen (17) or better. The TOEFL score determines the student’s initial level of English proficiency. Students must submit a satisfactory score of a minimum of 550 on the paper-based test, 213 on the computer based test, or an 79-80 on the new international based TOEFL, or documentation (i.e., a transcript, certificate of completion of a program, etc.) of satisfactory completion of an intensive curriculum of English instruction. The University will also consider international applicants who have taken the General Education Development (GED) test. Applicants must submit a notarized copy of their GED certificate with their application and fee to be considered for admission.

## **Students with Other Types of Visas**

Prospective students with a temporary Visa status such as J or B (i.e., visitors, business, exchange, etc.) should contact the Office of International Affairs to have their applications approved before registering for classes. Nonimmigrant students, other than F-1 international student Visa holders, may take as many credit courses as their admission status permits, as long as the term begins and ends within the duration of stay indicated on the I-94 in their passport. These students are subject to the out-of-state tuition rates. Refunds will not be issued after the term’s scheduled drop dates.

## **Additional Overall Information**

- Students with F-1 Visas must enroll for a full-time course of study—a minimum of six (6) credits hours each term.
- Priority application deadlines:
  - April 1 for Fall (August) enrollment
  - November 1 for Spring (January) enrollment
- Information obtained in this process is strictly confidential and will not be disclosed unless required by law.

## **Applicant Classification Definitions**

***Delaware Resident*** - a student who is a resident of the State of Delaware or whose parent(s) are residents of the State of Delaware is considered a resident of the state. If a Delaware resident graduated from an out-of-state high school, proof of residency must be submitted in order to avoid out-of-state tuition.

Original (or notarized copies) of two (2) of the following items can be submitted to show proof of residency:

- A completed U.S. Tax Return from the previous year;
- A State of Delaware Driver's License or Identification Card;
- A State of Delaware Vehicle Registration Card; and
- A State of Delaware Voter Registration Card.

Applicants should indicate residency on their application for admission to the University. Applicants who are minors are considered to be resident applicants if their parent(s) or legal guardian(s) have been residents of Delaware for at least one year. Adult applicants (at least 24 years of age) are considered to be residents of Delaware if they have been residents of the state for at least one year prior to the date of their initial quest for admission to the University.

A student, who may have been admitted into the University at non-residency or out-of-state status, may apply for a change in residency status after being enrolled at the University for twelve (EDUC) consecutive months. A student seeking a change in residency status should complete a Request for Change of Residence Form and submit an original or notarized copy of two (2) of the following supporting documents to the Office of the Registrar:

- A completed U.S. Tax Return from the previous year;
- A State of Delaware Driver's License or Identification Card;
- A State of Delaware Vehicle Registration Card; and
- A State of Delaware Voter Registration Card.

**Note: The aforementioned does not apply to international students.**

***Non-Resident*** - a student who is not a resident, or whose parent(s) are not residents, of the State of Delaware.

***International*** - a student who is not a citizen or immigrant (permanent resident) of the United States of America. International students who are not U.S. citizens or immigrants should have a completed admission application on file three (3) months prior to the beginning of the term in which they intend to enroll.

### **Application Deadlines**

Applications will be accepted at any time. However, specific graduate programs may have specific admittance deadlines. Complete applications are reviewed and evaluated by the respective department, which recommends action to the Dean of Graduate Studies and Research. The Dean of Graduate Studies and Research provides official notification to the applicant regarding admission.

### **Retention of Applications**

The application and credentials of applicants, including transcripts of their academic records from other institutions, are placed in a student's admissions file. They are not returned to the student.

In cases where application materials are incomplete with respect to required credentials (including test scores), an applicant has not been accepted for admission, or an applicant does not register for the term to which she/he has been admitted, the application and its accompanying credentials will be retained for two (2) years by the University.

### **Classification**

Applicants for graduate degrees are considered for admission and, if admitted, classified in one (1) of three (3) categories: Unconditional Admission, Provisional Admission, and Non-Degree Admission. Successful applicants are notified of their classification at the time of admission.

**Unconditional Admission to graduate study requires:**

1. A bachelor's degree from a fully accredited four year college or university.
2. A minimum of 2.50 cumulative quality point average (GPA) on a 4.00 point system of grading (or the equivalent in another grading system).
3. An acceptable score on the specified standardized examination.
4. Completion of all undergraduate prerequisites for the selected graduate program.
5. Acceptance in the program selected for graduate study.

Requirements for unconditional admission to a doctoral program or certain graduate programs may be more rigorous.

**Provisional Admission includes:**

1. An applicant who has a limited number of deficiencies in undergraduate course prerequisites but who has attained a baccalaureate degree from a fully accredited four-year college or university. These deficiencies must be removed before enrollment in graduate courses of the same series.
2. A graduate of an accredited college or university who has a cumulative undergraduate GPA of 2.5 or higher, but who has not taken the specified standardized examination before admission. Applicants admitted to degree programs must take the specified standardized examination in the first semester and prior to admission to candidacy.
3. A graduate of an accredited college or university who presents a cumulative undergraduate grade point average of less than 2.50 at the time of application, along with specified standardized examination scores at an acceptable level as determined by the respective graduate program. To be considered for full admission, those students are required to take six (6) semester hours of graduate-level coursework specified by the Chairperson and/or Graduate Program Director and achieve a quality point average of 3.00 or above.

**Non-degree Admission:**

Is granted to those who wish to enroll in courses but who do not intend to qualify for a degree. The non-degree admission category includes those enrolling in graduate study for any of the following purposes:

1. To complete certification requirements;
2. To earn hours beyond the Master's degree;
3. To enrich their professional development; or
4. To transfer earned credits to a degree program at another institution.

If a student classified as non-degree is subsequently accepted into a Delaware State University graduate degree program, the student may petition to carry forward not more than nine (9) semester hours of credit earned as a non-degree seeking student. Approval/authority rests with the Chairperson and/or Graduate Program Director of the degree program.

**Submitting an Appeal Regarding Admission**

Appeals concerning denial of admission to a graduate program should be submitted as follows:

1. Graduate students should file, in writing, the appeal to the appropriate Chairperson or Graduate Program Director for resolution. The Chairperson or Graduate Program Director shall reply in writing to the student within ten (10) business days.
2. If the disposition is not favorable, graduate students may submit a final written appeal to the Dean of Graduate Studies and Research, accompanied by copies of the original appeal and the response. The Dean of Graduate Studies and Research shall provide the final decision in writing.

to the student and the Chairperson or Graduate Program Director within ten (10) business days.

### **Change of Status**

Provisionally admitted students and non-degree students may apply for a change of status upon satisfying all admission requirements. Application for change of status must be submitted to the respective Graduate Program Director, who recommends action to the Dean of Graduate Studies and Research, who notifies the student. Students who are not fully admitted are limited to taking no more than nine (9) credit hours of graduate courses toward a graduate degree.

### **Transfer of Credit**

Applicants who have earned a grade of “B” or higher in graduate courses taken at an accredited institution and related to their proposed program of study can request consideration for transfer credit. These courses will be evaluated on an individual basis by the respective Graduate Program. Applicants admitted to master's degree graduate programs may transfer a maximum of nine (9) graduate credits from another accredited institution toward the master's degree provided these credits have not been used to meet the requirements of a degree previously earned.

Transfer credits for applicants admitted to doctoral programs with an earned master's degree from an accredited institution will be evaluated on an individual basis by the department and approved by the Dean of the respective College. Supporting documentation must be provided by the student with the request for transfer of credit. The respective Graduate Program Director and Department Chairperson, and the Dean of Graduate Studies and Research must give written approval at the time of admission for the transfer credits.

The transfer credit must be directly related to the graduate student's program of study, and must have been completed within the time limit allowed by Delaware State University for the graduate degree sought by the applicant. Some graduate programs have special transfer of credit regulations. Students must check with their Graduate Program Director. Transfer of Credits must be made within one year of acceptance.

The transfer credit limit does not apply in the case of courses to be taken at another institution that are approved in advance by the respective Graduate Program Director or taken per an approved joint program that includes courses offered at other accredited institutions.

### **Readmission**

A break in continued pursuit (registered for one course minimum) of a degree extending past a full academic year (fall and spring) will invoke dismissal. Readmission will require a new application with application fee, unless specified by the graduate program.

## **ENROLLMENT POLICIES AND PROCEDURES**

### **Health Records**

The University requires that all graduate students file a personal health and immunization record with the Student Health Center at the time of first enrollment. Appropriate forms are sent directly to newly enrolled graduate students. Forms are also available at the Student Health Center.

### **Registration**

Graduate students register for courses at the time specified on the Academic Calendar. After the schedule is approved by the advisor, a student receives a pin number and is then allowed to web register. Course lists are published each semester by the Registrar's Office and are available for viewing at the student services web site at <http://www.desu.edu>.

All charges, such as tuition and applicable fees for the ensuing semester, must be paid at the time of registration, or arrangements made with the Office of Student Accounts, before registration is official.

Graduate students not officially registered for a course will not be permitted to attend the course and will not receive credit at the end of the semester.

Delaware State University regularly mails schedule/bills to students, but cannot assume responsibility for their receipt. If students do not receive a bill on or before the beginning of each semester, it is the students' responsibility to contact the Office of Student Accounts or to go on-line to obtain information relative to their bill.

### **Graduate Course Levels**

Courses which may apply towards a graduate program are numbered 500 and above.

### **Course Loads**

Full-time graduate enrollment is defined at DSU as a minimum of six (6) credit hours. Students enrolled in less than six (6) credit hours per semester are considered part-time students, with those enrolled for three (3) credit hours defined as half-time students.

### **Auditing Classes**

Courses may be taken for audit by graduate or non-degree students with the permission of the instructor and the student's advisor. No credits are earned for auditing courses. The deadline for designating a course as an Audit is at the end of the first week of each semester. A grade of "AU" is entered on the graduate student's record for the course. Graduate students are charged tuition for the credit hours.

### **Add/Drop**

Courses may be added or dropped online or by using a drop/add slip during the periods prescribed in the Academic Calendar. Courses dropped during the official drop/add period will not appear on the student's transcript.

From the end of the late registration period through the last day to drop courses, graduate students who wish to withdraw from a course must complete the drop/add form, consult with their advisor, and submit the form to the instructor for signature. The graduate student is then responsible for delivering the form to the Registrar's Office no later than 4:00 p.m. of the Last Day to Drop Courses (as prescribed in the Academic Calendar). The graduate student will be assigned a grade of "W" for the course by the Registrar's Office.

For courses offered on a schedule different from the regular fall, spring, and summer terms, the add period is the shorter of one week or the calendar equivalent of thirteen (13) percent of the instructional time. For such courses that meet only once per week, the add period ends on the day before the second meeting of the class. The last day to drop such a course is prior to completion of sixty (60) percent of the instructional time.

To add or drop a course, the student must complete a “Notice of Class Change” form, and submit it to the Records office, signed by the student, the student’s advisor, and the instructor of the course. The department Chairperson may sign on behalf of the instructor, if the instructor is not available. To add a course after the late registration fee requires in addition the signature of the Dean of Graduate Studies and Research or designee.

### **Withdrawal from Courses or University**

After the last day to drop courses, withdrawal from a course requires a graduate student to obtain the advisor’s approval and then to petition the Dean of Graduate Studies and Research, explaining that they are interested in withdrawing from the course due to extenuating circumstances beyond their control. Such a petition must contain conclusive evidence, properly documented, of the situation that prevents completion of the course. Acceptable reasons do not include dissatisfaction with performance in a course, with instruction, or with an expected grade. If the petition is approved, the graduate student will receive a grade of “WA” (Administrative Withdrawal) in the course.

A graduate student who wishes to withdraw from all courses or the graduate program must obtain and complete a Withdrawal Form for Graduate Students from the Registrar’s Office. Withdrawal is complete when all necessary signatures have been obtained and the form has been received in and processed by the Registrar’s Office. A student who withdraws from the University will receive a grade of “W” in each course enrolled that term. All withdrawals must be completed on or before the last day to withdraw from the University as indicated on the Academic Calendar for the term.

For graduate courses offered on a schedule different from the standard academic terms, the last day to withdraw from a course is prior to completion of sixty (60) percent of the instructional time. The last day to withdraw from the University is prior to the final week of the student’s classes.

To re-enter the graduate program after withdrawing from the University a graduate student must reapply for admission.

### **Administrative Withdrawal from the University**

A student with a compelling reason (such as documented extreme personal difficulty or documented medical reason) may request to be administratively withdrawn from the University for a previous term. Administrative withdrawal is rarely granted, but it may be warranted in some circumstances. Only the Provost and Vice President for Academic Affairs may authorize such withdrawal, and the following procedure must be followed.

1. The student must submit a written request for administrative withdrawal from the University, to the Dean of Graduate Studies and Research. The request must state the compelling reason, specify the term to be withdrawn, and be accompanied by documentation of the validity of the reason.
2. The Dean of Graduate Studies and Research reviews the request and submits his or her recommendation in writing to the Provost and Vice President for Academic Affairs, along with the request and documentation from the student.

3. If the Provost and Vice President for Academic Affairs approves the request, the student is reported to the Registrar's Office as "Administratively Withdrawn," and a grade of "WA" is assigned for all courses taken during that semester. The Provost and Vice President for Academic Affairs also inform the student in writing of the decision.

The student must reapply, in order to reenter the graduate program for a subsequent term.

### **Grading Policies**

Graduate students are issued grades at the end of each term. For each course in which the graduate student was enrolled, either a letter grade or a symbol will be entered on the graduate student's academic record. Only courses completed with a grade of "A," "B," or "C" can be used toward fulfilling the graduation requirements for a graduate degree.

The following letter designations are used to indicate the quality of achievement in a graduate course:

#### Quality of Achievement

Grade	Interpretation	Points
A	Excellent	4.0
B	Good	3.0
C	Fair	2.0
D	Poor	1.0
F	Failure	0.0
WF	Withdrawal/Fail	0.0

#### Symbols

I	Incomplete
Q*	Thesis/Dissertation in progress, proceeding satisfactorily but Incomplete
W	Withdrawn
AU	Audit
S/U	Satisfactory/Unsatisfactory (Field Experience)
WA	Administrative Withdrawal

\*A grade of "Q" is to be used when thesis or dissertation research is in progress and proceeding satisfactorily. If the thesis or dissertation is not proceeding satisfactorily, a "U" grade is given. The "Q" grade can be used for several semesters. At the time the thesis or dissertation is presented, defended, and graded, the thesis/dissertation advisor will submit the appropriate quality grade (A, B, C, D, F, S, or U) for the final term, and use grade change forms to convert a sufficient number of prior to the final grade that the number of graded thesis/dissertation credits is equal to the number required for the degree.

An "I" will automatically convert to an "F" if not removed within the first six (6) weeks of the following term. An Incomplete Documentation Form must be submitted by the course instructor to the respective Graduate Program Director.

### **Academic Probation**

Graduate students who receive a grade of "U" in a graduate course or thesis/dissertation or do not achieve a cumulative grade point average of 3.0 or greater at the end of their second semester are placed on academic probation for the following term.

## **Dismissal**

Any of the following situations will result in the academic dismissal of a graduate student working toward a graduate degree:

1. Receiving a grade of “D” or “F” in a graduate course;
2. Failure to achieve a term grade point average of 3.0 or greater while on academic probation;
3. Being placed on academic probation for more than two (2) terms; or
4. Receiving three (3) grades of “C”.

## **Veterans in Continuing Education Programs**

All eligible persons desiring to receive educational assistance through the Veterans Administration are required to apply for admission to the University as a degree candidate.

## **Change of Major or Personal Data**

Changes in major and personal data (address or telephone number) must be submitted to the Office of Records and Registration on the appropriate forms. Graduate students changing to a different program must be accepted by the new program.

## **Automobile Registration and Parking Regulations**

Graduate students must register their vehicles with the University Police Department in order to park on the Dover campus. Official car registration, proof of insurance, and the appropriate parking fee are required at the time of registration. Graduate students will receive a parking decal that must be displayed on their vehicle as directed at all times to avoid being towed or ticketed.

## **GRADUATE ACADEMIC POLICIES AND REGULATIONS**

### **Academic Advisement**

Students accepted into a graduate program are assigned a faculty advisor by their Graduate Program Director. Graduate students should consult with their advisor in selection of courses, degree requirements, and related matters.

### **Admission to Candidacy**

For a Master's degree student, official admission to the graduate program constitutes admission to candidacy, unless the specific program has additional requirements. No graduate student will be allowed to register for a master's level course after completion of fifteen (15) hours at Delaware State University unless he/she has been admitted to the program and to candidacy.

Each doctoral program is required to state clearly and to communicate to its students the requirements for candidacy. Students in doctoral programs must apply for candidacy after they have completed the program's core required coursework with an average of "B" or higher, and have successfully passed the qualifying examination. A program may use an alternative assessment process comparable to the qualifying examination and appropriate to the discipline to allow the student to demonstrate the content knowledge and other skills deemed to be essential prerequisites for entering the dissertation phase.

Applications for admission to candidacy must be submitted for approval prior to the dissertation phase, and in no cases later than two (2) semesters prior to graduation. Admission to doctoral candidacy must be approved by the respective Graduate Program Director and by the Dean of Graduate Studies and Research. It is the responsibility of the graduate student to become familiar with the policies and procedures governing admission to candidacy in his/her degree program.

### **Degree Requirements and Application for Graduation**

In order to earn a master's or a doctorate degree, graduate students must satisfy all of the institutional requirements as well as the specified requirements of the program in which they are enrolled. At a minimum to earn a Master's degree, a student must have earned at least thirty (30) graduate credits, of which no more than six (6) may be thesis, internship, or other special project. At a minimum to earn a doctoral degree, a student must have earned at least sixty (60) graduate credits (including those previously applied toward a Master's degree and accepted as part of the doctoral curriculum), of which not more than twelve (12) may be for the dissertation. Students may take additional thesis or dissertation credits, as needed, for the duration of their project. In no cases may additional thesis/dissertation credits be substituted for core or elective courses in determining qualification for the degree.

To earn a graduate degree, the graduate student must have a cumulative grade point average of 3.0 or higher (on a 4.0 scale) for all work taken on the graduate level.

Graduate students who expect to graduate in May must file an Application for Graduation with the Office of Records and Registration and the Dean of Graduate Studies and Research by February 1 of that year.

### **Participation in Graduation Exercises**

Graduate students may participate in the annual graduation exercises in May only if the following conditions are met:

1. File the application for graduation by February 1.
2. Enroll in all courses required to complete degree requirements.

3. Successfully complete those courses of current enrollment and satisfy all degree program requirements.
4. Submit any required thesis or dissertation to the library for binding not later than the last day of the Final examination period.
5. Satisfy all financial obligations to the University.

Graduate degree recipients interested in participating in Commencement ceremonies must submit the Application for Graduation according to the procedures and deadlines in place, even if they completed the requirements the previous August or December.

### **Submitting an Appeal**

Appeals concerning reevaluation of a final course grade should be submitted as follows:

1. Graduate students should file, in writing, the complaint or appeal to the appropriate Graduate Program Director for resolution. The Graduate Program Director shall reply to the student within ten (10) business days;
2. If the disposition is not favorable, the graduate student may appeal to the respective College Dean, by submitting the previous appeal documents, the Graduate Program Director's response, and any additional relevant information. The Dean shall reply to the student within ten (10) business days.
3. If the disposition is not favorable, the final appeal may be brought in writing to the Dean of Graduate Studies and Research. All prior documents plus additional information must be submitted. The Dean of Graduate Studies and Research shall reply to the student within ten (10) business days.

Appeals concerning reinstatement from dismissal from a graduate program must be submitted to the Dean of Graduate Studies and Research. The appeal must be in writing, include documented support from the Graduate Program Director and College Dean, and provide an explanation from the student describing how he/she will complete the degree program successfully, if reinstated.

### **Thesis**

A master's degree student, who elects or is required to complete a thesis, must have a Thesis Committee established no later than the end of the second semester of full-time residency. The Committee shall consist of a minimum of four (4) members equivalent to the rank of Assistant Professor or above, at least one of whom shall be from outside the department. External member are prohibited from serving as chair.

A graduate student initiating a thesis project should select a topic in consultation with the Research Advisor and the Graduate Program Director. The graduate student must file for and receive approval from the Thesis Committee during the semester prior to beginning work on the thesis. At a minimum this request will require the student to submit a brief written thesis proposal to the Committee for its approval. Graduate Programs may have additional requirements, including but not limited to oral presentation of the project proposal.

Due to the nature of research and creative work at the graduate level, it is expected that the thesis project may evolve in unanticipated ways. Graduate students are strongly advised to consult frequently with their Research Advisor and to keep their thesis committee members apprised of progress. In the event that the student and the Advisor decide to make substantive changes in the project's goals, aims, or scope, a revised thesis proposal should be submitted, reviewed, and approved in the same manner as the original one was.

The application for approval of the Thesis Committee membership is available in the Department Office, from the Graduate Program Director, and from the Office of Graduate Studies. The style manual to be used in writing the thesis will be designated by the respective department. Certain mandatory formatting requirements are described in the Delaware State University Thesis Handbook, available at [www.desu.edu](http://www.desu.edu), from the Graduate Program Director, and from the Office of Graduate Studies.

A graduate student preparing a thesis or dissertation must present and satisfactorily defend the thesis in an oral presentation and examination by the Thesis Committee during the student's final semester. The thesis defense has four (4) components: 1.) presentation of the work by the student; 2.) defense of the thesis by the student through questioning in an open session by the Committee members and others in attendance and, if requested by the Committee, at a closed session for the Committee and the student only; 3.) discussion by the Committee in a closed session to determine whether or not the thesis, including its defense, is satisfactory; and 4.) communication to the student by the Committee chairperson the outcome of the defense.

The Committee has five (5) alternatives: 1.) to accept the thesis without any recommended changes, and for all members to sign the approval page; 2.) to accept the thesis, subject to the student making the recommended changes, with all Committee members, except the chairperson signing the approval page, and the chairperson responsible for checking the revised thesis to ensure the changes were made, and signing approval at that time; 3.) to recommend revision to the thesis, but not to sign until the revised thesis has been submitted to and reviewed and approved by the Committee members; 4.) to recommend revision of the thesis and a second meeting of the Committee with the student to review the thesis and complete the defense; or 5.) to determine the thesis, including its defense, to be unsatisfactory, and therefore the student fails. The Committee chairperson will communicate the decision to the student and except for alternatives (1) and (5) the expected time period for completing the revisions and process.

The thesis defense should be scheduled at least three (3) weeks in advance, and it must be announced publically to the University community, so that interested persons can attend the presentation portion. All members of the Committee shall be given a copy of the final draft of the thesis at least one week (7 days) prior to the examination for master's theses. Defense will be conducted with a maximum of two presentations, one, open to the general public and one, closed session. Number of question(s) will be determined by the Program Director

Graduate students must have the thesis completed, defended, approved, and submitted to the library for binding prior to the date grades are due for the term. Students whose final signed theses/dissertations are not submitted to the library before the spring semester grades are due will not be eligible to participate in the May Commencement ceremonies. For further information relative to the thesis, a copy of the Thesis Handbook may be requested from the Office of Graduate Studies.

The thesis and all related procedures must be completed by April 15 for those planning to graduate at the conclusion of the spring semester. The finished thesis, which includes changes resulting from the oral examination along with a completed approval form, must comply with criteria described in the Thesis Handbook. The University Library will bind the required bound copies of the Thesis at the student's expense. Once completed, the student will distribute the thesis as follows:

1. One bound original to the Department.
2. One bound copy to the University Library.
3. One bound copy to the Dean of Graduate Studies and Research.
4. One copy to each committee member (binding not required).
5. One copy to the student (binding not required).

A graduate student who requires more than one (1) semester to complete the thesis will receive the symbol “Q” (Thesis incomplete) for each semester in which progress is satisfactory, until the thesis/dissertation is satisfactorily completed. A graduate student who has previously registered for thesis and completed all course and research requirements may choose not to register for, or work on the thesis but must pay the current Sustaining Fee (all other fees waived) for each semester until the degree is completed. Semesters not registered will count toward the time limit allotted to complete the degree. The Graduate Program Director and Dean of Graduate Studies and Research must approve all registrations for the Sustaining Thesis beyond one (1) semester.

## **Dissertation**

A doctoral degree student must have a Dissertation Committee established not later than the end of the third semester of full-time residency and before his or her dissertation project begins. For a doctoral dissertation, the Committee will be augmented by an additional expert member from outside the University at the time of dissertation defense. The Committee shall consist of five (5) members equivalent to the rank of Assistant Professor or above, at least one of whom shall be from outside the department. External member are prohibited from serving as chair. The Committee membership must be approved by the Research Advisor, Graduate Program Director, College Dean, and Dean of Graduate Studies and Research.

A graduate student initiating a dissertation project should select a topic in consultation with the Research Advisor and the Graduate Program Director. The graduate student must file for and receive approval from the Dissertation Committee during the semester prior to beginning work on the dissertation. At a minimum this request will require the student to submit a brief written dissertation proposal to the Committee for its approval. Graduate programs may have additional requirements, including but not limited to oral presentation of the project proposal.

Due to the nature of research and creative work at the graduate level, it is expected that the dissertation project may evolve in unanticipated ways. Graduate students are strongly advised to consult frequently with their Research Advisor and to keep their dissertation committee members apprised of progress. In the event that the student and the Advisor decide to make substantive changes in the project’s goals, aims, or scope, a revised dissertation proposal should be submitted, reviewed, and approved in the same manner as the original one was.

The application for approval of the Dissertation Committee membership is available in the Department Office, from the Graduate Program Director, and from the Office of Graduate Studies. The style manual to be used in writing the thesis will be designated by the respective department. Certain mandatory formatting requirements are described in the Delaware State University Dissertation Handbook, available at [www.desu.edu](http://www.desu.edu), from the Graduate Program Director, and from the Office of Graduate Studies.

A graduate student preparing a thesis or dissertation must present and satisfactorily defend the thesis in an oral presentation and examination by the Dissertation Committee during the student’s final semester. The Dissertation defense has four (4) components: 1.) presentation of the work by the student; 2.) defense of the dissertation by the student through questioning in an open session by the Committee members and others in attendance and, if requested by the Committee, at a closed session for the Committee and the student only; 3.) discussion by the Committee in a closed session to determine whether or not the Dissertation, including its defense, is satisfactory; and 4.) communication to the student by the Committee chairperson the outcome of the defense.

The Committee has five (5) alternatives: 1.) to accept the dissertation without any recommended changes, and for all members to sign the approval page; 2.) to accept the dissertation, subject to the student making the recommended changes, with all Committee members, except the chairperson signing

the approval page, and the chairperson responsible for checking the revised thesis to ensure the changes were made, and signing approval at that time; 3.) to recommend revision to the dissertation, but not to sign until the revised dissertation has been submitted to and reviewed and approved by the Committee members; 4.) to recommend revision of the dissertation and a second meeting of the Committee with the student to review the dissertation and complete the defense; or 5.) to determine the dissertation, including its defense, to be unsatisfactory, and therefore the student fails. The Committee chairperson will communicate the decision to the student and except for alternatives (1) and (5) the expected time period for completing the revisions and process.

The Dissertation defense should be scheduled at least three (3) weeks in advance, and it must be announced publically to the University community, so that interested persons can attend the presentation portion. All members of the Committee shall be given a copy of the final draft of the dissertation three weeks (21 days) prior to the examination for a doctoral dissertation. Defense will be conducted with a maximum of two presentations, one, open to the general public and one, closed session. Number of question(s) will be determined by the Program Director

Graduate students must have the dissertation completed, defended, approved, and submitted to the library for binding prior to the date grades are due for the term. Students whose final signed dissertations are not submitted to the library before the spring semester grades are due will not be eligible to participate in the May Commencement ceremonies. For further information relative to the dissertation, a copy of the Dissertation Handbook may be requested from the Office of Graduate Studies.

The dissertation and all related procedures must be completed by April 15 for those planning to graduate at the conclusion of the spring semester. The finished dissertation, which includes changes resulting from the oral examination along with a completed approval form, must comply with criteria described in the Dissertation Handbook. The University Library will bind the required bound copies of the Dissertation at the student's expense. Once completed, the student will distribute the dissertation as follows:

1. One bound original to the Department.
2. One bound copy to the University Library.
3. One bound copy to the Dean of Graduate Studies and Research.
4. One copy to each committee member (binding not required).
5. One copy to the student (binding not required).

A graduate student who requires more than one (1) semester to complete the dissertation will receive the symbol "Q" (dissertation incomplete) for each semester in which progress is satisfactory, until the thesis/dissertation is satisfactorily completed. A graduate student who has previously registered for thesis/dissertation and completed all course and research requirements may choose not to register for, or work on the dissertation, but must pay the current Sustaining Fee (all other fees waived) for each semester until the degree is completed. Semesters not registered will count toward the time limit allotted to complete the degree. The Graduate Program Director and Dean of Graduate Studies and Research must approve all registrations for the Sustaining Dissertation beyond one (1) semester.

### **Change of Program**

If an admitted student wishes to change to a different program offered at DSU, a request must be made by the student, in writing, to the Graduate Program Director of the different program. Upon receipt of the request, the student's file will be forwarded to the Chairperson of the desired program for review. If both the Chairperson of the desired program and the respective Dean of Graduate Studies and Research approve, the formal transfer of program will be made in the respective Graduate Studies Offices with notification to the former program Chairperson, new program Chairperson, the student, and the Registrar. The time limit for completion of the degree runs from the date of acceptance into the new program, with

credit brought in subject to the appropriate transfer limitation.

## **Time Limitation**

For full-time students a maximum of five (5) years is permitted to complete Master's degree requirements and a maximum of seven (7) years is permitted to complete Doctoral degree requirements. For part-time and under extenuating circumstances, these time limitations can be extended.

## **Summer Sessions**

Some graduate programs offer courses during the summer sessions for graduate students who wish to accelerate their degree programs.

## **Notification of FERPA**

The Family Educational Rights and Privacy Act (FERPA) provides graduate students with certain rights with respect to their education records. They are:

1. The right to inspect and review the graduate student's education records within forty-five (45) days of the day the University receives a request for access. Graduate students should submit to the Registrar, respective Dean, head of the academic department, or other appropriate official, written requests that identify the record(s) they wish to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the graduate student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the graduate student's education records that the graduate student believes to be inaccurate or misleading. Graduate students may ask the University to amend a record that they believe is inaccurate or misleading. They should write the University official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the University decides not to amend the record as requested by the graduate student, the University will notify the graduate student of the decision and advise the graduate student of his or her right to a hearing. Procedures will be provided to the graduate student when notified of the right to a hearing.
3. The right to consent to disclosures of personally identifiable information contained in the graduate student's education records, except to the extent that FERPA authorizes disclosure without consent. One (1) exception which permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the University has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, or assisting another school official performing his or her tasks. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility. Upon request, the University discloses education records without consent to officials of another school in which a student seeks or intends to enroll.
4. The right to file a complaint with the U.S. Department of Education concerning alleged failures by Delaware State University to comply with the requirements of FERPA. The name and address of the Office that administers FERPA is:

Family Policy Compliance Office  
U. S. Department of Education  
400 Maryland Avenue, SW  
Washington, D.C. 20202-4605

## **Directory Information**

The Family Educational Rights and Privacy Act permits the release of directory-type information to third parties outside the institution without written consent of the student provided the student has been given the opportunity to withhold such disclosure.

The University releases, upon inquiry to third parties outside the University, directory information without written consent of the student. Directory information at Delaware State University includes:

- Name
- Address (including e-mail address)
- Telephone number
- College/school
- Classification
- Major field of study
- Dates of attendance
- Enrollment status
- Honors
- Degree(s) conferred (including dates)

Graduate students who do not wish to have the above information released should fill out an information exclusion card at the Records Office.

## EDUCATIONAL AND LIVING EXPENSES

The tuition and fees listed here are for 2011-2012 only and are subject to change in future years by the action of the Board of Trustees.

### GRADUATE STUDENT FEES

#### Tuition

In-State	\$399.00 per credit hour
Out-of-State	\$880.00 per credit hour
Doctoral candidates	\$505.00 per credit hour

#### Other Fees

Application Fee	\$ 50.00
Technology Fee* (per term)	\$ 55.00
Registration Fee (per term)	\$ 60.00
FT Grad Activity Fee	\$ 60.00
Late Registration Fee (per term)	\$ 50.00
Failure to Pre-Register Fee (per term)	\$ 50.00
PT Grad Activity Fee	\$ 30.00
Sustaining Fee** (per term)	\$ 25.00
Graduation Fee	\$175.00
Wellness Fee*** (pro-rated)	\$200.00

\* Entitles full-time students to the same benefits as undergraduate students; this has nothing to do with insurance; entitles part-time students to receive a card for use of the library.

\*\* Charged to graduate students who have completed all coursework for the master's degree except the thesis. All students in this category must register in sustaining status.

\*\*\* Amount varies based on membership obtained through the Wellness Center.

## **Applicant Classification Definitions**

### **Delaware Resident**

A student who is a resident of the state of Delaware or whose parent(s) are residents of the state of Delaware is considered a resident of the state. If a Delaware resident graduated from an out-of-state high school, proof of residency must be submitted in order to avoid out-of-state tuition. Original (or notarized copies) of two (2) of the following items can be submitted to show proof of residency:

- A completed U.S. Tax Return from the previous year
- A State of Delaware Driver's License or Identification Card
- A State of Delaware Vehicle Registration Card
- A State of Delaware Voter Registration Card

Applicants should indicate residency on their application for admission to the University. Applicants who are minors are considered to be resident applicants if their parent(s) or legal guardian(s) have been residents of Delaware for at least one (1) year. Adult applicants (at least 24 years of age) are considered to be residents of Delaware if they have been residents of the State for at least one (1) year prior to the date of their initial quest for admission to the University.

A student, who may have been admitted into the University at non-residency or out-of-state status, may apply for a change in residency status after being enrolled at the University for EDUC consecutive months. A student seeking a change in residency status should complete a Request for Change of Residence Form and submit an original or notarized copy of two (2) of the following supporting documents to the Office of the Registrar:

- A completed U.S. Tax Return from the previous year
- Lease or deed

Note: The aforementioned does not apply to international students.

### **Non-Resident**

A student who is not a resident of or whose parent(s) are not residents of the state of Delaware.

## **Housing and Living Expenses**

Matriculating graduate students are offered an exclusive housing opportunity with the University Courtyard Apartments located within a mile of the main campus. Students interested in residing there must contact the director of the complex directly at:

### **University Courtyard Apartments**

**Director**

**430 College Road**

**Dover, Delaware 19904**

Applications must be downloaded from our website [www.desu.edu](http://www.desu.edu), mailed with the \$400.00 deposit to:

**Delaware State University**

**Attn: Cashier's Office**

**1200 North DuPont Highway**

**Dover, DE 19901**

**Or faxed to (302) 857-6202**

Graduate students may participate in a variety of meal plans through the University provided by Thompson Hospitality. Students may use their plans at a number of locations around campus. The Office of Student Accounts has information about the various meal plans. You will have a EDUC-month contract. If you are paying out of pocket, please pay the cashier directly. If you receive financial aid, your rental charges will automatically be deducted.

## **Drop Fee**

To drop a course, students may obtain approval from their Advisor or Department Chair and go online and adjust their schedule or obtain a DROP/ADD form from the Department Chair. The form is to be turned in to the academic department through the late registration period and to the Registrar's Office thereafter, bearing the required signatures. Students may drop courses as indicated on the Academic Calendar. **A drop fee of \$10.00 per course** will be assessed after late registration. Students who **DROP** courses which results in a credit on their student account will receive a refund in accordance with University and Federal Regulations/policies. **Students requesting to drop classes after the last day to drop or add courses must obtain the signature of the Academic Dean as well as their Instructor and Advisor/Chair.**

The change in registration is effective on the date the form is submitted to the Office of Records and Registration.

## **Payment of Fees**

All tuition and fees must be paid by July 10 for the fall semester, December 10 for the spring term, and upon enrollment for the summer semester(s). Credits for scholarships, grants, and loans will only be considered when the awards have been approved by the Financial Aid Office in advance or at registration. Applications for financial aid should be completed at least four (4) months before registration each school year.

Payments may be made by VISA, MasterCard, Discover card, debit card (including MAC), certified/cashier's check, or money order payable to Delaware State University. Payments in cash must be made in person to the University Cashier's Office. **DO NOT SEND CASH IN THE MAIL.**

Certified/cashier's checks or money orders should be made payable and mailed to:

**Delaware State University  
Attn: Cashier  
1200 North DuPont Highway  
Dover, DE 19901**

All payments sent by mail should include the student's name and student's I.D. number. Checks drawn on out-of-state banks must be a cashier or certified check.

Correspondence or credit card payments should be mailed to:

**Delaware State University  
Attn: Cashier  
1200 N. DuPont Highway  
Dover, Delaware 19901-2277**

Make online payments in real-time using *QuikPAY*

- Go to [www.desu.edu](http://www.desu.edu)
- Click in the "Make a Payment" box.
- In the Login as Student section, enter Student ID and Pin.
- Click the link – Yes, continue to NelNet QuikPAY.
- Click on the Make Payment link on the left side of the page.
- Click on the Pay button to the right of the category for which you want to make a payment.
- Select the Term from the drop-down list, enter the Payment Amount, select the Payment Method, and click on the Continue button.
- Enter the requested information: credit card/bank information, billing address, and contact information, and click the Continue button.
- Follow the directions to complete the payment transaction.

All authorized third-party documentation such as Military Tuition Assistance, Vocational Rehabilitation, Veteran's Rehabilitation Assistance, Tuition Exchange, and other programs must be submitted and approved by the manager of the Office of Student Accounts.

Students are officially registered for courses only when they have complied with all of the procedures applying to registration, including full payment of tuition and fees, or satisfactory financial arrangements through the Office of Student Accounts, and the validation of the student I.D. cards.

### **Reinstatement Fee**

A fee that is charged to any student whose courses and/or room and board has been removed for non-payment for a specific semester. This fee must be paid before the student is allowed to register for the next semester (if not already pre-registered) or receive any University service.

### **Student Center Complex (Wellness) Fee**

A fee is charged to all undergraduate students. This fee allows the student to have access to the new Wellness and Recreation Center on campus.

### **Technology Fee**

A Technology fee is charged to all doctorate, graduate, and undergraduate students. This is for the support of campus computing labs and technological equipment.

### **Student Health Insurance**

All full-time registered students taking six (6) or more credit hours are automatically enrolled in a health insurance plan that covers sickness and injury.

Students must actively attend classes for at least the first thirty-one (31) days for coverage to be in effect. Contact Student Health Services at (302) 857-6393 for additional information on available services.

### **Laboratory Fees**

Laboratory fees are assessed for designated courses within the Departments listed below to cover the cost of supplies and special facilities. Labs may vary from \$10 to \$20,000. Departments assessing laboratory fees are: Agriculture and Natural Resources, Airway Science, Art, Biology, Chemistry, Computer & Information Sciences, Education & Sport Sciences, Family and Consumer Sciences, Foreign Language, Mathematics, Music, Physical Education, Physics, Nursing, Accounting and Finance, Business Education, Hospitality Management, and Mass Communications. **Airway Science Labs range from \$5,000 to \$20,000 per related course\***

Students are fully responsible for the use of laboratory equipment. Excessive breakage of equipment or items returned in an unacceptable condition will be charged to the student.

The University reserves the right to assess a special fee to cover the cost of using off-campus facilities when required in connection with any course offering.

*\*Additional fees will be paid to the Federal Aviation Association (FAA) Examiner for flight physicals, written examinations and all flight examinations.*

### **Deferred Payment Plan**

Delaware State University is pleased to offer you the Actively Managed Payment Plan (AMPP), administered by NelNet Business Solutions®. The AMPP plan is an interest-free alternative to paying each semester's (Fall, Spring, Summer I or Summer II) or yearly (Fall and Spring) tuition and expenses in full prior to the Fall term (payment due July 10 ), the Spring term (payment due December 10 ) or Summer sessions (payment due one week before the first day of class or upon enrollment).

**Enroll in the AMPP plan for each academic year and get these great benefits:**

- Manageable Payments -- Spread your payments over 10, 9, 8, or 7 months beginning June 21, respectively, over 5 payments beginning June 21 for the Fall-only semester or over 6 payments beginning October 25 for just the Spring term.
- No Interest Payments -- The AMPP plan is interest-free. It can be used on its own or in conjunction with loans, grants and/or scholarships.
- MyFacts -- 24-hour access to manage your account via the Web.
- Convenient Online Statements -- You will receive your statements via email each month.
- Automatic reoccurring monthly payments via ACH or credit card (includes debit cards) processed on the 5th of every month.
- ACH and credit card payments are accepted.

**Delinquent Accounts**

Delaware State University will not issue a degree, transcript, or grade report to any student who has a delinquent account. A student with a delinquent account will not be readmitted to the University until all balances are paid.

Students who have not paid all financial obligations by November for the Fall semester and April for the Spring semester will have a hold placed on their account and will not be permitted to pre-register for classes for the next term.

Past due accounts will be referred to the State Division of Revenue, the University's collection agencies, or attorneys, and will be reported to the credit bureau.

Each account will be charged an additional amount that approximates the administrative costs incurred in collecting the past due amount, any attorney fees, and all collection costs.

## **Billing**

The University will send electronic monthly statements to students' Delaware State University-issued email address who have an outstanding balance or have activity on their accounts. The electronic statement will show the balance from the prior month, detail activity of the current month, and the ending balance. These electronic statements are emailed on the third Friday of each month to the student's Delaware State University-issued email address. Although the University regularly emails bills to students, it cannot assume responsibility for their receipt. Students are reminded that it is their responsibility to review their student account and email account for billing and its accuracy.

If a bill is not received on or before the beginning of each semester, it is the student's responsibility to obtain a copy of the bill from the myDESU or NelNet QuikPay website by **logging into [www.desu.edu](http://www.desu.edu)**.

The first bill mailed prior to the beginning of the semester may not include deductions of grants, scholarships, or loans.

Payments and financial aid awards applied to accounts will be listed in the credit column. Payments and financial aid awards in the anticipated credits column have not been physically applied to the accounts, but will reduce the outstanding balance. Questions pertaining to bills should be directed to the Office of Student Accounts at (302) 857-6240.

Questions pertaining to financial aid credits or adjustments on monthly statements should be directed to the Financial Aid Office at (302) 857-6250.

## **Cashier Services**

The Cashier's Office is located in the Administration Building, first floor. The hours of operation are 9:00 a.m. to 4:00 p.m. Monday through Friday.

Students may make payments on their accounts at the Cashier's Office. The following services are available to students currently enrolled at Delaware State University:

1. Payment can be made on a student account by check, money order, cash, credit card (Visa, MasterCard, and Discover), and debit card (including MAC).
2. All student paychecks can be obtained from the Cashier's Office between the hours of 10:00 a.m. and 4:00 p.m. on payday.
3. Credit/debit card payments can be made via telephone:  
(302) 857-6220 from 9:00 a.m. to 4:00 p.m.  
or  
(302) 857-6200 from 4:00 p.m. to 4:30 p.m.
4. All payments, except cash, can be made online at [www.desu.edu](http://www.desu.edu) through *QuikPAY*.

The University recommends that students use one of the local banks for their banking needs. An automatic teller machine is located on the campus in the Administration Building and in the William C. Jason Building. Please note: Any check made payable to Delaware State University and the student must be applied to the student's account. Any amount that exceeds what the student owes may be refunded to the student.

## Rooms & Meals

The Advance Room Deposit is a **NON-REFUNDABLE FEE**, with the exception of when the University is unable to provide a room. The Advance Room Deposit will be credited **to the student's account thirty (30) days** after the end of late registration. **This fee is non-refundable if the student decides not to attend the University.** An additional residence hall damage fee may be assessed at the end of each term.

The University cannot guarantee availability of campus housing and it is recommended that you submit the application for housing early.

## Refunds of Credit Balances

Refunds for overpayments or credit balances as a result of dropping a course will be processed thirty (30) days after the end of late registration, or within fourteen (14) days during the semester. Refunds cannot be issued from credit card payments. Credit balances will be transferred back to credit card. All charges and payments must be stated on the account before a refund will be processed. After the refund is processed, students are liable for any additional charges that may result from reductions in financial aid awards and/or other adjustments to tuition and fees.

Students who drop courses must obtain a Drop Slip and return the completed form to the Office of Records and Registration. The effective date of the change in registration is the date the drop slip(s) is filed in the Office of Records and Registration.

Students who officially change their enrollment from full-time to part-time (less than six credit hours) by dropping a course or courses will be eligible for a refund in accordance with the following policy:

### Period from the First Day of Fall/Spring Semester

Period from the First Day of Fall/Spring Semester	Refundable Tuition	Refundable Fees
Prior to 1st day of classes	100%	100%
Two weeks or less	80%	0%
After two weeks	No Refund	No Refund

### Period from the First Day of Summer Sessions(s)

Period from the First Day of Summer Session(s)	Refundable Tuition	Refundable Fees
Prior to 1st day of classes	100%	100%
Two days or less	80%	0%
After two days	No Refund	No Refund

## Withdrawal Refunds

Students should secure a Withdrawal form from the Office of Counseling located in Room 123 of the Education and Humanities Building. Recipients of Title IV funds must complete an exit interview.

Please log on to [www.desu.edu](http://www.desu.edu), select myDESU, and click on “Exit Interview.” The student mailbox key and Smart Card (I.D.) must be returned to the Office of Student Accounts. Students who do not adhere to the withdrawal process will forfeit their right to a refund. Stop payment on a check, failure to pay the semester bill, or failure to attend classes does not constitute official withdrawal from the University.

Students withdrawing from the University will be credited for tuition only, if applicable. Other fees, with the exception of application fees and advance deposit, are to be credited in accordance with the following schedule:

### Period from the First Day of Fall/Spring Semester

Period from the First Day of Fall/Spring Semester	Refundable Tuition	Refundable Fees
Prior to 1st day of classes	100%	100%
*Two weeks or less	80%	0%
After two weeks	No Refund	No Refund

### Period from the First Day of Summer Sessions(s)

Period from the First Day of Summer Session(s)	Refundable Tuition	Refundable Fees
Prior to 1st day of classes	100%	100%
*Two days or less	80%	0%
After two days	No Refund	No Refund

\*Student accident and health insurance will be canceled retroactively and any claim filed will not be honored.

Room and Boarding charges are refunded on a prorated weekly basis, when student withdraws from the University or from residence halls after classes begin.

## **Title IV Recipients**

The 1998 Reauthorization of the Higher Education Act requires Delaware State University to calculate the Return of Title IV Funds on all Federal Financial Aid recipients who withdraw (OFFICIALLY OR UNOFFICIALLY) from classes on or before the sixty (60) percent attendance point in the semester.

The federal formula requires a return of Title IV Aid, if the student received Federal Financial Assistance in the form of a Pell Grant, Supplemental Educational Opportunity Grant (SEOG), Federal Plus Loan, Perkins Loan, Federal Subsidized Stafford Loan, or a Federal Unsubsidized Stafford Loan, if a student withdraws on or before completing sixty (60) percent of the semester. The percentage of Title IV Aid to be returned is equal to the number of calendar days remaining in the semester divided by the number of calendar days in the semester. Scheduled breaks of more than five (5) consecutive days are excluded.

If funds are to be returned after completing the return of Title IV Aid calculation, Delaware State University is required to return its portion of unearned Title IV Aid to the appropriate Federal Programs within thirty (30) days from the date the student withdraws from classes. A hold will be placed on the account and all University services will be withheld if the account reflects a balance. Delaware State University will not return any funds required by the student.

**STUDENTS WHO STOP ATTENDING CLASSES WITHOUT OFFICIALLY WITHDRAWING WILL BE SUBJECT TO THE RETURN OF TITLE IV FUNDS AT THE END OF THE SEMESTER, BASED ON WITHDRAWAL DATES/LAST DOCUMENTED DATE OF ATTENDANCE AS DETERMINED BY DELAWARE STATE UNIVERSITY.**

## **Removal for Non-Payment**

Student's housing/meal assignments and registrations will be removed due to non-payment in accordance with the published date in the Academic Calendar and Course Schedule Guide. Once removed for non-payment, a hold will be placed on your student account to prevent you from registering and you will be required to pay a "Reinstatement Fee" of \$150.00 for each semester in which the registration housing/meal assignments are removed. Failure to pay the reinstatement fee will prevent you from receiving all University services.

## FINANCIAL AID

Graduate students who are fully admitted into a graduate program are eligible to apply for the Federal Stafford Loan which can be either subsidized or unsubsidized. All funds are administered through the Office of Financial Aid.

### **Federal Family Educational Loan Program (FFELP)**

Considered one (1) form of self-help aid, under the FFELP Loan Program students are able to borrow directly from lenders of their choice. Students may apply by completing the Free Application for Federal Student Aid (FAFSA) and ensuring that the results of the application (Student Aid Report) are submitted to the Financial Aid Office. The student's financial aid award may contain a FFELP loan that is either subsidized or unsubsidized. A subsidized loan is awarded on the basis of financial need. The federal government pays the interest on the loan until the borrower begins repayment and/or during authorized periods of deferment. A student can borrow an unsubsidized loan, if the student does not have financial need. Interest will be charged from the time the loan is disbursed until it is paid in full. If the interest is allowed to accumulate, the interest will capitalize -- that is, the interest will be added to the principal amount of the loan, which will increase the amount of the borrower's outstanding balance.

### **Procedures for Applying for Financial Aid**

Candidates for admission to the University who wish to apply for financial aid should complete the Free Application for Federal Student Aid (FAFSA) by the priority deadline date of March 15. Your FAFSA must be filed online at [www.fasfa.ed.gov](http://www.fasfa.ed.gov) to ensure the results are received before the priority deadline date. FAFSA's are transmitted electronically from the Department of Education. To ensure that we receive your application from the Department of Education use our School Code 001428 in the section requesting the school's address and Title IV School Code.

### **Students receiving financial aid must meet the requirements established by the Department of Education and must meet Satisfactory Academic Progress (SAP) determined by Delaware State University.**

Delaware State University requires a student to maintain a 3.0 GPA for Graduates. Students who do not meet the criteria for SAP will be notified by the Financial Aid Office. A student may provide documentation to appeal a SAP decision and indicate any special circumstances (e.g., medical records, accident report, medical bills, and change in program of study, etc.), which may have interfered with meeting eligibility as well as provide an outline of steps towards improvement. The appeal must be submitted at least two (2) months prior to the start of the next semester.

Students will not be eligible to receive financial aid for audited classes.

# COLLEGE OF AGRICULTURE AND RELATED SCIENCES



## **College of Agriculture & Related Sciences**

### **Department of Agriculture**

M.S. in Agriculture

Concentration in Plant Science

Concentration in Animal Science

M.S. in Natural Resources

### **Department of Human Ecology**

M.S. in Food Science

M.S. in Family and Consumer Sciences Education

## **MASTER OF SCIENCE IN AGRICULTURE**

### **OBJECTIVES**

The Department of Agriculture and Natural Resources' Graduate Program prepares students for career opportunities and cooperative ventures with federal and state agencies, private industry, and nearby agricultural institutions. The program strives to generate research designed to solve problems encountered in the study, production and manipulation of plant, animal and food science and in evaluating various aspects of the plant, animal and food sciences.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

In addition to the general Graduate School Requirements, potential candidates must have an undergraduate degree in agricultural sciences respective to their area of concentration or the equivalent with thirty (30) credits from the following lists of courses for a specialization in Plant Science: General Botany, Horticultural Plant Materials, Statistics/Biometrics, Organic Chemistry, Biochemistry, Field Crops, Forage Crops, Ecology, Plant Systematics, Soils, Entomology, Weed Science, Genetics, Plant Physiology, Molecular Biology, Plant Pathology, and Plant Propagation.

In Animal Science: thirty (30) hours in Animal Production, Animal Reproduction, Anatomy and Physiology, Nutrition, Genetics, Selection, Forage Production, Immunity, Animal Diseases, Animal Behavior and similar courses are required for admission into the program.

In Food Science: thirty (30) hours of coursework in Food Science, Dietetics, Human Nutrition, Microbiology, HACCP, Organic Chemistry, Food Processing, Packaging and Marketing and similar areas are required for admission into the program.

In Plant Science: thirty (30) hours of coursework in General Botany, Horticultural Plant Materials, Statistics/Biometrics, Organic Chemistry, Biochemistry, Field Crops, Forage Crops, Ecology, Plant Systematics, Soils, Entomology, Weed Science, Genetics, Plant Physiology, Molecular Biology, Plant Pathology, and Plant Propagation.

#### **DEGREE REQUIREMENTS**

The Masters of Science in Agriculture degree is designed to prepare students for advanced study in plant, animal or food science. The degree requires a supervised research program and a thesis. A total of thirty-one (31) credit hours are required for the degree, including twenty-five (25) hours of coursework and six (6) credit hours of research.

#### **FACULTY**

The faculty in the Department of Agriculture and Natural Resources are dedicated to their respective fields of study and they have a diverse background. Specific areas of research interest of the agriculture faculty include plant systematics, plant physiology, genomics tissue culture, forage production, forage utilization, and minor crop production, animal production, reproductive physiology, sustainable agricultural production, and animal well-being. Active research programs exist within these areas and offer graduate students many opportunities for active learning and discovery.

## **FACILITIES**

The Department of Agriculture and Natural Resources is housed in the W.W. Baker Building, and the Agriculture Annex which contains classrooms, offices, and laboratories that house the program. Other facilities include the Claude E. Phillips Herbarium and a 6,000 square foot Research Greenhouse. The Claude E. Phillips Herbarium contains the largest collection of preserved plant specimens at any historically black institution and is the largest public herbarium east of the Mississippi River. A research greenhouse is located to the north side of the Baker building. Several fields and research plots are located on the campus grounds. Hickory Hill Farm, a 75 acre beef, meat goat and forage research farm is located approximately seven (7) miles from campus in Cheswold, Delaware. The Smyrna Outreach and Research Center is a 192 acre farm in located in Smyrna, Delaware.

**MASTER OF SCIENCE IN AGRICULTURE**

<b>CORE COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
AGRI-551	3	Experimental Design
AGRI-560	3	Research Problem in area of Specialization
AGRI-572	1	Department Seminar (attendance required each semester, credit given during the semester that the thesis research is presented).
AGRI-561	6	Thesis Research
<b>ELECTIVES (Select 18 credit hours)</b>		
HMEC-500	3	Fundamentals of Food Science
HMEC-550	4	Food Microbiology
HMEC-560	2	Principles of HACCP
AGRI-507	3	Soils and Soil Fertility
AGRI-516	3	Plant Genetics and Breeding
AGRI-531	3	Crop Biochemistry, Physiology, Ecology
AGRI-541	3	Plant Anatomy and Morphology
AGRI-575	3	Molecular Genetics and Genomics
AGRI-581	3	Advanced Forage and Minor Crop Production and Utilization
AGRI-601	3	Advanced Field Botany
AGRI-609	3	Advanced Weed Science
AGRI-641	3	Evolution of Vascular Plants
AGRI-695	0	Agriculture and Natural Resources Sustaining Grad
30-501	3	Population Biology
<b>TOTAL CREDIT HOURS: 31</b>		

## **COURSE DESCRIPTIONS**

**(Note: Additional Course Descriptions can be found under Animal Science, Food Science, Plant Science, Natural Resources and Biology)**

### **HUMAN ECOLOGY (HMEC) (18)**

#### **HMEC-500. FUNDAMENTALS OF FOOD SCIENCE**

**3:2:1**

This course provides an in-depth review of the fundamental concepts in food science including food chemistry, food microbiology and safety, food processing and engineering, nutrition, sensory evaluation, and food product development. Students would develop the skills needed to analyze the composition, chemical and physical properties of food in the laboratory. Two (2) hours of lecture and one (1) hour of lab.

Credit, three hours.

#### **HMEC-510. FOOD PROCESSING**

**3:3:0**

The course integrates principles of food chemistry including nutrition, food biotechnology, characteristics of raw food materials, principles of food preservation including low and high temperatures, pH, salinity, water activity, Principles of food processing techniques, such as freeze drying, high pressure, aseptic processing, extrusion, packaging materials and methods, cleaning and sanitation, water and waste management. Three (3) hours of lecture.

Credit, three hours.

#### **HMEC-520. FOOD MICROBIOLOGY**

**3:2:1**

The course deals with the identification, enumeration, and characterization of pathogenic and spoilage microorganisms associated with foods and food processing. Beneficial microorganisms in food systems will be discussed. Influence of the food system on the growth and survival of microorganisms and control of microorganisms will be studied. The course introduces techniques for detecting and quantifying microorganisms in foods. Application of colony counts, most probable numbers, immunoassays, and molecular techniques is used to understand the numbers and types of microorganisms or microbial end products in foods. Laboratory safety and oral and written reports are emphasized. The course provides students with standard techniques used in microbial analysis of foods and the major groups of organisms associated with food safety and spoilage problems, and food production. Two (2) hours of lecture and one (1) hours of lab.

Credit, three hours.

#### **HMEC-530. FOOD CHEMISTRY**

**3:3:3**

The course covers the structure and properties of major and minor food components, including water, carbohydrates, protein, lipids, other nutrients and food additives, and the chemistry of changes occurring during food processing, storage and utilization. Three (3) hours lecture and three (3) hours lab a week.

Prerequisites: HMEC-500, CHEM-302.

Credit, three hours.

#### **HMEC-535. FOOD TOXICOLOGY**

**3:3:0**

This course emphasizes biological and chemical aspects of toxicology, microbial aspects of food borne infections and intoxications, food additives, toxic substances occurring in food, either naturally or formed during processing, and the toxic effects of these substances on the biological systems. Safety of genetically engineered foods, risk assessment and food safety policy will be discussed as general topics. Three (3) lecture hours a week.

Prerequisites: HMEC-520, HMEC-530.

Credit, three hours.

**HMEC-540. FOOD ANALYSIS****3:2:3**

Principles, methods and techniques used for quantitative physical and chemical analyses of food and food ingredients. Analytical techniques will include spectroscopy, chromatography, mass spectrometry, immunochemistry and atomic absorption. Physical measurements of food properties will cover color, pH, water activity, water holding capacity and textural characteristics. Two (2) hours lecture and three (3) hours lab a week.

Prerequisites: CHEM-530.

Credit, three hours.

**HMEC-550. FOOD ENGINEERING****3:3:0**

The course deals with the material and energy balances with application food processing, fluid flow, and heat and mass transfer in food processing, and thermodynamics properties. Three (3) hours lecture a week.

Prerequisites: PHYS-201, MTSC-251.

Credit, three hours.

**HMEC-560. PRINCIPLES OF HACCP****2:2:0**

The course provides an in-depth review of the Hazard Analysis and Critical Control Point (HACCP) system and its application in the food industry. Two (2) hours lecture a week.

Credit, two hours.

**HMEC-570. SENSORY EVALUATION OF FOODS****3:2:3**

Sensory techniques used in evaluating food appearance, texture, and flavor, and the evaluation of consumer acceptance. The course includes an introduction to sensory testing methods, consumer panels and statistical methods for analyzing sensory data. Two (2) hour lecture and three (3) hours lab a week.

Prerequisites: HMEC-500.

Credit, three hours.

**HMEC-580. FOOD QUALITY ASSURANCE****3:3:0**

All technical aspects of quality assurance and quality control will be covered. Topics covered will include quality management systems, selection of analytical methods, HACCP principles, acceptance sampling, product recall plans, statistical quality control methods, government regulation and food legislation. Three (3) hours lecture a week.

Prerequisites: HMEC-510.

Credit, three hours.

**HMEC-600. FOOD PRODUCT DEVELOPMENT****3:2:1**

The course deals with all aspects of new food product development from concept to commercialization, including market screening; idea generation; prototype development; ingredient functionality and interactions; processing; packaging; safety and regulatory issues; labeling; physical, chemical, microbiological, and sensory evaluations; quality control procedures; and HACCP plans. Two (2) hours lecture and one (1) hour lab a week.

Prerequisites: HMEC-530 or consent of the Instructor.

Credit, three hours.

**HMEC-610. ADVANCED FOOD SAFETY****3:3:0**

The course provides and understanding of the relationship of environmental factors to occurrence, growth and survival of microorganisms in foods, Food Safety Epidemiology, HACCP, sanitation, food safety education, and risk assessment. Risk Management in the context of food safety is-the process of weighing

policy alternatives to control risks as effectively as possible. Food Safety Epidemiology. Three (3) hours lecture a week.

Prerequisites: HMEC-560.

Credit, three hours.

**HMEC-620. FOOD SCIENCE INTERNSHIP**

**3:0:0**

Supervised on-site, hands-on experience in the food industry or in governmental agencies that regulate food. Students will be full-time interns and are required to work a minimum of three (3) months during the Summer, Fall, or Spring Semester. An intern will be expected to prepare and present a written report at the end of the internship.

Credit, three hours.

**HMEC-625. RESEARCH PROBLEMS IN FOOD SCIENCE**

**6:0:0**

A special problem course designed to provide research training in the area of the student's area of concentration and specification related to the needs of their research and thesis work.

Credit, one to six hours.

**HMEC-630. THESIS RESEARCH**

**6:0:0**

An in depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, three to six hours.

**HMEC-661. GRADUATE SEMINAR**

**1:0:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one hour.

**AGRICULTURE (AGRI) (29)**

**AGRI-504. ADVANCED AQUACULTURE**

**4:3:2**

Advanced aquaculture will include environmental, social and legal considerations; various culture systems; water quality management (as related to organism cultured and system type); feeds and nutrition; health management; and economics and marketing. The course will include literature research and research projects as well as assigned laboratory work. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, three hours.

**AGRI-505. AQUATIC ANIMAL PHYSIOLOGY**

**4:3:2**

A study of the basic physiological systems in fishes and crustaceans and their relationships to development, growth and reproduction. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, four hours.

**AGRI-507. SOILS AND SOIL FERTILITY**

**3:2:2**

The study of soil properties, processes, nutrients, fertility, and management practices related to crop production and environmental protection. Two (2) hours lecture and one (1) two-hour laboratory.

Credit, three hours.

**AGRI-511. PLANT BREEDING****3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

**AGRI-516. PLANT GENETICS AND BREEDING****3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

**AGRI-531. CROP BIOCHEMISTRY, PHYSIOLOGY AND ECOLOGY****3:3:0**

An advanced study of the physiology and ecological factors affecting the productivity of crop plants and their response to environmental stress.

Prerequisites: AGRI-317, AGRI-205.

Credit, three hours.

**AGRI-541. PLANT ANATOMY AND MORPHOLOGY****3:3:0**

A study of the structure and function of major plant cells and tissues and the morphology of organs of vascular and nonvascular plants. Laboratories will focus upon comparisons among taxa and the characteristics of major plant groups.

Prerequisites: 23-101, 23-102, AGRI-205.

Credit, three hours.

**AGRI-551. EXPERIMENTAL DESIGN****3:3:0**

A study of the use of advanced experimental designs in planning, analyzing, and interpreting experimental data. Three (3) one-hour class periods per week.

Prerequisites: Three (3) credits in Statistics/Biometrics.

Credit, three hours.

**AGRI-560. RESEARCH PROBLEMS****1-3:1-****3:0**

A special problems course designed to provide research training in the area of the student's field of study and specifically related to the needs of their research program.

Credit, one to three hours.

**AGRI-561. THESIS RESEARCH****0-6:0-****6:0**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. This involves experimental design, data collection, data analysis and the preparation of the thesis. A grade of "Q" is given until the thesis is completed.

Credit, zero to six hours.

**AGRI-572. GRADUATE SEMINAR****1:1:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one hour.

**AGRI-575. MOLECULAR GENETICS AND GENOMICS****4:3:3**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences.  
Credit, three hours.

**AGRI-581. ADVANCED FORAGE AND MINOR CROP PRODUCTION AND UTILIZATION**  
**3:3:0**

An advanced application of forage and minor crop production and utilization. The course will include visits to and analysis of various forage and minor crop operations in the Delmarva Area.  
Credit, three hours.

**AGRI-601. ADVANCED FIELD BOTANY****3:3:0**

Through field work, lectures, study of herbarium specimens, and readings, this course provides experience with identifications, habitats, and geographic distributions of native and naturalized plants of eastern North America, concentrating on the Delmarva Peninsula. Principles of plant systematics and phytogeography are illustrated through direct study of plants in the field. Primary and secondary literature of plant identification and distribution are used in the field, herbarium, library, and classroom. In addition, collection, preparation, and labeling of plant specimens are covered in this course.  
Credit, three hours.

**AGRI-609. ADVANCED WEED SCIENCE****3:2:2**

An advanced study of weeds and their control. Principles involving weed plant classification, weed biology and ecology, and plant and herbicide chemistry will be presented. Practices which prevent, eliminate, and control weeds in grain crops, legumes, vegetables, fruit, pasture and other crop ecologies will be discussed. Herbicide formulations and safe herbicide use will be taught. Two (2) one-hour lectures and one (1) two-hour laboratory per week.  
Prerequisites: AGRI-102, AGRI-317 or AGRI-219 or the permission of the Instructor.  
Credit, three hours.

**AGRI-641. EVOLUTION OF VASCULAR PLANTS****3:2:2**

Advanced study of the evolution and classification of Tracheophyta, including traditional and experimental evidence of phylogenetic diversity. Two (2) lectures and one (1) two-hour laboratory per week.  
Credit, three hours.

**AGRI-695. AGRICULTURE AND NATURAL RESOURCES SUSTAINING GRADUATE STUDENT****0:0:0**

A continuation course to allow students who have completed their research and their coursework the additional time necessary to complete their thesis. A fee is assigned to this course, however no credit is awarded.  
Credit, none.

## **MASTER OF SCIENCE IN AGRICULTURE PLANT SCIENCE**

### **OBJECTIVES**

The Graduate Program in the Department of Agriculture and Natural Resources prepares students for career opportunities and cooperative ventures with federal and state agencies, private industry, and nearby horticultural institutions. The program strives to generate research designed to solve problems encountered in the study, production and manipulation of plant species and in evaluating various aspects of the plant sciences including plant production, physiology, culture and taxonomy.

### **ADMISSIONS AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Plant Sciences or the equivalent, with thirty (30) credits from the following courses: General Botany, Horticultural Plant Materials, Statistics/Biometrics, Organic Chemistry, Biochemistry, Field Crops, Forage Crops, Ecology, Plant Systematics, Soils, Entomology, Weed Science, Genetics, Plant Physiology, Molecular Biology, Plant Pathology, and Plant Propagation.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit GRE scores.
5. Submit a resume.
6. Submit three (3) letters of recommendation to the Office of Graduate School and copies to the Chair of the Department of Agriculture and Natural Resources.
7. A statement of intent should tell us what you want to get out of your degree, what specific areas of research you are interest in studying, and perhaps why you have an interest in the Agriculture or Natural Resource area (maximum two pages).
8. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

The Masters Degree in Plant Science is designed to prepare students for advanced study in plant culture, physiology, management and/or systematics. The degree requires a supervised research program and a thesis. A total of thirty-one (31) credit hours are required for the degree, including twenty-two (22) hours of coursework and nine (9) credit hours of research.

#### **FACILITIES**

The Department of Agriculture and Natural Resources is housed in the W.W. Baker Building, which contains classrooms, offices, and laboratories that support the program. Other facilities include the Claude E. Phillips Herbarium and a 6,000 square foot Research Greenhouse. The Claude E. Phillips Herbarium, with ca. 145,000 specimens, contains the largest collection of preserved plant specimens at any historically black institution and is a premier center for studying plant diversity, human uses of plants, and the conservation of rare plants. A research greenhouse is located on the north side of the Baker building. Several fields and research plots are located on the campus grounds. Hickory Hill Farm, used for forage and animal research, is located approximately seven (7) miles away in Cheswold, Delaware.

**FACULTY**

The faculty in the Department of Agriculture and Natural Resources are dedicated to their fields of study and has diverse backgrounds. Their specific areas of research interest include plant systematics, plant physiology, tissue culture, forage production, forage utilization, and minor crop production. Active research programs exist within these areas and offer graduate students many opportunities for active learning and discovery.

**MASTER OF SCIENCE IN AGRICULTURE  
PLANT SCIENCE**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
AGRI-551	3	Experimental Design
AGRI-560	3	Research Problem in area of Specialization
AGRI-561	6	Thesis Research
AGRI-572	1	Department Seminar (attendance required each semester, credit given during the semester that the thesis research is presented).
<b>ELECTIVE COURSES (Select 18 credit hours)</b>		
BIOL-501	3	Organismal Biology
BIOL-502	3	Cell and Molecular Biology
BIOL-504	3	Population Biology
AGRI-511	3	Plant Breeding
CHEM-521	3	Biochemistry
AGRI-531	3	Crop Biochemistry, Physiology, Ecology
AGRI-541	3	Plant Anatomy and Morphology
AGRI-581	3	Advanced Forage and Minor Crop Production and Utilization
23-611	3	Advanced Genetics
23-641	3	Evolution of Vascular Plants
*Select 18 credit hours of elective courses.		
<b>TOTAL CREDIT HOURS: 31</b>		

## **COURSE DESCRIPTIONS**

**(Note: Additional Course Descriptions can be found under Animal Science, Food Science, Plant Science, Natural Resources and Biology)**

### **AGRICULTURE (AGRI) (AGRI)**

#### **AGRI-504. ADVANCED AQUACULTURE**

**4:3:2**

Advanced aquaculture will include environmental, social and legal considerations; various culture systems; water quality management (as related to organism cultured and system type); feeds and nutrition; health management; and economics and marketing. The course will include literature research and research projects as well as assigned laboratory work. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, three hours.

#### **AGRI-505. AQUATIC ANIMAL PHYSIOLOGY**

**4:3:2**

A study of the basic physiological systems in fishes and crustaceans and their relationships to development, growth and reproduction. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, four hours.

#### **AGRI-507. SOILS AND SOIL FERTILITY**

**3:2:2**

The study of soil properties, processes, nutrients, fertility, and management practices related to crop production and environmental protection. Two (2) hours lecture and one (1) two-hour laboratory.

Credit, three hours.

#### **AGRI-511. PLANT BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-516. PLANT GENETICS AND BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-531. CROP BIOCHEMISTRY, PHYSIOLOGY AND ECOLOGY**

**3:3:0**

An advanced study of the physiology and ecological factors affecting the productivity of crop plants and their response to environmental stress.

Prerequisites: AGRI-317, AGRI-205.

Credit, three hours.

#### **AGRI-541. PLANT ANATOMY AND MORPHOLOGY**

**3:3:0**

A study of the structure and function of major plant cells and tissues and the morphology of organs of vascular and nonvascular plants. Laboratories will focus upon comparisons among taxa and the characteristics of major plant groups.

Prerequisites: 23-101, 23-102, AGRI-205.

Credit, three hours.

**AGRI-551. EXPERIMENTAL DESIGN****3:3:0**

A study of the use of advanced experimental designs in planning, analyzing, and interpreting experimental data. Three (3) one-hour class periods per week.

Prerequisites: Three (3) credits in Statistics/Biometrics.

Credit, three hours.

**AGRI-560. RESEARCH PROBLEMS****1-3:1-3:0**

A special problems course designed to provide research training in the area of the student's field of study and specifically related to the needs of their research program.

Credit, one to three hours.

**AGRI-561. THESIS RESEARCH****0-6:0-****6:0**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. This involves experimental design, data collection, data analysis and the preparation of the thesis. A grade of "Q" is given until the thesis is completed.

Credit, zero to six hours.

**AGRI-572. GRADUATE SEMINAR****1:1:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one hour.

**AGRI-575. MOLECULAR GENETICS AND GENOMICS****4:3:3**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences.

Credit, three hours.

**AGRI-581. ADVANCED FORAGE AND MINOR CROP PRODUCTION AND UTILIZATION****3:3:0**

An advanced application of forage and minor crop production and utilization. The course will include visits to and analysis of various forage and minor crop operations in the Delmarva Area.

Credit, three hours.

**AGRI-601. ADVANCED FIELD BOTANY****3:3:0**

Through field work, lectures, study of herbarium specimens, and readings, this course provides experience with identifications, habitats, and geographic distributions of native and naturalized plants of eastern North America, concentrating on the Delmarva Peninsula. Principles of plant systematics and phytogeography are illustrated through direct study of plants in the field. Primary and secondary literature of plant identification and distribution are used in the field, herbarium, library, and classroom. In addition, collection, preparation, and labeling of plant specimens are covered in this course.

Credit, three hours.

**AGRI-609. ADVANCED WEED SCIENCE****3:2:2**

An advanced study of weeds and their control. Principles involving weed plant classification, weed biology and ecology, and plant and herbicide chemistry will be presented. Practices which prevent, eliminate, and control weeds in grain crops, legumes, vegetables, fruit, pasture and other crop ecologies

will be discussed. Herbicide formulations and safe herbicide use will be taught. Two (2) one-hour lectures and one (1) two-hour laboratory per week.

Prerequisites: 23-102, AGRI-317 or AGRI-219 or the permission of the Instructor.

Credit, three hours.

**AGRI-641. EVOLUTION OF VASCULAR PLANTS**

**3:2:2**

Advanced study of the evolution and classification of Tracheophyta, including traditional and experimental evidence of phylogenetic diversity. Two (2) lectures and one (1) two-hour laboratory per week.

Credit, three hours.

**AGRI-695. AGRICULTURE AND NATURAL RESOURCES SUSTAINING GRADUATE STUDENT**

**0:0:0**

A continuation course to allow students who have completed their research and their coursework the additional time necessary to complete their thesis. A fee is assigned to this course, however no credit is awarded.

Credit, none.

## **MASTER OF SCIENCE IN AGRICULTURE ANIMAL SCIENCE**

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Agricultural Sciences respective to their area of concentration or the equivalent with thirty (30) credits from the following list of courses for a specialization in Plant Science: General Botany, Horticultural Plant Materials, Statistics/Biometrics, Organic Chemistry, Biochemistry, Field Crops, Forage Crops, Ecology, Plant Systematics, Soils, Entomology, Weed Science, Genetics, Plant Physiology, Molecular Biology, Plant Pathology, and Plant Propagation. In Animal Science: thirty (30) hours in Animal Production, Animal Reproduction, Anatomy and Physiology, Nutrition, Genetics, Selection, Forage Production, Immunity, Animal Diseases, Animal Behavior, and similar courses are required for admission into the program.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit GRE scores.
5. Submit a resume.
6. Submit three (3) letters of recommendation to the Office of Graduate School and copies to the Chair of the Department of Agriculture and Natural Resources.
7. A statement of intent should tell us what you want to get out of your degree, what specific areas of research you are interested in studying, and perhaps why you have an interest in the Agriculture or Natural Resource area (maximum two pages).
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**MASTER OF SCIENCE IN AGRICULTURE  
ANIMAL SCIENCE**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
AGRI-551	3	Experimental Design
AGRI-560	3	Research Problem in area of Specialization
AGRI-561	6	Thesis Research
AGRI-572	1	Department Seminar (attendance required each semester, credit given during the semester that the thesis research is presented).
<b>ELECTIVE COURSES (Select 18 credit hours)</b>		
23-501	3	Organismal Biology
23-502	3	Cell and Molecular Biology
23-611	3	Advanced Genetics
23-621	3	Advanced Microbiology
23-625	3	Immunology
CHEM-521	3	Biochemistry
<b>TOTAL CREDIT HOURS: 31</b>		

## **COURSE DESCRIPTIONS**

**(Note: Additional Course Descriptions can be found under Animal Science, Food Science, Plant Science, Natural Resources and Biology)**

### **AGRICULTURE (AGRI) (29)**

#### **AGRI-504. ADVANCED AQUACULTURE**

**4:3:2**

Advanced aquaculture will include environmental, social and legal considerations; various culture systems; water quality management (as related to organism cultured and system type); feeds and nutrition; health management; and economics and marketing. The course will include literature research and research projects as well as assigned laboratory work. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, three hours.

#### **AGRI-505. AQUATIC ANIMAL PHYSIOLOGY**

**4:3:2**

A study of the basic physiological systems in fishes and crustaceans and their relationships to development, growth and reproduction. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, four hours.

#### **AGRI-507. SOILS AND SOIL FERTILITY**

**3:2:2**

The study of soil properties, processes, nutrients, fertility, and management practices related to crop production and environmental protection. Two (2) hours lecture and one (1) two-hour laboratory.

Credit, three hours.

#### **AGRI-511. PLANT BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-516. PLANT GENETICS AND BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-531. CROP BIOCHEMISTRY, PHYSIOLOGY AND ECOLOGY**

**3:3:0**

An advanced study of the physiology and ecological factors affecting the productivity of crop plants and their response to environmental stress.

Prerequisites: AGRI-317, AGRI-205.

Credit, three hours.

#### **AGRI-541. PLANT ANATOMY AND MORPHOLOGY**

**3:3:0**

A study of the structure and function of major plant cells and tissues and the morphology of organs of vascular and nonvascular plants. Laboratories will focus upon comparisons among taxa and the characteristics of major plant groups.

Prerequisites: 23-101, 23-102, AGRI-205.

Credit, three hours.

**AGRI-551. EXPERIMENTAL DESIGN****3:3:0**

A study of the use of advanced experimental designs in planning, analyzing, and interpreting experimental data. Three (3) one-hour class periods per week.

Prerequisites: Three (3) credits in Statistics/Biometrics.

Credit, three hours.

**AGRI-560. RESEARCH PROBLEMS****1:3:1-****3:0**

A special problems course designed to provide research training in the area of the student's field of study and specifically related to the needs of their research program.

Credit, one to three hours.

**AGRI-561. THESIS RESEARCH****0-6:0-****6:0**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. This involves experimental design, data collection, data analysis and the preparation of the thesis. A grade of "Q" is given until the thesis is completed.

Credit, zero to six hours.

**AGRI-572. GRADUATE SEMINAR****1:1:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one hour.

**AGRI-575. MOLECULAR GENETICS AND GENOMICS****4:3:3**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences.

Credit, three hours.

**AGRI-581. ADVANCED FORAGE AND MINOR CROP PRODUCTION AND UTILIZATION****3:3:0**

An advanced application of forage and minor crop production and utilization. The course will include visits to and analysis of various forage and minor crop operations in the Delmarva Area.

Credit, three hours.

**AGRI-601. ADVANCED FIELD BOTANY****3:3:0**

Through field work, lectures, study of herbarium specimens, and readings, this course provides experience with identifications, habitats, and geographic distributions of native and naturalized plants of eastern North America, concentrating on the Delmarva peninsula. Principles of plant systematics and phytogeography are illustrated through direct study of plants in the field. Primary and secondary literature of plant identification and distribution are used in the field, herbarium, library, and classroom. In addition, collection, preparation, and labeling of plant specimens are covered in this course.

Credit, three hours.

**AGRI-609. ADVANCED WEED SCIENCE****3:2:2**

An advanced study of weeds and their control. Principles involving weed plant classification, weed biology and ecology, and plant and herbicide chemistry will be presented. Practices which prevent, eliminate, and control weeds in grain crops, legumes, vegetables, fruit, pasture and other crop ecologies

will be discussed. Herbicide formulations and safe herbicide use will be taught. Two (2) one-hour lectures and one (1) two-hour laboratory per week.

Prerequisites: 23-102, AGRI-317 or AGRI-219 or the permission of the Instructor.

Credit, three hours.

**AGRI-641. EVOLUTION OF VASCULAR PLANTS**

**3:2:2**

Advanced study of the evolution and classification of Tracheophyta, including traditional and experimental evidence of phylogenetic diversity. Two (2) lectures and one (1) two-hour laboratory per week.

Credit, three hours.

**AGRI-695. AGRICULTURE AND NATURAL RESOURCES SUSTAINING GRADUATE STUDENT**

**0:0:0**

A continuation course to allow students who have completed their research and their coursework the additional time necessary to complete their thesis. A fee is assigned to this course, however no credit is awarded.

Credit, none.

## **MASTER OF SCIENCE IN NATURAL RESOURCES**

### **OBJECTIVES**

The Department of Agriculture and Natural Resources' Master of Science in Natural Resources program was developed: to provide advanced studies in natural resources for students who wish to specialize in this area; to generate research designed to address local problems encountered in the study, management, or manipulation of natural resource areas; to provide opportunities for advanced study in disciplines in natural resource studies that are not readily available at other local colleges and universities; and to provide the opportunity for cooperative ventures with federal and state government agencies, private industry, and other interested organizations (i.e. grant proposals, internships, service learning relationships, etc.).

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in natural or applied field science (such as Natural Resources, Wildlife Management, Fisheries, a field-oriented biological science degree or similar), including thirty (3) credits from the following courses: Aquaculture, Biometrics, Botany, Dendrology, Ecology, Ecosystems, Environmental Law/Policy, Fisheries Science, Ichthyology, Forestry, Land Use Planning, Limnology/Aquatic Ecology, Mammalogy, Marine Biology, Ornithology, Population Biology, Resource Management, Soil & Water Management, Wetlands Biology, Wildlife Management, and Zoology. Any deficiencies in course background identified by a student's advisory committee can be made up, although courses taken to fill deficiencies cannot be applied to the graduate program for credit.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit GRE scores.
5. Submit a resume.
6. Submit three (3) letters of recommendation to the Office of Graduate School and copies to the Chair of the Department of Agriculture and Natural Resources.
7. A statement of intent should tell us what you want to get out of your degree, what specific areas of research you are interest in studying, and perhaps why you have an interest in the Agriculture or Natural Resource area (maximum two pages).
8. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

The Master of Science degree in Natural Resources is designed to prepare students for advanced study in the various disciplines in the field. The degree requires a supervised research program and a thesis. A total of thirty (30) credit hours are required for the degree, including twenty-four (24) credit hours of coursework and six (6) credit hours of research.

#### **FACULTY**

The faculty in the Department of Agriculture and Natural Resources is dedicated to their respective fields of study and has a diverse background. Specific areas of research interest of the Natural Resource science faculty include wildlife management, wetland ecology, rainforest ecology, fisheries management and aquaculture. Active research programs exist within these areas and offer graduate students many opportunities for active learning and discovery.

**FACILITIES**

The Department of Agriculture and Natural Resources is housed in the W.W. Baker Building, which contains classrooms, offices, and laboratories that house the program. Other facilities include the Claude E. Phillips Herbarium and Hickory Hill Farm. The Claude E. Phillips Herbarium contains the largest collection of preserved plant specimens at any historically black institution and is the largest public herbarium east of the Mississippi River. Several fields, forest lands and research plots are located on the campus grounds. In addition, there is an aquaculture facility with in excess of thirty (30) ponds and an aquatic ecology laboratory. Collaborative efforts with various state and federal parks and natural areas allow for a wide range of project activities throughout the state.

**MASTER OF SCIENCE IN NATURAL RESOURCES**

<b>CORE COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
30-501	3	Population Biology
30-502	3	Habitat Management and Restoration: Theory
30-503	3	Conservation and Restoration Biology, Applications
AGRI-551	3	Experimental Design
AGRI-572	2	Department Seminar (attendance required each semester, credit given during semester that thesis research is presented).
AGRI-561	6	Thesis Research
<b>ELECTIVE COURSES (Select 10 credit hours)</b>		
AGRI-504	3	Advanced Aquaculture
AGRI-505	4	Aquatic Animal Physiology
AGRI-507	3	Soils and Soil Fertility
AGRI-695	variable	Research Problem in area of Specialization
AGRI-560	0	Agriculture and Natural Resources Sustaining Grad
30-504	3	GIS Applications in Natural Resources
30-531	3	Advance Ecosystems
30-604	3	Environmental Modeling
30-643	3	Marine Biology
30-644	3	Wetlands Biology
30-675	3	Advanced Environmental Policy and Law
30-684	3	Advanced Wildlife Biology
<b>TOTAL CREDIT HOURS: 30</b>		

## **COURSE DESCRIPTIONS**

**(Note: Additional Course Descriptions can be found under Animal Science, Food Science, Plant Science and Natural Resources)**

### **AGRICULTURE (AGRI) (29)**

#### **AGRI-504. ADVANCED AQUACULTURE**

**4:3:2**

Advanced aquaculture will include environmental, social and legal considerations; various culture systems; water quality management (as related to organism cultured and system type); feeds and nutrition; health management; and economics and marketing. The course will include literature research and research projects as well as assigned laboratory work. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, three hours.

#### **AGRI-505. AQUATIC ANIMAL PHYSIOLOGY**

**4:3:2**

A study of the basic physiological systems in fishes and crustaceans and their relationships to development, growth and reproduction. Three (3) hours lecture and one (1) two hour laboratory per week.

Credit, four hours.

#### **AGRI-507. SOILS AND SOIL FERTILITY**

**3:2:2**

The study of soil properties, processes, nutrients, fertility, and management practices related to crop production and environmental protection. Two (2) hours lecture and one (1) two-hour laboratory.

Credit, three hours.

#### **AGRI-511. PLANT BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-516. PLANT GENETICS AND BREEDING**

**3:3:0**

An introduction to and application of plant breeding methodology and selection. Various methods utilized in plant breeding programs, and an understanding of heredity, hybridization and selection of various plant species will be discussed.

Prerequisites: AGRI-317.

Credit, three hours.

#### **AGRI-531. CROP BIOCHEMISTRY, PHYSIOLOGY AND ECOLOGY**

**3:3:0**

An advanced study of the physiology and ecological factors affecting the productivity of crop plants and their response to environmental stress.

Prerequisites: AGRI-317, AGRI-205.

Credit, three hours.

#### **AGRI-541. PLANT ANATOMY AND MORPHOLOGY**

**3:3:0**

A study of the structure and function of major plant cells and tissues and the morphology of organs of vascular and nonvascular plants. Laboratories will focus upon comparisons among taxa and the characteristics of major plant groups.

Prerequisites: 23-101, 23-102, AGRI-205.

Credit, three hours.

**AGRI-551. EXPERIMENTAL DESIGN****3:3:0**

A study of the use of advanced experimental designs in planning, analyzing, and interpreting experimental data. Three (3) one-hour class periods per week.

Prerequisites: Three (3) credits in Statistics/Biometrics.

Credit, three hours.

**AGRI-560. RESEARCH PROBLEMS****1-3:1-3:0**

A special problems course designed to provide research training in the area of the student's field of study and specifically related to the needs of their research program.

Credit, one to three hours.

**AGRI-561. THESIS RESEARCH****0-6:0-****6:0**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. This involves experimental design, data collection, data analysis and the preparation of the thesis. A grade of "Q" is given until the thesis is completed.

Credit, zero to six hours.

**AGRI-572. GRADUATE SEMINAR****1:1:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one hour.

**AGRI-575. MOLECULAR GENETICS AND GENOMICS****4:3:3**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences.

Credit, three hours.

**AGRI-581. ADVANCED FORAGE AND MINOR CROP PRODUCTION AND UTILIZATION****3:3:0**

An advanced application of forage and minor crop production and utilization. The course will include visits to and analysis of various forage and minor crop operations in the Delmarva Area.

Credit, three hours.

**AGRI-601. ADVANCED FIELD BOTANY****3:3:0**

Through field work, lectures, study of herbarium specimens, and readings, this course provides experience with identifications, habitats, and geographic distributions of native and naturalized plants of eastern North America, concentrating on the Delmarva Peninsula. Principles of plant systematics and phytogeography are illustrated through direct study of plants in the field. Primary and secondary literature of plant identification and distribution are used in the field, herbarium, library, and classroom. In addition, collection, preparation, and labeling of plant specimens are covered in this course.

Credit, three hours.

**AGRI-609. ADVANCED WEED SCIENCE****3:2:2**

An advanced study of weeds and their control. Principles involving weed plant classification, weed biology and ecology, and plant and herbicide chemistry will be presented. Practices which prevent, eliminate, and control weeds in grain crops, legumes, vegetables, fruit, pasture and other crop ecologies

will be discussed. Herbicide formulations and safe herbicide use will be taught. Two (2) one-hour lectures and one (1) two-hour laboratory per week.

Prerequisites: 23-102, AGRI-317 or AGRI-219 or the permission of the Instructor.

Credit, three hours.

**AGRI-641. EVOLUTION OF VASCULAR PLANTS** **3:2:2**

Advanced study of the evolution and classification of Tracheophyta, including traditional and experimental evidence of phylogenetic diversity. Two (2) lectures and one (1) two-hour laboratory per week.

Credit, three hours.

**AGRI-695. AGRICULTURE AND NATURAL RESOURCES SUSTAINING GRADUATE STUDENT** **0:0:0**

A continuation course to allow students who have completed their research and their coursework the additional time necessary to complete their thesis. A fee is assigned to this course, however no credit is awarded.

Credit, none.

**NATURAL RESOURCES (NTRS) (30)**

**NTRS-501. POPULATION BIOLOGY** **3:2:2**

A study of biology above the level of the individual with emphasis on ecology and evolution. Two (2) hours of lecture and one (1) two-hour laboratory.

Credit, three hours.

**NTRS-502. HABITAT MANAGEMENT AND RESTORATION: THEORY** **3:3:0**

An exploration of advanced theory and methodology for the establishment, maintenance and restoration of aquatic and terrestrial habitats.

Credit, three hours.

**NTRS-503. CONSERVATION AND RESTORATION BIOLOGY, APPLICATIONS**

**3:3:0**

Application of theory and methodology presented in the theory course to field projects involving data collection and interpretation.

Credit, three hours.

**NTRS-504. ENVIRONMENTAL MODELING** **3:2:2**

An introduction to the major types of environmental models, including modeling theory and various methodologies used for modeling environmental systems. Two (2) hours lecture and two (2) hours laboratory/project work per week.

Credit, three hours.

**NTRS-531. ADVANCED ECOSYSTEMS** **3:3:0**

A philosophical course, integrating concepts in social, physical, and biological sciences with an introduction to the quantitative synthesis of ecological systems. The course is designed to provide the specialist with a total view of resource use and management.

Prerequisites: 23-205, NTRS-321 or the consent of the Instructor. Students who have taken NTRS-451 are not eligible to take NTRS-531 for graduate credit.

Credit, three hours.

**NTRS-551. EXPERIMENTAL DESIGN** **3:3:0**

A study of the use of advanced experimental designs in planning, analyzing, and interpreting experimental data. Three (3) one-hour class periods per week.

Prerequisites: Three (3) credits in Statistics/Biometrics.

Credit, three hours.

#### **NTRS-604. GIS APPLICATION IN NATURAL RESOURCES**

**3:2:2**

This course is an introduction to the design, development, and application of Geographic Information System technologies for students in natural resources, environmental management, or similar disciplines that could benefit from a professional GIS curriculum. Two (2) hours lecture and two (2) hours laboratory/project work per week.

Credit, three hours.

#### **NTRS-643. MARINE BIOLOGY**

**3:3:0**

A broad overview of the biota of marine environments, examining the ecological structure and function of oceanic, coastal, and estuarine habitats. Aspects of physical, chemical, and geological oceanography will also be covered pertinent to biological communities and adaptations. Lectures, demonstrations, laboratories, and two (2) weekend field trips.

Prerequisites: 23-205 or consent of the Instructor.

Credit, three hours.

#### **NTRS-644. WETLANDS BIOLOGY**

**3:3:3**

A broad overview of the ecological structure and function of wetlands environments, emphasizing comparisons of different wetland types in terms of hydrology, soils, biogeochemistry, biota, and ecological processes. Human interactions with wetlands will be examined in terms of wetlands values and functions, delineation, classification, inventory, regulations, mitigation, compensation, and management. Lectures, demonstrations, laboratories, and two (2) weekend field trips.

Prerequisites: 23-205 or consent of the Instructor.

Credit, three hours.

#### **NTRS-675. ADVANCED ENVIRONMENTAL POLICY AND LAW**

**3:3:0**

A study of the development and enforcement of environmental law. Emphasis on the history of the molding of national and regional environmental policy concerns. Synoptic review of major international, national, regional, state, and local environmental laws.

Prerequisites: 23-205 or permission of the Instructor. Students who have taken NTRS-475 are not eligible to take NTRS-675 for graduate credit.

Credit, three hours.

#### **NTRS-684. ADVANCED WILDLIFE BIOLOGY**

**3:3:0**

Advanced study of wildlife populations including the application of computers to field data analysis and theoretical models. Research techniques of project planning, record keeping, wildlife literature review, and scientific writing. Environmental management using remote sensing and reconnaissance field mapping, habitat analysis and evaluation, sustained yield, and wildlife damage control.

Prerequisites: NTRS-403.

Credit, three hours.

## MASTER OF SCIENCE IN FOOD SCIENCE

### OBJECTIVES

The educational objectives for this new degree would be to train new cadre of food scientists through integration of high quality course delivery methods and research. The proposed program will prepare a high tech workforce for the food industry through hands-on experience and integration of emerging technologies with the more traditional lecture. Integration of instruction and research will help students acquire the knowledge and skills needed to be successful food scientist in the global economy. The Graduate Program in Food Science is a multi-disciplinary program that integrates knowledge in biology, Chemistry, Biochemistry, microbiology, nutrition and engineering. Students entering the program must choose one (1) of the two (2) concentrations: 1.) Food Chemistry or 2.) Food Microbiology. Foundation course requirements will normally be satisfied with completion of a B.S. degree in Food Science from an accredited institution. Students deficient in the foundation courses will be required to complete selected undergraduate coursework to fulfill these foundation course requirements.

### ADMISSION AND DEGREE REQUIREMENTS

#### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree in Food Science, Biology, Chemistry, Nutrition, or a closely related field.
  - a. Must have a minimum of 2.75 overall undergraduate GPA for their undergraduate work.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit GRE scores. Students who have not taken the GRE will be given provisional admission. Students on provisional admission must complete admission requirements on/or before the end of the first semester.
5. Submit a resume.
6. Submit three (3) letters of recommendation to the Office of Graduate School and copies to the Chair of the Department of Human Ecology.
7. A statement of intent should tell us what you want to get out of your degree, what specific areas of research you are interest in studying, and perhaps why you have an interest in the Agriculture or Natural Resource area (maximum two pages).
8. International applicants must meet all requirements.

#### Requirements for International Applicants

All international students must meet the requirements listed below before the OISS issues a Certificate of Eligibility for Nonimmigrant (F-1) Student Visa (I-20 A-B form). A potential applicant must:

- Submit a written application for an I-20 signed by the student.
- Submit a copy of the acceptance letter from the Office of Graduate Studies (graduate) and be officially admitted by the Admissions Office.
- Submit a copy of the Scholarship/Award Letter (the letter must state the exact amount and duration of the scholarship/award). If the student will not receive a scholarship or if the scholarship does not cover the entire amount of tuition/fees and room/board, students must submit an Affidavit of Annual Cash Support with the following attachments: proof of sponsor's employment on employer's business stationery; official bank statements in U.S. dollars no less than two (2) months old and/or a letter from the bank on letterhead stationery which states the date the account was opened and current balance in U.S. dollars. International students must submit

financial documents that show funds exist to pay the total amount of at least the student's first year of study. Moreover, except for unanticipated conditions, students must also indicate how they will be supported for the remaining years of his/her program of study.

- Submit an **Affidavit of Free Room & Board** if student will live off-campus and reside with a friend or relative. The following documents must be attached to the Affidavit: copy of the deed, lease or rent receipts and proof of the sponsor's employment on employer's business stationery.
- Meet the health standards established by the university and provide adequate attested records of a physical examination and all required immunizations and enroll in or waive (based on adequate coverage), the university's international health insurance program no later than the first day of classes.
- Attend the International Student Orientation
- The TOEFL test must be taken if the earned baccalaureate degree is from a non-English speaking country. The IELTS may be accepted.

The department of Human Ecology graduate committee will review students' application materials and make recommendation for acceptance into the Food Science program. Admission to a graduate degree program requires both the recommendation of the department and the Graduate School.

### **DEGREE REQUIREMENTS**

The degree will involve a minimum of two (2) years of advanced coursework in food science. Students entering the program must choose one (1) of the two (2) concentrations: 1.) Food Chemistry or 2.) Food Microbiology. Foundation course requirements will normally be satisfied with completion of a BS degree in Food Science from an accredited institution. Students deficient in the foundation courses will be required to complete selected undergraduate coursework to fulfill these foundation course requirements.

#### **Foundation Courses are:**

- Mathematics, including college algebra, calculus and statistics
- Organic chemistry and Biochemistry
- Introduction to Physics
- Introduction to Microbiology
- Botany or General Biology

The Food Science program offers a Master's degree with a thesis option and non-thesis option.

#### **M.S. Thesis Option**

Candidates selecting a thesis option are required to complete at least thirty (30) credit hours of graduate level coursework including six (6) credits for thesis work. In addition, the candidate must develop a thesis topic, prepare a research prospectus and submit to a thesis committee for approval. Prior to graduation, a candidate must conduct research work, collect and analyze data, and write results and present to the Thesis Committee for an oral examination, which will consist principally of a defense of the thesis. After the thesis has been read and approved by the Thesis committee, it must be submitted to the Dean of the College and finally to the Dean of Graduate School. A majority of the student's thesis committee must approve the thesis and its defense. If approval is denied, the candidate will not be recommended for graduation. In this event, the student may be reexamined at a later period as determined by the thesis committee.

#### **M.S. Non-Thesis Option**

Candidates selecting a non-thesis option are required to complete at least thirty-three (33) credit hours of graduate level coursework. In addition, the candidates selecting a non-thesis option are required to take a comprehensive written and oral examination. Candidates are also required to write a comprehensive term paper on a topic related to Food Microbiology or Food Chemistry. The examination will be administered

each spring semester and during the first summer session each year. To be eligible to take the examination, the student must be within six (6) hours or less, of completing degree requirements upon completion of semester in which the comprehensive examination is scheduled.

### **Non-Degree Option**

This option provides opportunity for MBA and other professionals who are seeking graduate coursework for their professional growth.

### **Required Coursework**

Students enrolled in the Food Science graduate program are required to complete a minimum of thirty (30) credit hours for thesis option or thirty-three (33) credit hours for non-thesis option. Required coursework includes: 1.) Fundamentals of Food Science, 2.) Food Microbiology, 3.) Food Toxicology, and 4.) Experimental Design. Students must complete graduate level coursework with the approval of an advisor.

### **Requirements:**

1. Total hours required: a minimum of thirty (30) credit hours for thesis option or thirty-three (33) credit hours for non-thesis option. All coursework must be above 500-level.
2. Transfer Credits: a maximum of six (6) credit hours may be transferred into the program from another accredited institution of higher learning. For credits to be transferred: 1.) the course curriculum must have covered material equivalent to that of the substituted course within the program, 2.) the student must have earned a minimum grade of “B” for the course, and 3.) the course must be approved by the student’s Advisory Committee.
3. Departmental Seminar: students are required to take one (1) credit hour of departmental seminar.
4. Candidates must develop a thesis topic, prepare a research prospectus and submit to a thesis committee for approval. Prior to graduation, a candidate must conduct research work, collect and analyze data, and write results and present to the Thesis Committee for defense. A minimum of six (6) credit hours are required for Thesis research.

### **FACULTY**

The faculty in the Department of Agriculture and Natural Resources are dedicated to their respective fields of study and have a diverse background. Specific areas of research interest of the agriculture faculty include plant systematics, plant physiology, genomics tissue culture, forage production, forage utilization, and minor crop production, animal production, reproductive physiology, sustainable agricultural production, and animal well-being. Active research programs exist within these areas and offer graduate students many opportunities for active learning and discovery.

**MASTER OF SCIENCE IN FOOD SCIENCE (Thesis Option)**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
CHEM-621	3	Advanced Biochemistry
HMEC-500	3	Fundamentals of Food Science*
HMEC-625	1-6	Research Problems
HMEC-520	3	Food Microbiology*
AGRI-506	3	Experimental Design*
HMEC-590	3	Food Toxicology*
HMEC-630	3	Thesis Research I
HMEC-630	3	Thesis Research II
HMEC-661	1	Graduate Seminar
HMEC-xxx	6	Electives
<b>TOTAL CREDIT HOURS: 30</b>		

**MASTER OF SCIENCE FOOD SCIENCE (Non-Thesis Option)**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
CHEM-621	3	Advanced Biochemistry
HMEC-500	3	Fundamentals of Food Science*
HMEC-625	1-6	Research Problems
HMEC-520	3	Food Microbiology*
AGRI-506	3	Experimental Design*
HMEC-590	3	Food Toxicology*
HMEC-661	1	Graduate Seminar
HMEC-xxx	11	Electives (above the 500 level)
<b>TOTAL CREDIT HOURS: 33</b>		

\*Students in both options are required to take these courses.

## **COURSE DESCRIPTIONS**

**(Note: Additional Course Descriptions can be found under Animal Science, Food Science, Plant Science, Natural Resources and Biology)**

### **HUMAN ECOLOGY (HMEC) (18)**

#### **HMEC-500. FUNDAMENTALS OF FOOD SCIENCE**

**3:2:1**

This course provides an in-depth review of the fundamental concepts in food science including food chemistry, food microbiology and safety, food processing and engineering, nutrition, sensory evaluation, and food product development. Students would develop the skills needed to analyze the composition, chemical and physical properties of food in the laboratory. Two (2) hours of lecture and one (1) hour of lab.

Credit, three hours.

#### **HMEC-510. FOOD PROCESSING**

**3:3:0**

The course integrates principles of food chemistry including nutrition, food biotechnology, characteristics of raw food materials, principles of food preservation including low and high temperatures, pH, salinity, water activity, Principles of food processing techniques, such as freeze drying, high pressure, aseptic processing, extrusion, packaging materials and methods, cleaning and sanitation, water and waste management. Three (3) hours of lecture.

Credit, three hours.

#### **HMEC-520. FOOD MICROBIOLOGY**

**3:2:1**

The course deals with the identification, enumeration, and characterization of pathogenic and spoilage microorganisms associated with foods and food processing. Beneficial microorganisms in food systems will be discussed. Influence of the food system on the growth and survival of microorganisms and control of microorganisms will be studied. The course introduces techniques for detecting and quantifying microorganisms in foods. Application of colony counts, most probable numbers, immunoassays, and molecular techniques is used to understand the numbers and types of microorganisms or microbial end products in foods. Laboratory safety and oral and written reports are emphasized. The course provides students with standard techniques used in microbial analysis of foods and the major groups of organisms associated with food safety and spoilage problems, and food production. Two (2) hours of lecture and one (1) hours of lab.

Credit, three hours.

#### **HMEC-530. FOOD CHEMISTRY**

**3:3:3**

The course covers the structure and properties of major and minor food components, including water, carbohydrates, protein, lipids, other nutrients and food additives, and the chemistry of changes occurring during food processing, storage and utilization. Three (3) hours lecture and three (3) hours lab a week.

Prerequisites: HMEC-500, CHEM-302.

Credit, three hours.

#### **HMEC-535. FOOD TOXICOLOGY**

**3:3:0**

This course emphasizes biological and chemical aspects of toxicology, microbial aspects of food borne infections and intoxications, food additives, toxic substances occurring in food, either naturally or formed during processing, and the toxic effects of these substances on the biological systems. Safety of genetically engineered foods, risk assessment and food safety policy will be discussed as general topics. Three (3) lecture hours a week.

Prerequisites: HMEC-520, HMEC-530.

Credit, three hours.

**HMEC-540. FOOD ANALYSIS****3:2:3**

Principles, methods and techniques used for quantitative physical and chemical analyses of food and food ingredients. Analytical techniques will include spectroscopy, chromatography, mass spectrometry, immunochemistry and atomic absorption. Physical measurements of food properties will cover color, pH, water activity, water holding capacity and textural characteristics. Two (2) hours lecture and three (3) hours lab a week.

Prerequisites: CHEM-530.

Credit, three hours.

**HMEC-550. FOOD ENGINEERING****3:3:0**

The course deals with the material and energy balances with application food processing, fluid flow, and heat and mass transfer in food processing, and thermodynamics properties. Three (3) hours lecture a week.

Prerequisites: PHYS-201, MTSC-251.

Credit, three hours.

**HMEC-560. PRINCIPLES OF HACCP****2:2:0**

The course provides an in-depth review of the Hazard Analysis and Critical Control Point (HACCP) system and its application in the food industry. Two (2) hours lecture a week.

Credit, two hours.

**HMEC-570. SENSORY EVALUATION OF FOODS****3:2:3**

Sensory techniques used in evaluating food appearance, texture, and flavor, and the evaluation of consumer acceptance. The course includes an introduction to sensory testing methods, consumer panels and statistical methods for analyzing sensory data. Two (2) hour lecture and three (3) hours lab a week.

Prerequisites: HMEC-500.

Credit, three hours.

**HMEC-580. FOOD QUALITY ASSURANCE****3:3:0**

All technical aspects of quality assurance and quality control will be covered. Topics covered will include quality management systems, selection of analytical methods, HACCP principles, acceptance sampling, product recall plans, statistical quality control methods, government regulation and food legislation. Three (3) hours lecture a week.

Prerequisites: HMEC-510.

Credit, three hours.

**HMEC-600. FOOD PRODUCT DEVELOPMENT****3:2:1**

The course deals with all aspects of new food product development from concept to commercialization, including market screening; idea generation; prototype development; ingredient functionality and interactions; processing; packaging; safety and regulatory issues; labeling; physical, chemical, microbiological, and sensory evaluations; quality control procedures; and HACCP plans. Two (2) hours lecture and one (1) hour lab a week.

Prerequisites: HMEC-530 or consent of the Instructor.

Credit, three hours.

**HMEC-610. ADVANCED FOOD SAFETY****3:3:0**

The course provides and understanding of the relationship of environmental factors to occurrence, growth and survival of microorganisms in foods, Food Safety Epidemiology, HACCP, sanitation, food safety education, and risk assessment. Risk Management in the context of food safety is-the process of weighing

policy alternatives to control risks as effectively as possible. Food Safety Epidemiology. Three (3) hours lecture a week.

Prerequisites: HMEC-560.

Credit, three hours.

**HMEC-620. FOOD SCIENCE INTERNSHIP**

**3:0:0**

Supervised on-site, hands-on experience in the food industry or in governmental agencies that regulate food. Students will be full-time interns and are required to work a minimum of three (3) months during the Summer, Fall, or Spring Semester. An intern will be expected to prepare and present a written report at the end of the internship.

Credit, three hours.

**HMEC-625. RESEARCH PROBLEMS IN FOOD SCIENCE**

**6:0:0**

A special problem course designed to provide research training in the area of the student's area of concentration and specification related to the needs of their research and thesis work.

Credit, one to six hours.

**HMEC-630. THESIS RESEARCH**

**6:0:0**

An in depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, three to six hours.

**HMEC-661. GRADUATE SEMINAR**

**1:0:0**

A seminar, meeting once per week with faculty and student presentations on their research and/or other relative scientific topics.

Credit, one

## **MASTER OF SCIENCE (MS) DEGREE IN FAMILY AND CONSUMER SCIENCE EDUCATION (FCSE)**

### **Admission Requirement**

For admission to the MS degree program in FCSE, applicants are required to have completed a B.S. degree in family and consumer science education or a related field. Preference will be given to applicants who are certified teachers of Family and Consumer Sciences. Prospective graduate students must have a minimum of 2.75 overall undergraduate GPA in their undergraduate work and taken the GRE. Students who have not taken the GRE will be given **probational admission**. Students on probational admission must complete admission requirement on/or before the end of the first semester. All applicants are required to:

1. Earned Baccalaureate degree,
2. Complete an application for admission,
3. Submit official transcript(s),
4. Submit GRE scores
5. Submit a resume,
6. Submit two letters of recommendation to the Office of Graduate School and copies to the Chairperson of department Human Ecology,
7. The TOEFL test must be taken if the earned baccalaureate degree is from a non-English speaking country.

The department of Human Ecology graduate committee will review students' application materials and make recommendation for acceptance into the FCSE program. Admission to a graduate degree program requires both the recommendation of the department and the Graduate School.

### **Degree Requirement:**

Students admitted into the FCSE program are required to complete at least **30** hours of graduate level course work for a Thesis Option or 32 credit hours for a Non-Thesis Option. Required coursework includes: 1) curriculum development, 2) educational leadership, and 3) Statistics and Research methods. A Master Degree of Family and Consumer Sciences Education is conferred upon completion of course work, maintaining a minimum GPA of 3.00 and completing a Thesis or passing a written and oral comprehensive examination.

### **M.S. Thesis Option**

Candidates selecting a thesis option must develop a thesis topic, prepare a research prospectus and submit to a thesis committee for approval. Prior to graduation, a candidate must conduct research work, collect and analyze data, and write results and present to the Thesis Committee for an oral examination, which will consist principally of a defense of the thesis. After the thesis has been read and approved by the Thesis committee, it must be submitted to the Dean of the College and finally to the Dean of Graduate School. A majority of the student's thesis committee must approve the thesis and its defense. If approval is denied, the candidate will not be recommended for graduation. In this event, the student may be reexamined at a later period as determined by the thesis committee.

### **M.S. Non-Thesis Option**

Candidates selecting a non-thesis option are required to take a comprehensive written and oral examination. Candidates are also required to write a comprehensive term paper on a topic related to Family and Consumer Science. The examination will be administered each spring semester and during the first summer session each year. To be eligible to take the examination, the student must be within six (6) hours or less, of completing degree requirements upon completion of semester in which the comprehensive examination is scheduled.

### **Non-Degree Option**

This option provides opportunity for FCS professionals who are seeking graduate course work for their professional growth.

### **Required Course Work**

Students enrolled in the FCSE graduate program are required to complete a minimum of **30** credit hours for the **Thesis Option** or **33** credit hours for Non-Thesis option. Required coursework includes: 1) curriculum development, 2) educational leadership, and 3) statistics and research methods. In addition to these required courses, students may focus on an individualized area of interest through the selection of courses within and outside of the department. Students must complete at least 18 credit hours in Family and Consumer Sciences courses offered in the department of Human Ecology. This may include the 6 semester hours for thesis. The remaining semester hours could be completed outside the department.

Students must complete graduate level course work in one of the following areas (6 credits) with the approval of an advisor:

1. Family and Consumer Sciences
2. Food and Nutritional Science
3. Textiles and Apparel Studies

### **Requirements:**

5. Total hours required: a minimum of **30** credit hours for Thesis option or **33** credit hours for Non-Thesis option. All coursework must be above 500-level.
6. Transfer Credits: a minimum of 6 credit hours may be transferred into the program from another accredited institution of higher learning. For credits to be transferred: 1) the course curriculum must have covered material equivalent to that of the substituted course within the program, 2) the student must have earned a minimum grade of “B” for the course, and 3) the course must be approved by the student’s Advisory Committee.

7. Departmental Seminar: students are required to take 2 credit hours of departmental seminar.
8. Candidates selecting a thesis option must develop a thesis topic, prepare a research prospectus and submit to a thesis committee for approval. Prior to graduation, a candidate must conduct research work, collect and analyze data, and write results and present to the Thesis Committee for an oral examination, which will consist principally of a defense of the thesis. A minimum of 6 credit hours are required for Thesis research.
9. Candidates selecting a non-thesis option are required to take a comprehensive written and oral examination. Candidates are also required to write a comprehensive term paper on a topic related to Family and Consumer Science.

### **PROGRAM MANAGEMENT**

***Thesis/Advisory Committee:*** Students admitted into the program must have an Advisor who will serve as the Chairperson of the Thesis/Advisory Committee. A student's Academic Advisor in consultation with the student must select an Advisory Committee during the last week of the first semester and no later than the first month of the second semester. The Thesis/Advisory Committee must be approved by the Department Chairperson and the Graduate School. The Advisory Committee should consist of a minimum of three graduate faculty members, and one of the members must be from another department.

***Thesis/Advisory Committee Responsibility:*** The responsibility of this Committee is to guide student's research work and proof read Thesis, evaluate academic performance and conduct appropriate examination.

**Time Limit for Completion of Degree:** It is expected that this program will take two-three years

## CURRICULUM

### *Course Sequence*

Year 1: Semester 1

<i>Course #</i>	<i>Course Name</i>	<i>Credit hours</i>
HMEC-561	Curriculum Development & Evaluation FCS	3
EDUC-640	Diversity in Education	3
HMEC-xxx	FCSE Elective (optional)	3

Year 1: Semester 2

<i>Course #</i>	<i>Course Name</i>	<i>Credit hours</i>
EDUC-683	Using Tech to Enhance Learning	3
HMEC-515	Fam. Eco & Resource Mgmt	3
HMEC-621	Statistics & Research Methods in FCS	3

### *Year 2: Semester 1*

<i>Course #</i>	<i>Course Name</i>	<i>Credit hours</i>
HMEC-700	FCSE Thesis	2
HMEC-622	Theor & Method of Instruction in FCS	3
EDUC-614	Human Growth & Development	3

### *Year 2: Semester 2*

<i>Course #</i>	<i>Course Name</i>	<i>Credit hours</i>
HMEC-700	FCSE Thesis	3
HMEC-603	Global Sourcing of Apparel & Textile Products	3
EDUC-611	Theor. & Practices of Exceptionalities	3
HMEC-661	Research Seminar in FCSE	1

Abbreviations:

**ED** = Education

**FCSE** = Family and Consumer Science Education

**FNS** = Food and Nutritional Sciences

**TAS** = Textiles and Apparel Studies

## COURSE DESCRIPTIONS

**HMEC-503 (TAS) Fundamentals of Fashion Industry 3:3:0**

Fashion with an emphasis on various product categories. Concentration on fashion innovation, the role of designers, trends in fashion, and the power of fashion in society. Identification of components in apparel assembly and a structural approach to evaluating apparel quality.

**HMEC-505 (TAS) Product Development in the Textile and Apparel Industries 3:3:0**

Study of product development methods and core functions of this process. The principles discussed in this course can be used in the development of all types of products. This course is specifically designed to focus on products that utilize textiles.

**HMEC-507 (TAS). Fashion Promotion and Visual Merchandising 3:3:0**

Overview of promotion practices in the apparel design, product development, manufacturing, and retail merchandising environment, including promotion planning and budgeting, special event organization, advertising, public relations, publicity, fashion show production, and visual merchandising.

**HMEC-508 (FCSE) Current Problems and Trends in Family & Consumer Sciences 3:3:0**

Readings and discussion of selected classic studies and recent developments in the field of family studies, education, clothing, textiles and merchandising. Implications for teachers, extension workers and others.

**HMEC-509 (TAS) Economics of Apparel and Textile Industries 3:3:0**

Factors affecting the production, distribution, and consumption of apparel and textile products; the role of the apparel and textile industries in the national economy

**HMEC-510 (FNS) Issues in Eating Disorders/Obesity & Health problems 3:3:0**

Interdisciplinary examination of eating disorders within the social and family context. Body image, self-esteem, cultural context, appropriate exercise and nutrition, human development, family science theory, family stress, child abuse, and interventions. Issues related to prevention, intervention, and genetics/physiology

**HMEC -513 (FCSE) Theory & Practice for Web-Based Instruction in Education 3:3:0**

Theory and application of design and development principles unique to Career and Technical Education (CTE) web-based course content. Focuses on development of knowledge and skills needed to engage in planning, management, assessment, and effective delivery of CTE web-based instruction and learning.

**HMEC -515 (FCSE) Family Economic Issues and Resource Management 3:3:0**

Personal and family management, including value orientation, decision making, and developing and using resources. Evaluate Family decision making processes involved and the role of housing. Emphasis is on interrelationships among decisions and the links between economic and social issues.

**HMEC-522 (FNS). Food and Nutrition Education Methods 3:3:0**

Philosophy, principles, methods, and materials involved in nutrition education. Application of nutrition knowledge and skills in the development, delivery, and evaluation of nutrition

education curriculum and programs in schools and communities is emphasized.  
Non-traditional format: Lecture and online.

**HMEC-524 (FNS). Managing School Nutrition Programs 3:3:0**

Principles of managing school nutrition programs, including federal, state, and local regulations; planning appealing and nutritious meals for children; budget management; human resources management; organizational leadership; marketing and communications; planning, assessment, and evaluation of programs.

**HMEC-551 (FCSE) Family Financial Counseling 3:3:0**

Indicators, causes, and impact of family financial problems on the family's well-being. Topics covered include credit difficulties, repossessions, liens, garnishments, and bankruptcy. Non-traditional format: Students are required to work on a regular basis with families in financial difficulty.

**HMEC-561 (FCSE) Curriculum Development & Evaluation in Fam. & Con. Sci 3:3:0**

Principles of curriculum development involving theoretical and philosophical concepts with emphasis on Family and Consumer Science programs including elementary, secondary, continuing education, and college. The analysis and development of curriculum and methods of teaching FCS in the context of the National Standards for FCS Students, the National Standards for Teachers of FCS and the standards for the state in which the candidate will teach. This course will include learners and the learning environment; program leadership; beginning instructional strategies; curriculum development; integration of technology in the FCS classroom; and assessment.

**HMEC-603 (TAS) Global Sourcing of Apparel and Textile Products 3:3:0**

The theory and practice of the global sourcing, manufacturing, and distribution of apparel and textile products. Understand the basic concepts and strategies unique to the retail industries of countries around the world. Emphasis placed on successful retail organizations and structures, merchandising and organization of market resources in apparel and textiles.

**EDUC-611 THEORIES AND PRACTICES OF EXCEPTIONALITIES 3:3:0**

This course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

**EDUC-614 (ED). HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

**HMEC-620 (FCSE) Issues of Ethnically Diverse students in Fam & Con Sci 3:3:0**

Influences of culture and ethnicity on family dynamics and child development on Family and Consumer Science programs. Historical, social, economic, political, and environmental factors that impact family processes and child bearing practices of ethnically diverse groups. Professional skills for effectively interacting with and serving culturally diverse populations

**HMEC-621 (FCSE) Statistics & Research Methods in FCS 3:3:0**

Analysis and interpretation of research in family consumer sciences. Examination of qualitative and quantitative research methodologies. Emphasis is placed on theory development, research design, and data analysis.

**HMEC-622 (FCSE) THEORIES AND METHODS OF INSTRUCTION in FCS 3:3:0**

This course is a study of educational theories as applied to curriculum and instruction in Family and Consumer Sciences (FCS) with emphasis on current trends and the identification of the instructional process, organizing operations and skills for teaching FCS. 3 credits.

**HMEC-631 (FCSE) Evaluation in Family and Consumer Sciences Education 3:3:0**

Methods of evaluation. Relationship to curriculum. Selection, construction, and use of evaluation devices for family and consumer sciences programs

**EDUC-640 (ED) DIVERSITY IN EDUCATION 3:3:0**

This course explores the use of knowledge about culture in the schooling process. It presents specific teaching strategies, classroom management techniques and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization. 3 credits.

**HMEC-661 (FCSE) Research Seminar in FCSE 3:3:0**

Repeatable for maximum 3 hours credit. Critical evaluation of research literature, research paradigms, future research needs, and research design/methodology in FCSE. Development of research skills necessary to identify an appropriate thesis topic and prepare the prospectus.

**HMEC-700 (FCSE) Master's Thesis 1-6 credit**

Repeatable for maximum 6 hours credit. Thesis writing under the direction of the major professor. Non-traditional format: Independent research and thesis preparation.

# **COLLEGE OF ARTS, HUMANITIES & SOCIAL SCIENCES**



## **Department of Art**

Master of Science in Art Education

## **Department of English and Foreign Languages**

Master of Arts in Teaching English as a Second Language

## **Department of History, Political Science, and Philosophy**

Master of Arts in Historic Preservation

## **MASTER OF SCIENCE IN ART EDUCATION**

### **OBJECTIVES**

This program is designed to meet the practical needs of the classroom art teacher by enabling them to: develop in-depth knowledge and skills in areas of teaching and learning in art education; help experienced teachers improve their competencies; enable practicing artists become art teachers; prepare students to work in museum and community settings; and in, in general, to prepare for art teaching at all levels. The M.A. Degree Program will prepare art educators for research and practice in art education. Focus will be on promoting cognitive understanding of art and education for all students through curriculum that balances studio work with art criticism, aesthetics, and the study of historical and intellectual concepts that include scholarly writing and research.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in a Visual Arts Education related field.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit GRE scores.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. A statement of intent is required, but there are no specific requirements or guidelines.
8. A scholarly Essay is required, but there are no specific requirements or guidelines. (Essay should be 1000 - 1500 words.)
9. Submit a Visual Arts Project/Portfolio. All applicants are asked to provide a CD portfolio (or link to an online portfolio ready for viewing). This portfolio should include students' work accomplished under your supervision, as well as selection of your own area of expertise and concentration, along with an artist's statement.
10. International applicants must meet all requirements.

Applicants seeking matriculation are subject to the approval of Delaware State University's Graduate College and Research and the Department of Visual Art.

#### **DEGREE REQUIREMENTS**

The Master of Science Degree in Art Education requires the completion of thirty (30) credit hours with a minimum of 3.0 cumulative grade point average. Students may select either a Thesis or Project option for their final research presentation.

## MASTER OF SCIENCE IN ART EDUCATION

<b>CORE COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
05-618	3	Critical Dialogue, About Art History and Aesthetic
05-629	3	Planning for Community Arts Services
05-640	3	Art and Curriculum Concepts for Art Teachers
05-645	3	Practices and Theories in Computer Graphics
05-642	3	Assessment Strategies in Art Education
05-660	3	Selected Topics in Art Education (approved by Advisor and Instructor)
05-661T	3	Artist Teacher Connection (approved by Advisor and Instructor)
05-662T	3	Traditions of Art (approved by Advisor and Instructor)
05-663T	3	Cultural and Ethnic Infusion in Art Education (approved by Advisor and Instructor)
05-664T	3	Issues and Recent Research in Art Education (approved by Advisor and Instructor)
05-665P	3	Artist Teacher Connection (approved by Advisor and Instructor)
05-666P	3	Traditions of Art (approved by Advisor and Instructor)
05-667P	3	Cultural and Ethnic Infusion in Art Education (approved by Advisor and Instructor)
05-668P	3	Issues and Recent Research in Art Education (approved by Advisor and Instructor)
05-700	3	Overview of Research Methods in Art Education
05-705	6	Master's Thesis/Project*
<b>ELECTIVES (select 3 credit hours)</b>		
05-608	3	Free Studio Elective - Drawing
05-633	3	Free Studio Elective - Printmaking
05-644	3	Free Studio Elective - Painting
05-645	3	Practices and Theories in Computer Graphics
05-646	3	Free Studio Elective-Fibers
<b>TOTAL CREDIT HOURS: 30</b>		
<p>*Students selecting a Thesis option must complete ONE Selected Topic from 05-661T-4T.            Students selecting a Project option must complete ONE Selected Topic from 05-665P-8P.</p>		

## **COURSE DESCRIPTIONS**

### **ART (ART) (05)**

#### **05-608. MASTERS LEVEL DRAWING**

**3:3:0**

The course deals with an advanced topic in drawing and compositional skills, involving the exploration of a variety of techniques, tools, and media used in drawing. The finished body of work may include problems in composition, line, perspective, the figure, and volume, combined with personal contextual imagery. (Lab Fee)

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **05-6ART. CRITICAL DIALOGUE ABOUT ART HISTORY AND AESTHETIC**

**3:3:0**

The course focuses on the theory and practice of engaging students in informed dialogue about works of art. Students will be introduced to the process of descriptive analysis as a means to a greater appreciation of works of art and of the creative process. Concepts discussed include the themes and purposes of art, the vocabulary of art, composition, and the basic principles of design.

Credit, three hours.

#### **ART-629. PLANNING FOR COMMUNITY ARTS SERVICES**

**3:3:0**

The course is designed to assist the art education major to develop skills in grant writing, fundraising, marketing, and public relations in community arts. Students will research current trends in arts administration and explore the diversity of career opportunities. Students will have the opportunity to connect with community arts organizations and to develop a model project that portrays an enduring understanding of organizational and programmatic development. Students will intern in an arts organization and develop short and long range goals related to the success of running a community arts program.

Credit, three hours.

#### **05-633. GRADUATE LEVEL PRINTMAKING**

**3:3:0**

The course introduces and/or reinforces the graduate Art Education student to various fine art methods of printmaking. Monoprint, relief, intaglio, and serigraph processes will be explored. Painterly and photographic approaches to creating designs suitable for printing methods will be encouraged. Students will research artists' work and their approaches in the field of printmaking and the contributions made in the medium. Once approaches to basic media have been introduced, students will be guided to combine processes in a contemporary and advanced manner. (Lab Fee)

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **ART-640. ART AND CURRICULUM CONCEPTS FOR ART TEACHERS**

**3:3:0**

Problems relating to teaching art, in terms of personal knowledge, insight into children's art work and approaches to teaching art to children in a K-EDUC curriculum. Students will examine a variety of contemporary issues (teaching theories, curriculum development, communication strategies, and real-life teaching scenarios) facing teachers in schools. Resources from the areas of psychology, sociology and art education are investigated.

Credit, three hours.

#### **ART-642. ASSESSMENT STRATEGIES IN ART EDUCATION**

**3:3:0**

The course is designed to explore assessment issues in art education, and application of assessment theories and practices related to art instruction from K-EDUC. Students will be involved in individual or group research on the assessment of art teaching/learning incorporating theory and practice. Focus will

be on implementing strategies that will assess levels of students learning in the arts, by exposing them to topics related to 'Understanding by Design'.

Credit, three hours.

#### **ART-644. GRADUATE LEVEL PAINTING**

**3:3:0**

The aim of the course is to provide the structure and instruction that will enable artists to develop, refine, and clarify their work. Students will be exposed to concepts, issues, and artists, past and present, relevant to the practice and study of art in the contemporary setting. The course emphasizes oil painting, acrylic painting, and newer media. Students will focus on a series of related works in relationship to concept, technique, and media. A written study proposal is required of each student at the beginning of the semester. In the proposal, you will state your interests and set your own goals for the semester. You will define in what media you will work, what themes, issues, or ideas you will explore what questions you will be trying to answer, and what procedures, resources, and course of study you will pursue to accomplish your goals. The proposal is a working document, not a contract, so it should not impose strict limits on your pursuits. The proposal is a "compass" that will help you set and maintain your course, but is not necessarily a clear map of where you will find yourself at the end of the journey. (Lab Fee)

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **ART-645. PRACTICES AND THEORIES IN COMPUTER GRAPHICS**

**3:3:0**

Technical and theoretical aspects of computer graphics will be examined in the course. Students will analyze the various modes in which technology can be integrated into the classroom. A critical approach to hands-on assignments will be emphasized. Course requirements will meet national standards in several content areas. (Lab fee)

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **ART-646. GRADUATE LEVEL FIBERS**

**3:3:0**

Students will be introduced to work on four (4) harness weaving looms and off loom techniques. The basic loom techniques include: weaving terminology, textile analysis and pattern drafting, preparation of wrap, dressing, and operating the loom. (Lab Fee)

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **ART-660. SELECTED TOPICS IN ART EDUCATION**

**3:3:0**

Independent topic selected by student and Advisor based on focus of research or project.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

#### **ART-661T. ARTIST TEACHER CONNECTIONS**

**3:3:0**

The course is an in-depth study of a particular topic, contemporary issue, or concern in studio related art education instruction. The course will be taught by specialists within the field as an alternative methodology for K-EDUC teachers. A faculty member will coordinate a series of guest speakers who will meaningfully address each topic. Exploration of the dual aspects of the art educator as artist/teacher includes studio work, museum trips, journal writing, research of cultural/historical expressions, and unit planning relevant to K-EDUC education.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-662T. TRADITIONS IN ART****3:3:0**

Theory and practice of engaging others in informed dialogue about traditions of art is a course designed to provide students to investigation works of art history concepts, aesthetics, and processes analyzing the traditions that they originated from. The course will foster further study of aesthetics and art history in Arts Education.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-663T. CULTURAL AND ETHNIC INFUSION IN ART EDUCATION****3:3:0**

The study of multicultural art education includes investigation of cultural contexts, studio processes, and teaching strategies in grades K-EDUC. The course will address four (4) themes relating to professional education: research, reflection, learning, and leading. Students will be given the opportunity to review, analyze, discuss, and apply research from diverse perspectives in education, including professional scholarship and practitioner inquiry, in order to reflect on their own practices as they study, observe, and practice in K-EDUC school and university classrooms. Reflection will also be integrated into students' learning opportunities through the production of written essays and analyses of observation and teaching experiences to help students take advantage of the analytical and problem-solving skills that comprise critical professional reflection on one's own teaching. The course emphasizes the commitment of professional education to assure that graduates move into their professional lives equipped for life-long learning as educators who will be active in leading colleagues in their schools, districts, and professional organizations. The ultimate goal in addressing these four (4) themes is to produce teacher leaders who work together to improve student learning among diverse populations and improve education in Delaware and beyond.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-664T. ISSUES AND RECENT RESEARCH IN ART EDUCATION****3:3:0**

The course draws focuses on the identification of issues in art education at various curricular levels; examination of related research with possible implications for practice and for purposes of study and discussion. Emphasis will be upon a selection of readings of the past two (2) decades that deepens knowledge and insight into issues currently confronting the field. Emphasis will be upon independent inquiry, individual presentations of subject matter, and group discussions related to assigned readings and the selected readings of participants.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-665P. ARTIST TEACHER CONNECTIONS****3:3:0**

The course is an in-depth study of a particular topic, contemporary issue, or concern in studio related art education instruction. The course will be taught by specialists within the field as an alternative methodology for K-EDUC teachers. A faculty member will coordinate a series of guest speakers who will meaningfully address each topic. Exploration of the dual aspects of the art educator as artist/teacher includes studio work, museum trips, journal writing, research of cultural/historical expressions, and unit planning relevant to K-EDUC education.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-666P. TRADITIONS IN ART****3:3:0**

Theory and practice of engaging others in informed dialogue about traditions of art is a course design to provide students to investigation works of art history concepts, aesthetics and processes analyzing the traditions that they originated from. The course will foster further study of aesthetics and art history in Arts Education.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-667P. CULTURAL AND ETHNIC INFUSION IN ART EDUCATION 3:3:0**

The study of multicultural art education includes investigation of cultural contexts, studio processes, and teaching strategies in grades K-EDUC. The course will address four (4) themes relating to professional education: research, reflection, learning, and leading. Students will be given the opportunity to review, analyze, discuss, and apply research from diverse perspectives in education, including professional scholarship and practitioner inquiry, in order to reflect on their own practices as they study, observe, and practice in K-EDUC school and university classrooms. Reflection will also be integrated into students' learning opportunities through the production of written essays and analyses of observation and teaching experiences to help students take advantage of the analytical and problem-solving skills that comprise critical professional reflection on one's own teaching. The course emphasizes the commitment of professional education to assure that graduates move into their professional lives equipped for life-long learning as educators who will be active in leading colleagues in their schools, districts, and professional organizations. The ultimate goal in addressing these four (4) themes is to produce teacher leaders who work together to improve student learning among diverse populations and improve education in Delaware and beyond.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-668P. ISSUES AND RECENT RESEARCH IN ART EDUCATION 3:3:0**

The course draws focuses on the identification of issues in art education at various curricular levels; examination of related research with possible implications for practice and for purposes of study and discussion. Emphasis will be upon a selection of readings of the past two (2) decades that deepens knowledge and insight into issues currently confronting the field. Emphasis will be upon independent inquiry, individual presentations of subject matter.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-698. SUSTAINING THESIS - ART 0-6:0-6:0**

This course allows students the opportunity to continue the thesis writing process under the supervision of their advisor.

Credit, zero to six hours.

**ART-700. OVERVIEW OF RESEARCH METHODS IN ART EDUCATION 3:3:0**

An Introduction to a wide range of methods applicable to art education research problems, including historical, philosophical, ethnographic, survey, experimental, and case studies.

Prerequisites: Consent of the Advisor and Instructor.

Credit, three hours.

**ART-705. MASTER'S THESIS/PROJECT 6:6:0**

The thesis for the M.S. degree in Art Education is structured as a research project. A clear research problem, methodology, and conclusions are necessary. Coursework will help prepare you for designing a research project that is both significant and of interest to you. Your thesis advisor and committee members will additionally help you design your research project. In addition to completing and reporting on a research project of significance to the field, the thesis is meant as a research learning experience.

Prerequisites: Consent of the Advisor and Instructor.

Credit, six hours.

## **MASTER OF ARTS IN TEACHING ENGLISH AS A SECOND LANGUAGE (TESL)**

### **OBJECTIVES**

The M.A. in ESL/Bilingual Education is designed to achieve the following:

- Provide candidates with exposure to the theory and practice of teaching English to children whose first language is not English (LEP and ELL);
- Certify teachers as bilingual and ESL teachers;
- Provide candidates with an advanced level of expertise and a thorough training in the discipline of analyzing the various facets of teaching LEP and ELL children; and
- Provide candidates with the preparation necessary for a career as a school teacher.

The M.A. in ESL/Bilingual Education is an interdisciplinary program designed for educational personnel at the early childhood, elementary, as well as, secondary school levels. The program emphasizes the training of teachers who are interested in working with second language learners from diverse linguistic settings. It also helps its candidates explore research related to bilingual and bicultural children. Finally, the program is open for non-degree teachers who simply want to take courses for Certification or for certified teachers who simply need Content Knowledge courses.

The interdisciplinary program involves courses taught in the Department of English and Foreign Languages on the one hand, and on the other hand, courses taught in the Department of Education. Faculty and staff from the above departments shall cooperate to make the program a success. While candidates shall use facilities available in both departments, the Department of English and Foreign Languages is responsible for coordinating and directing the student orientation, student advisement, student teaching, field experience, thesis projects, and portfolio reviews.

### **ADMISSIONS AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Applicants must possess the ability to produce graduate work of high quality, and be proficient in the target language.
  - b. Bachelor's degrees earned from international institutions may be considered, to the discretion of the relevant admissions personnel.
2. Teachers who intend to take courses for purposes of certification only must show evidence that they have earned a bachelor's degree at a regionally accredited college or university, in addition to proof of their professional affiliation with a particular school system in the nation.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit GRE scores.
6. Submit three (3) letters of recommendation from professors or supervisors.
7. A scholarly Essay is required that indicates education career goals and experience. (Essay should be 800 words.)
8. Show evidence of having passed Praxis I.
9. International applicants must meet all requirements.

Applicants must also submit the following to the Program Admissions' Committee:

1. Candidates need a pre- or co-requisite teacher education program in the following areas:
  - a. English, Foreign Language, Elementary Education, or Content Areas for ES (O) L.
  - b. Elementary Education (or Exceptional Children) for Bilingual: Elementary.
  - c. Content Area such as Biology, English, or Exceptional Children for Bilingual: Secondary.

Other requisites include:

1. Content Knowledge proficiency in the language where certification is sought: fifteen (15) semester hours of language at the intermediate level or above (or content knowledge Praxis II test) for Bilingual and up to thirty (30) semester hours at the intermediate level for ESOL (or content knowledge Praxis II test).
2. Productive Language test for Bilingual speakers.
3. Verification of knowledge of the relative culture (course, study abroad, native experience, etc.).

Furthermore, candidates have to fulfill the following language requirements:

1. **Proficiency in English:** native or near native fluency is required of all candidates.

## **DEGREE REQUIREMENTS**

The following is a proposal for a two-degree plan: a thirty-six (36) semester-hour plan without thesis but with a Comprehensive Exam (Plan A) or a thirty (30) semester-hour plan with thesis (6 credits), excluding the Comprehensive Exam (Plan B). Candidates of either plan must complete a three (3) credit practicum. Here is a breakdown of both programs:

### **Plan A includes:**

- Twenty-one (21) semester hours concentration in educational foundations, bilingual education, and linguistics courses.
- Twelve (EDUC) hours in a minor concentration.
- A three (3) credit hour practicum.
- A Comprehensive Exam

### **Plan B includes:**

- Twenty-one (21) semester hours concentration in educational foundations, bilingual education, and linguistics courses.
- Six (6) hours of electives.
- A three (3) credit hour practicum.
- A Comprehensive Exam.
- A thesis (6 hours).

## TEACHING ENGLISH AS A SECOND LANGUAGE (TESL)

<b>Year 1 – Fall I Session</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
ENGL-518	3	Methods of Teaching English as a Second Language*
<b>Year 1 – Fall II Session</b>		
EDUC-557	3	Effective Teaching Skills and Classroom Management *
<b>Year 1 – Spring I Session</b>		
ENGL-519	3	Teaching the Multicultural-Multilingual Student*
<b>Year 1 – Spring II Session</b>		
EDUC-614	3	Human Growth and Development
<b>Year 1 – Summer I Session</b>		
LING-504	3	Second Language Acquisition
ENGL-510	3	Structure of Modern English
<b>Year I – Summer II Session</b>		
LING-512	3	Seminar on Theories and Practice of Second Language Learning and Testing
EDUC-611	3	Theories and Practices in Exceptionalities*
<b>Year 2 – Fall I Session</b>		
EDUC-608	3	Diagnostic Teaching of Reading*
<b>Year 2 – Fall II Session</b>		
LING-590	3	Practicum*
<b>Year 2 – Spring I Session</b>		
Electives	3	Elective/Thesis
<b>Year 2 – Spring II Session</b>		
Electives	3	Elective/Thesis
<b>ELECTIVES*</b>		
LING-520	3	Foundations of Bilingual Education
EDUC-601	3	Contemporary Issues in American Education
EDUC-604	3	Theories and Methods of Instruction
EDUC-625	3	Intro. to Statistics and Research Methods

\*Courses require EFE as mandated by the Council of Professional Educators (CPE)

## **COURSE DESCRIPTIONS**

**ENGL-504. TEACHING ENGLISH IN HIGH SCHOOL** **3:3:0**  
Credit, three hours.

**ENGL-510. STRUCTURE OF MODERN ENGLISH** **3:3:0**  
Structure of Modern English is an advanced course in the grammar and structure of English. The course is designed to give intensive study and practice in analyzing the structure of English sounds, words, phrases, and sentences; doing error analysis; recognizing and correcting errors; taking examinations; writing research papers, and engaging in various pedagogically-oriented linguistic analysis projects.  
Credit, three hours.

**ENGL-518. METHODS OF TEACHING ENGLISH AS A SECOND LANGUAGE** **3:3:0**  
This course introduces students to basic concepts and methodologies for teaching second language learners. It is designed as a review of theories, programs, approaches, strategies and techniques for effective second language teaching methods. Additionally, the course addresses theories of acquisition of a second language.  
Credit, three hours.

**ENGL-519. TEACHING THE MULTICULTURAL-MULTILINGUAL STUDENT** **3:3:0**  
The course introduces students to the theories, methods, techniques, educational perspectives, and issues involved in teaching children from diverse cultural and linguistic backgrounds. The course includes a field experience.  
Credit, three hours.

**LING-504. SECOND LANGUAGE ACQUISITION** **3:3:0**  
The course is an analysis of current issues in second language acquisition based on readings and research findings. Discussion of theories includes the Acculturation Model, the Nativization Model, Accommodation Theory, Discourse Theory, the Monitor Model, The Variable Competence Model, The Universal Hypothesis, Neuro-functional Theory and other models.  
Prerequisites: Twelve (EDUC) semester hours of a Foreign Language.  
Credit, three hours.

**LING- 512. SEMINAR ON THEORIES AND PRACTICE OF SECOND LANGUAGE LEARNING AND TESTING** **3:3:0**  
The seminar will focus on and put into practice relevant aspects of applied linguistics, second language acquisition (SLA), pedagogy, and testing. Topics include interactive and non-interactive hypermedia technologies, computer-assisted language learning (CALL) and second language (L2) literacy, language testing and technology, distance learning, online chat discussions, software selection, and more. Course formats include readings, discussion, demonstrations, and hands-on sessions with technologies. As part of a teaching portfolio, students will create their own computer-based materials for teaching.  
Credit, three hours.

**LING-520. FOUNDATIONS OF BILINGUAL EDUCATION** **3:3:0**  
The course is designed to equip bilingual and second language teachers with the tools, knowledge, and philosophy for working with language minority students in the context of bilingual/ESL programs. The course introduces candidates to the historical, political, and legal foundations of bilingual education programs in the United States, in addition to exploring different models of bilingual programs and their psycholinguistic and sociolinguistic foundations upon which they rest.  
Credit, three hours.

**LING-590. PRACTICUM****3:3:0**

The course provides students with the opportunity to supplement coursework with practical work experience related to their educational program. Students work under the immediate supervision of experienced personnel at the School District where they are assigned as well as with the direct guidance of their instructor.

Credit, three hours.

**EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT)****3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (EDUC) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

**EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY****3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

**EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY****3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

**EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT)****0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

**EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL****3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-EDUC to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the

application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.  
Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS 4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT 3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION 3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS 3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION 3:3:0**

The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.

Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION 3:3:0**

The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.

Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN 3:3:0**

The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.

Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM 3:3:0**

The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.

Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT 3:3:0**

This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-EDUC classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.

Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING 3:3:0**

The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.

Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED 3:3:0**

In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.

Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS 3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT****3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION****3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH****3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION****3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION****3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS****3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION****3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications

and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at

classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION  
3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY  
SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning.

Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction.

Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented.

Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented.

Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored.

Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed.

Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS 3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT 3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advance students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS 3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES 3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS 3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; EDUC.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION 3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.  
Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP 3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.  
Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH 1-EDUC:1-EDUC:0**

Credit, one to twelve hours.

**EDUC-699. THESIS 6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.  
Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE) 3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.  
Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION 3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.  
Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.  
Credit, six hours.

## **MASTERS OF ARTS IN HISTORIC PRESERVATION**

### **OBJECTIVES**

The Graduate Program in Historic Preservation is one (1) of the few such programs among all historic preservation programs, and the only one (1) among Historically Black Colleges and Universities, with its specific purpose. Concentrating on the preservation of African American historic resources, the program seeks to provide students with the necessary training and preparation for employment in related fields. Courses in the program emphasize the practical and applied nature of the preservation field.

### **MEMBERSHIP AND AFFILIATIONS**

The Graduate Program in Historic Preservation at Delaware State University is a member of the National Council for Preservation Education. The program has a Memorandum of Understanding with Kent County Levy Court for administration of the Wildcat Manor property; a property that ongoing research indicates has connections to the Underground Railroad in Delaware. The program is an institutional member of the National Alliance of Preservation Commissions.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Hold a bachelor's degree in History, Art History, Architectural History, Architecture, Folk Studies, Black Studies, Historical Archaeology, Urban Studies, Community Development, and other related areas from an accredited college or university.
2. Complete an application for admission.
3. Present an official transcript of all previous college work with a minimum grade point average of 3.00 in the major field and 2.70 overall grade point average on a 4.00 grade scale at the undergraduate level.
4. Submit GRE scores.
5. Submit a cover letter and resume. (Recommended)
6. Submit three letters of recommendation.
7. Submit a scholarly Essay. (Optional)
8. International applicants must meet all requirements.

Exceptions to these requirements may qualify a student for provisional acceptance as defined by the Graduate Program in Historic Preservation and the Graduate School of the University. However, all required criteria for admission must be met by the end of the first semester of graduate study for the student to continue in the program.

#### **DEGREE REQUIREMENTS**

The Master of Arts Degree in Historic Preservation requires successful completion of thirty-six (36) credits hours, including twenty-seven (27) credit hours of coursework and a mandatory internship of nine (9) credit hours. A student may advance to candidacy after completion of twenty-seven (27) credit hours with a minimum 3.0 cumulative grade point average.

## MASTER OF ARTS IN HISTORIC PRESERVATION

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
HIST-603	3	Introduction to Historic Preservation and Museum Studies
HIST-601	3	American Historical Contexts to 1865
HIST-606	3	Research Methods
HIST-602	3	American Historical Contexts Since 1865
HIST-600	3	American Architectural History
HIST-604	3	Historical Preservation Law and Policy
HIST-632	3	African-American Historic Contexts Since 1865
HIST-631	3	African-American Historic Contexts to 1865
HIST-633	3	Survey and Evaluation of African-American Historic Resources
HIST-608	9	Historic Preservation Internship
<b>TOTAL CREDIT HOURS: 36</b>		

## **COURSE DESCRIPTIONS**

### **HISTORY (HIST) (34)**

#### **HIST-600. AMERICAN ARCHITECTURAL HISTORY**

**3:3:0**

The course covers the rich history of the development of architectural styles in America through the mid-twentieth century.

Credit, three hours.

#### **HIST-601. AMERICAN HISTORIC CONTEXTS TO 1865**

**3:3:0**

The course focuses on the historic context of the American built environment and cultural heritage of the Colonial Era and Early America during the 18th century through the first half of the 19th century. Emphasis will be placed on the heritage of Delaware.

Credit, three hours.

#### **HIST-602. AMERICAN HISTORIC CONTEXTS SINCE 1865**

**3:3:0**

The course focuses on the historic context of the built environment and cultural heritage of America from the second half of the 19th century through the first half of the 20th century. Emphasis will be on the development of cultural examples in Delaware.

Credit, three hours.

#### **HIST-603. INTRODUCTION TO HISTORIC PRESERVATION AND MUSEUM STUDIES**

**3:3:0**

The course will introduce graduate students in their first year to the fields of historic preservation and museum studies. Students will investigate the history of each field and how they relate to each other, such as historic house preservation and historic house museums or historic villages and museum interpretations. The course covers many contemporary facets of the preservation field, including law, economics, and policy. Students will develop solid foundations for further study in their selection concentrations in either Museum Studies or African-American Heritage Preservation.

Credit, three hours.

#### **HIST-604. HISTORIC PRESERVATION LAW AND PRESERVATION POLICY**

**3:3:0**

The course covers important legal precedents through the history of court cases associated with historic preservation and is also designed for students who wish to enter public administration. In part, the course focuses on zoning laws and issues, the economics of historic preservation, the politics of historic preservation, and the shaping of policy.

Credit, three hours.

#### **HIST-606. RESEARCH METHODS IN HISTORY**

**3:3:0**

Research Methods provides students with in-depth instruction on methods of historical archival research, use of government documents, and other primary research. Students will be required to write a research paper on a topic approved by the instructor.

Credit, three hours.

#### **HIST-608. HISTORIC PRESERVATION INTERNSHIP**

**9:9:0**

Students in the graduate program in historic preservation must complete an internship experience with a private historical group or a local, state, or federal government agency with the approval of the director of the graduate program and the chair of the department. At the conclusion of the internship, a paper summarizing the placement must be submitted and presented to the Graduate Program Committee.

Prerequisites: Completion of all required courses in the program.

Credit, nine hours.

**HIST-631. AFRICAN-AMERICAN HISTORIC CONTEXTS TO 1865**

**3:3:0**

The course focuses on the historic context of the African-American architectural environment and cultural heritage of the colonial era and early national period during the 18th through the first half of the 19th century. Emphasis will be placed on the rich heritage of the Mid-Atlantic region.

Credit, three hours.

**HIST-632. AFRICAN-AMERICAN HISTORIC CONTEXTS SINCE 1865**

**3:3:0**

The course focuses on the historic context of the African-American material culture and cultural heritage from the second half of the 19th through the first half of the 20th century. Particular attention will be given to the presence of African-American examples in the Mid-Atlantic region.

Credit, three hours.

**HIST-633. SURVEY AND EVALUATION OF AFRICAN-AMERICAN HISTORIC RESOURCES**

**3:3:0**

Students will learn how to survey historic resources of the African-American environment and cultural heritage and evaluate them for historical, aesthetic, and cultural significance.

Credit, three hours.

# COLLEGE OF BUSINESS



## **Department of Management**

Masters of Business Administration

Finance (concentration)

Information Systems (concentration)

Project Management (concentration)

## **Department of Sport Sciences**

M.S. in Sport Administration

## **MASTER OF BUSINESS ADMINISTRATION**

### **OBJECTIVES**

The Master of Business Administration (MBA) Degree Program is designed for working professionals and aspiring managers from a wide range of backgrounds who wish to advance their careers or acquire the knowledge and skills necessary to succeed as managers and leaders in the new economy. Candidates integrate and apply business and organizational concepts and techniques in the functional areas of organizational management. The program is flexible enough to accommodate both full-time and part-time (professional and accelerated) students. MBA candidates interested in pursuing full-time accelerated program can complete the degree in twelve (12) months by taking two (2) courses (6 credit hours) per term. MBA classes are offered during the evening hours and occasionally on the weekends. Those interested in part-time study can complete the degree requirements within two (2) years by attending, at least, one (1) summer session.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Management Admission Test (GMAT) scores. GRE is only accepted with approval of Program Director.
5. Submit a resume.
6. Submit two (2) letters of recommendation completed by persons acquainted with your ability for graduate study.
7. The Statement of Intent should include your philosophy, objectives, and career aspirations. (Optional but preferred.)
8. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

The MBA program consists of forty-eight (48) credits, including eighteen (18) credits of Foundations and thirty (30) credits of Core, Capstone, and Elective courses. Appropriately qualified students may petition for a waiver or may test out of foundations courses up to a maximum of eighteen (18) credits. In order to waive a course, a student must have taken the equivalent undergraduate courses or a graduate course at another institution with a grade of "B" or better. In addition, students may elect to have a concentration in Finance, Information Systems, or Project Management. To fulfill concentration requirements, students must take an additional nine (9) credit hours as follows:

##### **Finance Concentration:**

- Financial Statement Analysis (MBA 617)
- Investments and Portfolio Management (MBA 641)
- Domestic and Global Financial Markets and Institutions (MBA 643)
- Economic and Financial Environment of Business (MBA 645)

##### **Information Systems Concentration:**

- Strategic Information Systems (MBA 631)
- Managing Electronic Commerce (MBA 632)
- Topics in Information Systems (MBA 633)
- Supply Chain Management (MBA 651)

**Project Management**

Project Management Methodology (MBA 622)  
Program and Portfolio Management (MBA 623)  
Project Risk Management (MBA 621)

**FACULTY**

Courses are taught by qualified professors who want to see you succeed. Our faculty members have terminal degrees in their respective discipline and have published several research articles in recognized journals.

**FACILITIES**

The Bank of America Building is equipped with state-of-the-art technology and houses the College of Business as well as the University's program in Hospitality Management. The Delaware Center for Enterprise Development is also housed in this facility.

## **COURSE DESCRIPTIONS**

### **BUSINESS MBA (MBA) (51)**

#### **MBA-501. ACCOUNTING FOUNDATIONS**

**3:3:0**

The purpose of this course is to introduce students to basics of accounting, the language of business. It will help students understand some common accounting terms, what goes into presenting financial information into financial statements and how managers analyze performance from inside the firm. The course takes a user's perspective and will help students understand how to use accounting information rather than how financial testaments are prepared.

Credit, three hours.

#### **MBA-502. ECONOMICS FOUNDATIONS**

**3:3:0**

This is a general introductory course on the fundamentals of Microeconomic and Macroeconomic theories, market models, and principles and their application to national and international economics systems.

Credit, three hours.

#### **MBA-503. FINANCIAL FOUNDATIONS**

**3:3:0**

The purpose of this course is to introduce students to corporate finance. Since finance is the cornerstone of the free enterprise system, a good understanding of finance foundations is necessary to become good managers. The course takes a manager's perspective and will help students understand how to use accounting and economic information to make sound financial decisions.

Credit, three hours.

#### **MBA-504. MIS FOUNDATIONS**

**3:3:0**

The role of Information Systems (IS) in business and management is getting more important than before because of the growth of information systems, the internet, electronic commerce, and globalization. Thus students will learn what the information systems are, how they affect organizations and their employees, and how they can make business more competitive and efficient to make firms competitive.

Credit, three hours.

#### **MBA-505. MARKETING FOUNDATIONS**

**3:3:0**

This course is a general review course on the principles of marketing. This course addresses concepts and issues underlying the modern practice of marketing, including the following: the environmental forces affecting the marketing decision maker, organization, and planning of the market function; market segmentation; marketing mix; and other relevant topics.

Credit, three hours.

#### **MBA-506. QUANTITATIVE METHODS FOUNDATIONS**

**3:3:0**

This is a general review course on the fundamentals of mathematical theories, concepts, and applications as they pertain to business. It facilitates students to learn a Value-Driven Approach which presents an overview of fundamentals of Operations Management, the challenges facing today's Operations Managers, the need for a change from a cost orientation to a focus on value, and the place of OM within the corporate and competitive world. It helps to understand values and attributes that are associated with value such as speed, quality, cost, and flexibility.

Credit, three hours.

#### **MBA-565. MBA SELECTED TOPICS**

**3:3:0**

The MBA Selected Topics tests the student's strategic thinking and analytic skills. Students must receive prior approval by the MBA Director for the topic. The students will submit a final presentation discussing their analysis and recommendations of the company or real-world cases they have investigated. A Project Thesis is required.

Credit, three hours.

**MBA-600. INFORMATION AND TECHNOLOGY MANAGEMENT 3:3:0**

The course introduces the students to the uses, trends, and applications of information technologies in organizations. The course will expose the students to computer hardware, computer software, telecommunications, network technology, Internet, World Wide Web, multimedia, and other topics in information technology.

Credit, three hours.

**MBA-601. ECONOMICS FOR MANAGERIAL DECISION MAKING 3:3:0**

The course examines the applied micro-economic theory of the firm. Economics concepts covered include demand analysis, production and cost analysis, linear programming applications, pricing policies, and government regulation of the firm. The course also provides an analysis of macro-economic factors influencing business activity and their implications for strategic management and business policy.

Credit, three hours.

**MBA-602. MARKETING MANAGEMENT 3:3:0**

The course examines the strategic marketing planning process. Emphasis is placed on the development of product lines, sales promotion, and distribution strategies.

Prerequisites: Common Body of Knowledge (CBK) requirements in Principles of Economics and Marketing.

Credit, three hours.

**MBA-604. FINANCIAL MANAGEMENT 3:3:0**

The course addresses the principles of financial management. Topics covered include the following: capital acquisition; working capital management; capital budgeting; valuation theories; and dividend and long-term financial policies.

Prerequisites: Common Body of Knowledge (CBK) requirements in Economics, Finance, and Accounting.

Credit, three hours.

**MBA-605. ORGANIZATIONAL LEADERSHIP AND BEHAVIOR 3:3:0**

The course concentrates on the behavior of individuals in small, informal groups, and formal organizations. The course examines the following topics: leadership, in the context of group behavior, job satisfaction, supervision, planning, and conflict resolution.

Prerequisites: Common Body of Knowledge (CBK) requirements in Management.

Credit, three hours.

**MBA-616. APPLIED STRATEGIC MANAGEMENT****3:3:0**

The course is a study of policy formulation and implementation by middle- and senior-level management. The course integrates previous coursework in the other core courses. The capstone (integrated management course) is intended to apply theoretical concepts to a variety of organizational situations from a top-management perspective. The concepts and techniques of strategic management in organizations will be the focus of the course. Topics include developing a strategic vision, setting objectives, and crafting a strategy. Students will be expected to develop a competitive analysis portfolio; match strategy to an organization's situation; build resource capabilities, support systems, budgets, align culture and strategy; and structure the organization to implement the organization's strategic vision in a dynamic global marketplace.

Prerequisites: Completion of all other core course requirements.

Credit, three hours.

**MBA-617. FINANCIAL STATEMENT ANALYSIS****3:3:0**

The course provides the fundamentals managers need to analyze financial statements in making non-routine decisions, as well as in discharging their day-to-day operating responsibilities. Accordingly, it addresses the following issues: 1.) basic accounting and applications in the context of financial statement analysis; 2.) analyses of financial position, results of operations, and cash flows; 3.) inter-corporate investments; 4.) financial statement data issues, including "other financial data" and information economics; and 5.) financial statement audit opinions.

Prerequisites: MBA-603.

Credit, three hours.

**MBA-619. BUSINESS LAW AND ETHICS****3:3:0**

The course provides the student with an introduction to the areas of law pertaining to business, and teaches the student to critically evaluate legal issues within a legal framework. In the course, we will examine the legal and ethical laws, rules, and standards of conduct, guidelines and systems of conflict resolution relating to business operations and administration. Relevant topics will include contracts, commercial law (sales, secured transactions, and creditors' remedies), forms of business entities (including limited liability companies and corporations), agency, employer-employee relationships, real property concepts, bankruptcy, and negligence, and strict liability concepts. Students will examine corporate governance and business ethics, with emphasis on case studies drawn from recent corporate scenarios.

Credit, three hours.

**MBA-620. OPERATIONS ANALYSIS AND MANAGEMENT****3:3:0**

The course investigates the increasing use of the techniques of business support systems and work flow tools for the optimum performance of manufacturing and service organizations. Students will use analytical, quantitative, and qualitative techniques and workflow tools for resource allocations, facilities design and location, process design, planning, scheduling, and quality control. An emphasis will be placed on current technologies and their applications in various industries.

Credit, three hours.

**MBA-621. PROJECT RISK MANAGEMENT****3:3:0**

The exciting, challenging course focuses on how the Project and Program risks are managed in real life and based on the Standards for PMI (Project Management Institutes') PMBOK methodology. The course focuses on identifying and assessing various risks and developing response plans.

Prerequisites: MBA-605, MBA-622.

Credit, three hours.

**MBA-622. PROJECT MANAGEMENT METHODOLOGY****3:3:0**

The exciting, challenging course focuses on how the Projects and Programs planned and executed in real life based on the Standards for PMI (Project Management Institutes') PMBOK methodology. The course focuses on the five (5) phases of the Project management and nine (9) knowledge areas of the Project management discipline.

Prerequisites: MBA-605.

Credit, three hours.

**MBA-623. PROGRAM AND PORTFOLIO MANAGEMENT****3:3:0**

The exciting, challenging course focuses on how Organizations manage multiple projects and allocate resources through Portfolio Management discipline. The course covers the strategy, tactics, and processes needed for successful project portfolio management.

Prerequisites: MBA-605, MBA-622.

Credit, three hours.

**MBA-631. STRATEGIC INFORMATION SYSTEMS****3:3:0**

The course examines the use of information technology to achieve competitive advantage, effective decision-making and efficient operations. The course will explore the usage of many kinds of information systems and technology in organizations and analyze their role, functions, and effects on competitive strategy and organizational operations.

Prerequisites: MBA-600.

Credit, three hours.

**MBA-632. MANAGING ELECTRONIC COMMERCE****3:3:0**

With an emphasis on managing electronic organizations, the course examines electronic commerce infrastructures, various types of electronic commerce, issues in designing and managing on-line business, electronic payments as receivables and payables, and Internet security issues. Additional topics such as database marketing will be discussed.

Prerequisites: MBA-600.

Credit, three hours.

**MBA-633. TOPICS IN INFORMATION SYSTEMS****3:3:0**

Information technology is continuously evolving as so is the usage of information systems in the ever-changing business environment. Managers need to adapt operations and processes to the latest trends in information systems and technology. The course will deal with various topics and problems in many functional areas, such as marketing, accounting, production, human resources, and management information systems with information systems and technology. Case studies and lectures will reinforce lectures.

Credit, three hours.

**MBA-641. INVESTMENTS AND PORTFOLIO MANAGEMENT****3:3:0**

The course addresses principles in determining investment vehicles for individual and institutional investors. The course focuses on investment information sources, features of various securities instruments, as well as strategies and techniques for portfolio construction, management and protection.

Prerequisites: MBA-604.

Credit, three hours.

**MBA-642. DERIVATIVE SECURITIES AND RISK MANAGEMENT****3:3:0**

The course examines the fundamental issues in risk management by utilizing futures, options, swaps, and various other derivative securities. Other topics include hedging techniques, mergers and acquisitions, and financial engineering.

Prerequisites: MBA-641.

Credit, three hours.

**MBA-643. DOMESTIC AND GLOBAL FINANCIAL MARKETS AND INSTITUTIONS 3:3:0**

The course examines structures and functions of international and domestic financial markets such as stock, bond, mortgage, and money markets. The course also addresses financial management aspect of different financial institutions including banks, savings and loans association, investment companies, and pension funds. Theories of comparative advantage, foreign exchange markets, financial risk management, and funds transfer and investments will be discussed.

Prerequisites: MBA-604.

Credit, three hours.

**MBA-645. ECONOMIC AND FINANCIAL ENVIRONMENT OF THE ORGANIZATION 3:3:0**

The course examines the macroeconomic and financial environment within which the organization operates. The course focuses on identifying and assessing the macroeconomic and financial factors affecting the organization and on developing strategies to deal with changes in the macro environment.

Prerequisites: MBA-604.

Credit, three hours.

**MBA-651. SUPPLY CHAIN MANAGEMENT****3:3:0**

The course considers the components of modern-day distribution systems, with emphasis on facility location, transportation, warehousing, inventory control, and communication. Students will develop a conceptual understanding of issues relating to designing, planning, control, product design, information systems, inventory management, quality control, and warehousing.

Prerequisites: MBA-602.

Credit, three hours.

**MBA-680. MBA CASE PROJECT****3:3:0**

The MBA Case Project tests the student's strategic thinking and analytic skills. There are three (3) different approaches to the Case Project: 1) Students will be provided with the income statement and balance sheet, annual reports, and other pertinent information to make recommendations on a broad range of strategic issues facing a company. 2) Students will be provided with a portfolio and other pertinent information to make trades on investments and maximize their portfolios. 3) Students will be given a series of general management cases that cover a broad range of strategic issues facing companies. The students will submit a final presentation discussing their analysis and recommendations of the company or real-world cases they have investigated. A Project Thesis is required.

Credit, three hours.

**MBA-699. SPECIAL TOPICS: MBA****3:3:0**

The MBA Special Topics tests the student's strategic thinking and analytic skills. Students must receive prior approval by the MBA Director for the topic. The students will submit a final presentation discussing their analysis and recommendations of the company or real-world cases they have investigated. A Project Thesis is required.

Credit, three hours.

**MBA-699A. SPECIAL TOPICS: MBA**

**3:3:0**

The MBA Special Topics tests the student's strategic thinking and analytic skills. Students must receive prior approval by the MBA Director for the topic. The students will submit a final presentation discussing their analysis and recommendations of the company or real-world cases they have investigated. A Project Thesis is required.

Credit, three hours.

**MBA-699B. SPECIAL TOPICS: MBA**

**3:3:0**

The MBA Special Topics tests the student's strategic thinking and analytic skills. Students must receive prior approval by the MBA Director for the topic. The students will submit a final presentation discussing their analysis and recommendations of the company or real-world cases they have investigated. A Project Thesis is required.

Credit, three hours.

# **MASTER OF SCIENCE IN SPORT ADMINISTRATION**

## **OBJECTIVES**

The purpose of the Master of Science Degree in Sport Administration is to professionally prepare ethical leaders for advanced responsibilities within sport organizations and/or to design and implement new sport or sport-related enterprises. This is a thirty (30) credit hour, twelve (12) month program designed to develop your ability to lead and manage sport and/or sport-related organizations while adapting to changing economic, legal, political, and social influences.

## **LEARNING OBJECTIVES**

The student will be able to understand people who engage in sport within their respective living environments, comprehending their interest and values for sport participation. They will analyze economical, political, educational, legal, philosophical, and ethical environments that impact sport participants from historical and futuristic perspectives.

- The student will gain knowledge of management functions, leadership skills to create an organizational vision and goals, means of successfully conveying the vision and goals, and means of obtaining commitment to the vision.
- The student will be able to recognize and identify moral and ethical problems related to sport in its intrinsic and extrinsic dimensions and develop a personal philosophy regarding social responsibility in the sport management setting.
- The student will be able to apply marketing concepts through utilization, application, and initiation of marketing research, development of marketing plans, fundraising campaigns, and corporate sponsorship proposals.
- The student will obtain knowledge of financial management, planning, and budgeting in sport.
- The student will gain knowledge of legal concepts and their application to sport and sport-related organizations.
- The student will identify micro and macroeconomic principles.
- The student will be able to identify the functions/requirements of various governing bodies in professional and amateur sports.
- The student will understand the methods appropriate for conducting quantitative and qualitative research and will be able to analyze research data.
- The students will obtain practical experience in the sport industry.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Undergraduate 2.50 or higher GPA.
2. Official scores on either the Graduate Record Examination (GRE) or Miller Analogies Test (MAT) are required. Testing must be within five (5) years of application (required prior to completion of fifteen (15) credit hours.)
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation from Professionals in the field, one (1) from an academic professional.
6. International applicants must meet all requirements.

### **DEGREE REQUIREMENTS**

1. Completion of thirty (30) graduate level program credit hours with a 3.0 GPA or higher.
2. No more than two (2) courses with a grade of "C" and no individual course completed at a grade lower than a "C".
3. Submission and successful defense of Comprehensive Project.

**MASTER OF SCIENCE IN SPORT ADMINISTRATION**

<b>CREDIT NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
16-671	3	Financial Aspects of Sport
16-672	3	Sport Management
16-676	3	Sport in Society
EDUC-625	3	Intro. to Statistics and Research Methods
16-674	3	Sport Marketing
16-681	3	Legal Issues in Sport
16-673	3	Sport Facilities Design & Management
16-675	3	Current Trends & Issues in Sport
16-616	6	Internship
<b>TOTAL CREDIT HOURS: 30</b>		

## **COURSE DESCRIPTIONS**

### **SPORT SCIENCES (SPSC) (16)**

#### **16-616. INTERNSHIP IN SPORT**

**6:6:0**

The Sport Administration Internship is an experience in which a sport administration major enrolls in after all requirements, including coursework, in the sport administration curriculum has been completed successfully. The Sport Administration Internship comprises a minimum of 270 field-based hours at the agency, or at events sponsored by the agency if the responsibilities are carried out at another site.

Credit, six hours.

#### **16-625. INTRODUCTION TO RESEARCH METHODS AND STATISTICS**

**3:3:0**

The course is designed to introduce students to research methods and statistics used to assess, evaluate, and critically examine principle and practices of sport organizations.

Credit, three hours.

#### **16-671. FINANCIAL ASPECTS OF SPORT**

**3:3:0**

The course examines the financial and accounting principles and their application in for-profit and non-profit sport organizations. Topics include revenue and expenses, budgeting methods, economic principles, methods of financing sport and sport venues, and fund raising methods.

Credit, three hours.

#### **16-672. SPORT MANAGEMENT**

**3:3:0**

The course is designed to provide students with an understanding of organizational theory and its application in the sport industry. Students will examine the organizational structure, leadership styles, and culture of different sport organizations.

Credit, three hours.

#### **16-673. SPORT FACILITIES DESIGN AND MANAGEMENT**

**3:3:0**

The course is designed to introduce students to the fundamentals of conducting needs assessments, planning, constructing, equipping, staffing, programming, and managing facilities in sport and physical activities.

Credit, three hours.

#### **16-674. SPORT MARKETING**

**3:3:0**

The course provides an overview of the principles and practices of promotions and marketing in the sport industry. Topics include sport marketing planning, market segmentation and identification of target market, sport marketing mix, and sponsorship.

Credit, three hours.

#### **16-675. CURRENT TRENDS AND ISSUES IN SPORT**

**3:3:0**

The course examines the current trends and issues in the sport industry. Extensive research of current texts and journal articles is required.

Credit, three hours.

#### **16-676. SPORT IN SOCIETY**

**3:3:0**

The course is an examination of sport as a social institution and of the interactive impact of sport and society.

Credit, three hours.

**16-681. LEGAL ISSUES IN SPORT**

**3:3:0**

The course is designed to provide an overview of legislation and legal actions in sport.  
Credit, three hours.

# COLLEGE OF EDUCATION, HEALTH & PUBLIC POLICY



## **Department of Education**

Doctorate of Education in Educational Leadership

Master of Arts in Education

Adult Literacy & Basic Education (concentration)

Curriculum & Instruction (concentration)

Special Education (concentration)

Master of Arts in Educational Leadership

Master of Arts in Science Education

Master of Arts in Teaching (MAT)

## **Department of Nursing**

Master of Science in Nursing

## **Department of Social Work**

Master of Social Work

# **DOCTORATE OF EDUCATION IN EDUCATIONAL LEADERSHIP**

## **OBJECTIVES**

The Doctorate of Education in Educational Leadership (Ed.D.) is a fifty-one (51) credit hour, three (3) year program designed for the development and certification of educational leaders who can lead and manage private and public K-EDUC systems, higher education programs, and state, national and international educational organizations. The program emphasizes the mastery of skills and processes for adapting to social, political and economic influences when faced with human, financial, and structural demands.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
2. Evidence of completion of Master level graduate study with a cumulative GPA of no less than 3.0.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Students are required to submit GRE Scores. However, if students have taken the MAT, those scores will be accepted as well. Testing must be within five (5) years of application (scores must be submitted prior to being interviewed for admittance to the program).
6. Submit a resume.
7. Submit three (3) letters of recommendation. One (1) letter of recommendation must come from an administrator who would be willing to serve as your mentor. The letter must express his or her willingness to allow you to complete assigned field work.
8. Copies of earned teaching and/or administrative certificates.
9. The Statement of Intent should include your philosophy, objectives, and career aspirations.
10. Sample of scholarly work.
11. International applicants must meet all requirements.

### **DEGREE REQUIREMENTS**

The Doctor of Education in Educational Leadership (Ed.D.) is a fifty-one (51) credit hour, three (3) year program, including a six (6) credit hour Applied Educational Internship.

Courses are conducted in an accelerated weekend format. Courses span six (6) weeks. Class sections are normally held the first, third, and sixth weekends of a six (6) week session. Normally a two (2) week break is provided between courses so students can prepare for the next course. Sessions are held Friday nights from 5:00 p.m. to 9:00 p.m.; Saturdays from 9:00 a.m. to 4:00 p.m., and Sundays from 10:00 a.m. to 3:00 p.m.

### **CAPSTONE**

Doctoral candidates must complete and orally present and defend a doctoral research dissertation. Candidates are also responsible for presenting a professional portfolio reflecting their experiences and skills related to ISSLC standards.

**FACULTY**

Faculty in the Department of Education combines academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world and make wise career choices.

**FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

**DOCTORATE OF EDUCATION IN EDUCATIONAL LEADERSHIP**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-817	1	Dissertation Seminar: Writing
EDUC-800	3	The Superintendent as CEO
EDUC-801	3	Contemporary Issues in Am. Education
EDUC-805	3	Qualitative and Quantitative Research
EDUC-888	3	Action Research
EDUC-818	1	Dissertation Seminar:
EDUC-820	3	Dissertation Research: Prospectus
EDUC-803	3	Human Resource Management
EDUC-809	3	Technology Applications
EDUC-806	3	Educational Policy
EDUC-807	3	Leading School Change
EDUC-821	3	Dissertation Research: Proposal
EDUC-812	6	Applied Ed. Adm. Internship
EDUC-804	3	Effective Administration
EDUC-822	3	Dissertation Research
EDUC-819	1	Dissertation Seminar: Defense preparation
EDUC-808	3	Strategic Planning
EDUC-823	3	Dissertation Research: Completion/Defense
<b>TOTAL CREDIT HOURS: 51</b>		
<p>Note: If the dissertation defense has not been scheduled and successfully completed by the end of Spring II session of the third year in the program, the student must continue to register for EDUC-829 each semester until all degree completion requirements have been met.</p>		

## **COURSE DESCRIPTIONS**

### **EDUCATION**

#### **EDUC-800. THE SUPERINTENDENT AS CEO-EFFECTIVE MANAGEMENT AND EXECUTIVE SKILLS 3:3:0**

The course gives an overview and provides the foundation for developing and cultivating the leadership skills and values that superintendents will find helpful to move from a theoretical base to becoming an effective practicing CEO. The course addresses district vision, school culture, politics and governance, internal and external communication, organizing for high performance, curriculum design and delivery, and human resource management for student learning. ISLLC Standards 1-6, NCATE and AASA professional standards for the superintendence are used to define the role of a superintendent as CEO.

Credit, three hours.

#### **EDUC-801. CONTEMPORARY ISSUES IN AMERICAN EDUCATION 3:3:0**

The course assists advanced students to further analyze current trends, problems, and theories based upon an examination of recently surfacing educational events and/or topics from a historical perspective. Discussions focus on a critical exploration of topics related, but not limited to, the formation of curriculum, instructional policy and methodology, and assessment of student success in education. Additionally, current issues that involve students with challenges, No Child Left Behind, state standards and teacher certification, state testing, the state student testing program (DSTP), full inclusion, school choice, charter schools, and accreditation are typical topics of discussion. Components that relate to administrative handling of current issues and challenges in the educational system, found in ISLLC Standards 4 and 6, are addressed.

Credit, three hours.

#### **EDUC-803. HUMAN RESOURCES MANAGEMENT/PERSONNEL ADMINISTRATION 3:3:0**

The course addresses the role and functions, strategic planning, information technology, recruitment, selection, and induction of employees, staff development, performance appraisal, compensations, employment continuity, and unionism from the human resource administrator's standpoint. Additionally, the course addresses the human relations aspects intrinsically involved in and through the human resource parameters. The relationship of the human resources office to the effective, safe, and efficient operation of an educational organization's vision for the promotion of student success is further examined.

Credit, three hours.

#### **EDUC-804. EFFECTIVE ADMINISTRATION, STAFF DEVELOPMENT, SCHOOL PLANT AND FACILITIES 3:3:0**

The course explores the major issues that impact administrative policies, decisions, and one's effectiveness as a school leader. The following topics are examined: district vision and school culture; developing a staff development/in-service program that addresses the improvement of the educational program and assesses its effectiveness; strategic planning for future plant and facility needs; politics and school governance; internal and external communication; organizational processes for effective and efficient performance; curriculum design and delivery; human resource management for student learning; and leadership values and skills.

Credit, three hours.

#### **EDUC-805. QUANTITATIVE AND QUALITATIVE RESEARCH METHODS 3:3:0**

The course is designed to prepare doctoral students to understand, interpret, evaluate, and design qualitative and quantitative research, and to develop the ability to select and use appropriate research methods. The course integrates the major concepts and practices of qualitative and quantitative research methodology and introduces descriptive and inferential statistics. The course focuses on the development

and application of research for the purpose of writing the doctoral capstone. Topics addressed in the course include choice of research methods, developing a problem statement and proposal, preparing questionnaires, conducting research, tabulating data, and reaching conclusions from qualitative and quantitative data. Additionally, the course includes readings on methodology, lectures, discussions, presentations, and in-class exercises that are designed to highlight various issues.  
Credit, three hours.

**EDUC-806. EDUCATIONAL POLICY: POLITICAL, SOCIAL, ECONOMIC, LEGAL, AND CULTURAL ISSUES** **3:3:0**

The course provides the framework and content by which the doctoral student as an aspiring administrator can affect school governance and policy. Major issues influencing administrative practices are addressed, including, but not limited to, school autonomy versus government control, state legislated learning effects on the teaching profession, democratic versus professional authority in the teaching profession, lack of minorities in administration, the effects of economics on the educational system, society's cultural views, desires, and ramifications, and comprehending the diverse theories of school change. In the course, doctoral students have opportunities to develop their skill sets that will enable them, as aspiring administrators, to build the requisite interlocking and collaborative relationships among school personnel, the community, and state and federal agencies for the purpose of creating better schools. Advanced students will focus upon current issues and challenges that impact the formation of educational policy in today's ever changing society.  
Credit, three hours.

**EDUC-807. LEADING SCHOOL CHANGE AT A TIME OF INCREASING DEMANDS, PRESSURES, AND SOCIETAL CHANGE** **3:3:0**

The course focuses on a review and discussion of current methods used to change school cultures, curriculums, and parent/community involvement. The course is used to enhance collegiality, professionalism, instructional strategies, classroom management techniques, effective classroom designs, student motivational techniques, and to create a safe and orderly environment. Additionally, the course focuses on making staff development a worthwhile endeavor and using systems thinking as the key to continuous improvement. The course focuses on envisioning desired results, defining reality through data, and developing action plans while welcoming accountability.  
Credit, three hours.

**EDUC-808. STRATEGIC PLANNING AND PROGRAM ANALYSIS** **3:3:0**

The course explores the steps of the strategic planning process in educational organizations. The benefits of involving a broad range of personnel in the process are discussed. The doctoral student will examine the following strategic planning steps: the development of a mission statement; completion of an environmental scan; development of key objectives and initiatives; design of programs and activities to accomplish the key objectives; and determination of performance measures to monitor and evaluate the organization's progress toward accomplishing its key objectives.  
Credit, three hours.

**EDUC-809. TECHNOLOGY APPLICATIONS****3:3:0**

The course addresses the latest technologies from a practitioner's point of view. The Internet and World Wide Web are used with the intent to make informed decisions. Fifty (5) percent of the semester is assigned to an on-site field experience, in which the student demonstrates the ability to report research, security, and data collection, etc. Doctoral candidates complete a project focusing on the applications of technology to the unique area of their administrative interest within educational administration, leadership or supervision and teaching fields. Doctoral candidates will have the opportunity to focus on emerging technologies and their applications from the viewpoint of planning, enhancing communications, managing information, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-812. INTERNSHIP: APPLIED EDUCATIONAL ADMINISTRATION****3:3:0**

The internship experience is a supervised field experience that enables the doctoral candidate to practice knowledge and skills acquired in coursework and professional experiences in an authentic setting. The doctoral candidate experiences the everyday life of an administrator and how everyday challenges are solved, such as time management strategies, organizational techniques, successful secretarial relationships, appropriate interpersonal skills and human relations, communication vehicles, problem solving, negotiation, instructional leadership, management, professional dispositions, and leadership. In conjunction with the field-based administrator, doctoral candidates will identify an educational problem in the organization and design an action-based research project to examine possible solutions.

Credit, six hours.

**EDUC-813. INTERNSHIP: APPLIED EDUCATIONAL ADMINISTRATION****3:3:0**

This internship experience is an extension of the supervised experience that enables the doctoral candidate to demonstrate their internship experiences by presenting their field-based experiences. Students must also present their portfolio.

Credit, six hours.

**EDUC-817. DISSERTATION SEMINAR I****1:3:0**

Three (3) one-hour Dissertation Seminars are required. The dissertation seminar is designed to address doctoral candidates' progress in the choice of topic, determination of their research format, and dissertation chapter requirements. Assistance is given to clarify the candidate's research question(s), determine the appropriate research design, methodologies and analysis of data. Doctoral candidates meet with the course professor as a cohort group and/or on an individual basis with their respective dissertation committee chair. Discussion of policies and procedures of the dissertation process is addressed in the course.

Credit, one hour each.

**EDUC-818. DISSERTATION SEMINAR II****1:3:0**

Three (3) one-hour Dissertation Seminars are required. The dissertation seminar is designed to address doctoral candidates' progress in the choice of topic, determination of their research format, and dissertation chapter requirements. Assistance is given to clarify the candidate's research question(s), determine the appropriate research design, methodologies and analysis of data. Doctoral candidates meet with the course professor as a cohort group and/or on an individual basis with their respective dissertation committee chair. Discussion of policies and procedures of the dissertation process is addressed in the course.

Credit, one hour each.

**EDUC-819. DISSERTATION SEMINAR III****1:3:0**

Three (3) one-hour Dissertation Seminars are required. The dissertation seminar is designed to address doctoral candidates' progress in the choice of topic, determination of their research format, and dissertation chapter requirements. Assistance is given to clarify the candidate's research question(s), determine the appropriate research design, methodologies and analysis of data. Doctoral candidates meet with the course professor as a cohort group and/or on an individual basis with their respective dissertation committee chair. Discussion of policies and procedures of the dissertation process is addressed in the course.

Credit, one hour each.

**EDUC-820. DISSERTATION RESEARCH I****3:3:0**

The course provides candidates in the doctoral program of Educational Leadership with advisement and support while carrying out their dissertation study. Doctoral candidates are required to address one (1) or more ISLLC standards through their choice of dissertation research. Each course is three credits hours. A minimum of twelve (12) credit hours of Dissertation Research is required.

Credit, three hours each.

**EDUC-821. DISSERTATION RESEARCH II****3:3:0**

The course provides candidates in the doctoral program of Educational Leadership with advisement and support while carrying out their dissertation study. Doctoral candidates are required to address one (1) or more ISLLC standards through their choice of dissertation research. Each course is three credits hours. A minimum of twelve (12) credit hours of Dissertation Research is required.

Credit, three hours each.

**EDUC-822. DISSERTATION RESEARCH III****3:3:0**

The course provides candidates in the doctoral program of Educational Leadership with advisement and support while carrying out their dissertation study. Doctoral candidates are required to address one (1) or more ISLLC standards through their choice of dissertation research. Each course is three credits hours. A minimum of twelve (12) credit hours of Dissertation Research is required.

Credit, three hours each.

**EDUC-823. DISSERTATION RESEARCH IV****3:3:0**

The course provides candidates in the doctoral program of Educational Leadership with advisement and support while carrying out their dissertation study. Doctoral candidates are required to address one (1) or more ISLLC standards through their choice of dissertation research. Each course is three credits hours. A minimum of twelve (12) credit hours of Dissertation Research is required.

Credit, three hours each.

**EDUC-829. SUSTAINING DISSERTATION RESEARCH**  
**6:0**

**1-6:1-**

Students must be continuously enrolled until their dissertation research and oral defense requirements have been completed. The course provides the vehicle for completion of those requirements.

Credit, one to six hours.

**EDUC-888. ACTION RESEARCH IN EDUCATION**

**3:3:0**

The course addresses the role of action research in studying the underlying problems that occur in educational organizations. The types of action research, their advantages and disadvantages, the action research process, and the similarities and differences between action research and formal quantitative and qualitative research are examined in detail.

Credit, three hours.

## **MASTER OF ARTS IN EDUCATION ADULT EDUCATION AND BASIC LITERACY**

### **OBJECTIVES**

The purpose of the Adult Literacy and Basic Education Graduate Program is to increase the knowledge and competence of those who are working or will work with adult learners and lack a high school credential. The courses are designed to prepare highly qualified adult educators who will in a variety of settings such as business or industry, community recreation organizations, correctional facilities, religions education organization, human service organization, public schools, and community-based programs. The program of study leads to certification in Adult Education.

The goals of the program are to facilitate an understanding of the philosophy, theory and successful practices needed for productive teaching, and administration in adult basic, adult secondary, and ESL education. The goals of the program are to:

- Provide a balanced curriculum of theory, practice, research and issues that will improve adult education delivery system and the teaching-learning process.
- Provide self-directed learning experiences that prepare participants to assist adult learners with special needs and manage problems affecting learning.
- Complete the Delaware Department of Education requirements for certification in Adult Education.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree and completed prerequisite courses as designated by the Department of Education. The quality of academic performance in undergraduate and graduate studies will be considered in evaluating applicants for admission to a graduate program at Delaware State University.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. Submit scholarly work. (Optional)
9. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

#### **DEGREE REQUIREMENTS**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete an approved program consisting of thirty-six (36) semester hours of credit.

## **Capstone**

Students may choose one (1) of the following options for completing the Capstone Requirement.

### **Global Comprehensive Examination**

This option is designed to provide students to demonstrate mastery of advanced knowledge and skills in their area of concentration by responding to a battery of essay questions related to their area of concentration. Students are eligible to take the Global Comprehensive Examination after admission to candidacy, completion of twenty-four (24) credit hours and obtaining a grade point average of 3.0 or greater on a 4.0 scale.

### **Research Thesis**

Students selecting the thesis option must satisfactorily conduct an empirical research study and successfully defend the thesis before a faculty committee.

### **Scholarly Research and Multimedia Presentation**

This option requires students to write a scholarly research paper and present the contents of the paper in a multi-media presentation to a faculty committee.

## **FACULTY**

Faculty in the Department of Education combines academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world and make wise career choices

## **FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

**MASTER OF ARTS IN EDUCATION  
ADULT LITERACY AND BASIC EDUCATION**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-612	3	Research Methods in Education
EDUC-615	3	Education, Measurements & Statistics
EDUC-640	3	Multicultural Education
EDUC-655	3	Philosophical Foundations of Adult Education
EDUC-658	3	Utilizing Technology in Adult Education
EDUC-659	3	Adult Learning Characteristics & Alternative Delivery Systems
<b>ELECTIVE COURSES (select five)</b>		
EDUC-651	3	Outcome-Based Curriculum Design in Adult Education
EDUC-652	3	Program Evaluation and Outcomes in Adult Education
EDUC-653	3	Practicum in Adult Education Evaluation
EDUC-660	3	Instructional Strategies in Adult Basic Education
EDUC-661	3	Approaches to Adult English as a Second Language (ESL)
EDUC-662	3	Developing Higher Level Thinking/Reading Skills in Adults
EDUC-663	3	Organizational Administration of Adult Education Programs
EDUC-699	6	Thesis Option
<b>TOTAL CREDIT HOURS: 36</b>		

## **COURSE DESCRIPTIONS**

### **EDUCATION**

#### **EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (12) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

#### **EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT) 0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

**EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL 3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-12 to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.  
Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS 4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.  
Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT 3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION 3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS 3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION** **3:3:0**  
The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.  
Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION** **3:3:0**  
The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.  
Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN** **3:3:0**  
The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.  
Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM** **3:3:0**  
The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.  
Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT** **3:3:0**  
This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-12 classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.  
Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING** **3:3:0**  
The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.  
Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED** **3:3:0**  
In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.  
Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS** **3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION 3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH 3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION 3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS 3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION**

**3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning. Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction. Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented. Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented. Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored. Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed. Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS****3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION****3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT****3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advanced students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS****3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES****3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS** **3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; 12.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP** **3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH** **1-2:1-12:0**

Credit, one to twelve hours.

**EDUC-699. THESIS** **6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE)** **3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION** **3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit

hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

# **MASTER OF ARTS IN EDUCATION CURRICULUM AND INSTRUCTION**

## **OBJECTIVES**

The purpose of the Curriculum and Instruction (C&I) graduate program is to increase the knowledge and competence of educators and to prepare graduates for leadership roles as department chairs and curriculum directors. The focus of the program is on development, improvement and assessment of curricula, materials and instruction at all levels of the educational system. The program will provide opportunities to develop knowledge, skills, and attitudes to understand the educational needs of individuals with differing economic, social, racial, ethnic, religious backgrounds and handicapping conditions. The program is a course of advanced study and does not lead to certification.

The Master of Arts degree in Curriculum and Instruction goals are:

1. Provide opportunities for advanced study in the area of Curriculum and Instruction.
2. Prepare educators to assume leadership roles in improving the curriculum and design of instruction at all levels of schools and types of school (elementary, secondary, post-secondary, public and private, and trade and professional schools).
3. Prepare educators to assume leadership roles in improving the design of classroom instruction for special populations of students (exceptional children, minorities, and low-income).

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree and completed prerequisite courses as designated by the Department of Education. The quality of academic performance in undergraduate and graduate studies will be considered in evaluating applicants for admission to a graduate program at Delaware State University.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. Submit scholarly work. (Optional)
9. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

### **DEGREE REQUIREMENTS**

The program requires the completion of thirty-six (36) graduate credits in the program of study.

Master's degree candidates in the program gain first-hand experience with both quantitative and qualitative research. They must complete a Capstone project, which can take one (1) of the following three (3) forms:

**Global Comprehensive Examination**

Students demonstrate mastery of advanced concepts by answering a battery of essay questions related to their area of concentration. Students are eligible to take the Global Comprehensive Examination after admission to candidacy and completion of twenty-four (24) credit hours with a grade-point average of 3.0 or greater.

**Research Thesis**

Students must conduct an empirical research study, develop and write a thesis, and defend it before a faculty committee.

**Scholarly research and multimedia presentation**

Students must write a scholarly research paper and deliver the contents in a multimedia presentation to a faculty committee.

**FACULTY**

Faculty in the Department of Education combines academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world and make wise career choices.

**FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is the site for the University's wide-ranging cultural enrichment programs.

**MASTER OF ARTS IN EDUCATION  
CURRICULUM AND INSTRUCTION**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-603	3	History and Philosophy of American Education
EDUC-604	3	Theories & Methods Instruction
EDUC-605	3	Curriculum Organization & Design
EDUC-614	3	Human Growth & Development
EDUC-615	3	Education, Measurements & Statistics
EDUC-625/688	3	Intro. to Statistics and Research Methods/Action Research
EDUC-640	3	Multicultural Education
<b>ELECTIVE COURSES (select 18 credit hours)</b>		
EDUC-501	3	First Year Teacher Seminar: Elementary
EDUC-502	3	First Year Teacher Seminar: Secondary
EDUC-601	3	Contemporary Issues in American Education
EDUC-602	3	Identification & Instruction of the Disadvantaged
EDUC-606	3	Career Education in Elementary & Secondary Curriculum
EDUC-607	3	Classroom Management/Classroom and Behavior Management Techniques for Special Education Teachers
EDUC-608	3	Diagnostics of Teaching and Reading
EDUC-609	3	Identification & Instruction of the Gifted
EDUC-610	3	Development of Instructional Materials
EDUC-611	3	Theories & Practices in Exceptionalities
EDUC-627	3	Survey of Pre-College Science Instruction
EDUC-699	6	Thesis Option
<b>TOTAL CREDIT HOURS: 36</b>		

## **COURSE DESCRIPTIONS**

### **EDUCATION**

#### **EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (12) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

#### **EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT) 0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

**EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL 3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-12 to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.

Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS 4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT 3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION 3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS 3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION** **3:3:0**  
The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.  
Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION** **3:3:0**  
The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.  
Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN** **3:3:0**  
The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.  
Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM** **3:3:0**  
The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.  
Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT** **3:3:0**  
This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-12 classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.  
Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING** **3:3:0**  
The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.  
Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED** **3:3:0**  
In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.  
Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS** **3:3:0**  
The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.  
Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES** **3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT** **3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION** **3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION** **3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION** **3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS 3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION**

**3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning. Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction. Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented. Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented. Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored. Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed. Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS 3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning

organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

### **EDUC-682. ASSESSMENT OF INSTRUCTION**

**3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

### **EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT**

**3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advanced students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

### **EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS**

**3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

### **EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES**

**3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS** **3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; 12.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP** **3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH** **1-12:1-12:0**

Credit, one to twelve hours.

**EDUC-699. THESIS** **6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE)** **3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION**

**3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

## **MASTER OF ARTS IN SPECIAL EDUCATION**

**This program, in and of itself, does not lead to certification in special education.**

### **OBJECTIVES**

The advanced program in special education is an NCATE/NASDTEC (1998-99) approved, rigorous, non-categorical program, with emphasis on serving the needs of school students with high incidence disabilities. The program has been designed to enhance leadership, critical thinking/problem solving, and instructional skills of certified or certifiable teachers and teacher educators. The philosophy of the program is based on the following tenets that emanate from the stipulations of the Individuals with Disabilities Education Act (IDEA), and its subsequent reauthorizations and amendments, these are such that:

- All children are entitled to a free and appropriate public education (FAPE); Children with disabilities should be educated with age grade peers to every extent possible (LRE); and that the Zero Reject policy allows that all students with disabilities be educated to reach their individual potentials.
- The advanced program in special education is also based on the inclusion philosophy, such that students with disabilities are afforded the opportunities to engage in the same routines, activities, and lifestyles as students without disabilities. The advanced program also addresses preparation for meeting the needs of students who have exceptional gifts and talents. In addition, the advanced program aims to strengthen educators' collaboration, team work, integration of technology, and research as applicable to provide necessary supports and services for students with disabilities in today's educational settings. The advanced program in special education, therefore, primarily focuses on the sound rationale that extensive opportunities should be provided to program participants for the exploration of varied theoretical orientations and ideologies that significantly impact upon the development and utilization of best practices in the field of Special Education.
- The advanced program in special education at Delaware State University is aligned with the Professional Education Unit's conceptual model, with its component standards as follows: Diversity, Interpersonal Communication, Reflection, Effective Instruction/Assessment Strategies, Content and Pedagogical Knowledge and Skills (DIRECT), Delaware State Teaching Standards (DSTS), and with the National Council for Exceptional Children (CEC) Professional Practice Standards for instruction, assessment, behavior management, communication, consultation, and collaboration, inclusion, multi-cultural education, transition, the integration of technology to provide supports for all students to access the curriculum, and research necessary to maintain and further the field of Special Education

### **GOALS**

The goals of the advanced program in special education are to:

1. Prepare certified or certifiable educators to engage in the responsibilities of leadership in special education in both public and private sectors.
  1. Develop an understanding of program planning, funding, and implementations of programs and projects.
  2. Conduct program evaluations.
  3. Develop supervisory skills.

4. Understand multidisciplinary service delivery, including inter and intra-agency communication, consultation, and collaboration.
5. Facilitate parent participation in the assessment and education decision making processes.
6. Accurately and effectively implement the legal aspects of special education.
2. Prepare certified or certifiable educators to employ critical thinking and problem solving knowledge and skills as they relate to working in a variety of special education and inclusive settings.
  1. Conduct quantitative and qualitative research utilizing various appropriate methodologies.
  2. Develop analytical and synthetical skills.
  3. Conduct research and assessment with diverse populations that is not culturally biased.
3. Prepare certified or certifiable educators to apply theoretical knowledge, to the development and implementation of current best practices in instruction, assessment, behavior management, materials selection and development, communication, consultation, and collaboration, working with families and community agencies, inclusion, multicultural education, transition, technology, and research.
  1. Understand the historical, philosophical, and legal foundations of special education.
  2. Serve a diverse community of learners as it relates to special education.
  3. Demonstrate an in-depth knowledge of assessment procedures.
  4. Develop the necessary linkages between assessment and effective instruction in relation to program planning.
  5. Design and implement effective instructional strategies and curricula.
  6. Plan and manage classroom routines and behaviors.
  7. Consult and collaborate with various constituencies.
  8. Develop and implement plans and strategies to facilitate effective transitions from school to adult living.
  9. Integrate technology to enhance student learning.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree and completed prerequisite courses as designated by the Department of Education. The quality of academic performance in undergraduate and graduate studies will be considered in evaluating applicants for admission to a graduate program at Delaware State University.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. Submit scholarly work. (Optional)
9. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

## **DEGREE REQUIREMENTS**

A special education masters program candidate must have completed nine (9) to twelve (12) credit hours of masters level work, applied for candidacy, and been accepted into the Masters in Special Education Program. The program requirements component of the advanced program in special education includes courses of study that provide a strong foundation in knowledge of educational principles, practice and current trends, with emphasis on research in education. The required component also focuses on skills and practices that all students in the program must know and be able to perform as special educators and teacher educators. The elective component of the program provides a window for participating graduate candidates to prepare in one (1) or more areas of special education as specified by their choices related to their future professional goals. Thus, required coursework provides depth and breadth in special education, while elective courses provide opportunities to specialize in one (1) or more aspects of special education. The current Master of Arts in Special Education requires that candidates take nine (9) three credit hour courses in the required component, and three (3) electives, covering a variety of topics (see program curriculum), for a total of thirty-six (36) credit hours.

The program, in and of itself, does not lead to certification in special education. It is designed for certified or certifiable participants, who have taken the prerequisite courses that prepare them for certification in special education (see Masters of Arts in Teaching Elementary Special Education, and/or Master of Arts in Teaching Secondary Special Education. These programs require fifty-five (55) and fifty-one (51) credit hours respectively because they include the required content strands that lead to certification). Certification is determined by the Delaware State Department of Education. Note: Additional content area coursework may be necessary for Secondary Special Educators who wish to be considered highly qualified in the areas they teach.

## **FACULTY**

All faculties in the Special Education program have teaching experience with learning-disabled students between grades one (1) and twelve (12).

Faculty in the Department of Education offers more than academic instruction. They act as mentors, taking a personal interest in students to help them meet challenges in the classroom, the professional world, and in life. COE professors represent a diversity of cultural and ethnic backgrounds and have an impressive list of achievements in research and writing, as well as excellent connections within the education community.

## **FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

**MASTER OF ARTS IN EDUCATION  
SPECIAL EDUCATION**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-208	3	The Middle School Years
EDUC-322	3	Methods of Teaching Reading in Secondary Schools
EDUC-400	5	Pre-service/Student Teaching (must pass PRAXIS I & PRAXIS II prior to student teaching).
EDUC-403	3	Teaching of Mathematics at Secondary Schools
<b>CORE COURSES</b>		
EDUC-611	3	Theories and Practices of Exceptionalities
EDUC-625	3	Intro. to Statistics and Research Methods
EDUC-640	3	Multicultural Education/Global Societies
EDUC-644	3	Technology in Teaching
EDUC-648	3	Theories of Instruction and Curriculum Design
<b>REQUIRED COURSES IN THE SPECIALTY AREA</b>		
EDUC-621	3	Assistive Technology in Special Education
EDUC-629	3	Assessment of Exceptional Children and Youth
EDUC-630	3	Curriculum Methods and Materials in Special Education/ Elementary
EDUC-633	3	Classroom and Behavior Management Techniques for Special Education Teachers
<b>ELECTIVES (Select 9 credit hours)</b>		
EDUC-602	3	Identification and Instruction of the Disadvantaged
EDUC-607*	3	Classroom Management
EDUC-608*	3	Diagnostic Teaching of Reading
EDUC-609	3	Identification and Instruction of the Gifted
EDUC-629	3	Review of Research Methods and Technology in Special Education
EDUC-630	3	Administration and Supervision of Special Education
EDUC-634	3	Counseling and Guidance of Students with Exceptional Needs and their Families
EDUC-635	3	Legislation, Litigation, and Finance in Special Education
EDUC-637	3	Issues in Transition and Vocational Education for Individuals with Disabilities
EDUC-638	3	Seminar in Special Education
EDUC-699	6	Thesis Option
<b>Total Credit Hours: 51</b>		
* Required for Secondary Certification		

## **COURSE DESCRIPTIONS**

### **EDUCATION**

#### **EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (12) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

#### **EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT) 0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

**EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL 3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-12 to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.

Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS 4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT 3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION 3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS 3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION 3:3:0**

The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.

Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION 3:3:0**

The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.

Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN 3:3:0**

The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.

Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM 3:3:0**

The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.

Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT 3:3:0**

This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-12 classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.

Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING 3:3:0**

The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.

Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED 3:3:0**

In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.

Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS 3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION 3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH 3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION 3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS 3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION**

**3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning. Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction. Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented. Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented. Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored. Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed. Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS****3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION****3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT****3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advanced students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS****3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES****3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS** **3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; 12.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP** **3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH** **1-12:1-12:0**

Credit, one to twelve hours.

**EDUC-699. THESIS** **6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE)** **3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION**

**3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

## MASTER OF ARTS IN SCIENCE EDUCATION

### OBJECTIVES

The Science Education Master's Degree program is designed to provide a middle and senior high school science teachers with additional training in at least two (2) science disciplines, as well as, in the methodologies and techniques appropriate to the teaching experience. The goals of this program are:

1. To provide an exemplary program for the education of science teachers.
2. To provide a contemporary methodological foundation in science education.
3. To provide an opportunity for science teachers to broaden their understanding of concepts and issues related to their major discipline.
4. To provide an interdisciplinary perspective of the relationship between science, technology, and society.
5. To provide an opportunity to participate in the rigors of research and to appreciate its implications in classroom situations.

### Professional Preparation

U.S. educational leaders have identified science instruction as an area of critical need. The Master's program in Science Education addresses that national need, enabling middle-school and high school teachers to develop advanced expertise in at least two (2) science disciplines and to master contemporary methods of science instruction.

The program provides an interdisciplinary perspective, exploring the relationships among science, technology, and society. Candidates will gain first-hand experience in the rigors of research and learn to apply it in classroom settings. They will graduate with deep understandings of current scientific issues and the ability to make those subjects accessible, exciting, and relevant to 21st century students.

The Master's degree in Science Education prepares graduates for leadership roles in science instruction. Degree holders commonly serve in expanded teaching roles (such as department chairs or field-trip coordinators) or move beyond the classroom into such fields as:

- curriculum development
- training and assessment
- policy analysis
- educational research
- independent consulting

## ADMISSION AND DEGREE REQUIREMENTS

### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree and completed prerequisite courses as designated by the Department of Education. The quality of academic performance in undergraduate and graduate studies will be considered in evaluating applicants for admission to a graduate program at Delaware State University.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. Submit scholarly work. (Optional)
9. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

### DEGREE REQUIREMENTS

The program requires the successful completion (3.0 grade point average) of thirty-six (36) semester hours of graduate level courses including fifteen (15) hours of Science Education core courses, fifteen (15) hours of Science Electives, and six (6) hours of Science Education electives.

### Research and Experience

Two (2) required courses in the Master's program — Research Experience in Science, and Analysis of Research in Teaching Science — provide participants with first-hand scientific research experience, with emphasis on research applications for the classroom. In addition, all Master's degree candidates must complete a Capstone project, which can take one (1) of the following three (3) forms:

1. **Global Comprehensive Examination:** Students demonstrate mastery of advanced concepts by answering a battery of essay questions related to their area of concentration. Students are eligible to take the Global Comprehensive Examination after admission to candidacy and completion of twenty-four (24) credit hours with a grade-point average of 3.0 or greater.
2. **Research Thesis:** Students must conduct an empirical research study, develop and write a thesis, and defend it before a faculty committee.
3. **Scholarly research and multimedia presentation:** Students must write a scholarly research paper and deliver the contents in a multimedia presentation to a faculty committee.

**FACULTY**

The Faculty in the Department of Education combines academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world, and make wise career choices.

Members of our faculty are actively involved in collaborations with middle and high school teachers to enhance effective science teaching and professional development. They also have helped to develop statewide curriculum and standards for science instruction.

**FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

**MASTER OF ARTS IN  
SCIENCE EDUCATION**

<b>REQUIRED COURSES (Select 15 credit hours)</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
PSED-626	3	Science, Technology, and Society
PSED-627	3	Research Experience in Science
PSED-628	3	Analysis of Research on Teaching Science
PSED-629	3	Contemporary Methods of Science Teaching
PSED-630	3	Interdisciplinary Science
EDUC-615	3	Educational Measurement and Statistics
<b>ELECTIVE COURSES (Select 6 credit hours)</b>		
PSED-625	3	Mathematics for Science Teachers
PSED-631	1	Selected Topics in Science Education
PSED-632	2	Selected Topics in Science Education
PSED-633	3	Selected Topics in Science Education
PSED-634	3	Computers and Other Technologies in Science Teaching
PSED-636	3	The Science Olympiad and Other Competitions
EDUC-614	3	Human Growth and Development
EDUC-611	3	Theories and Practices in Exceptionalities
16-699	6	Thesis Option
xx-xxx	15	Science Electives (with department approval)
<b>SCIENCE ELECTIVES*</b>		
<b>TOTAL CREDIT HOURS: 36</b>		

\*Student should select 15 credit hours of science electives. Contact the Education department for further instruction.

## **COURSE DESCRIPTIONS**

### **PHYSICAL SCIENCES (PSED)**

#### **PSED-625. MATHEMATICS FOR SCIENCE TEACHERS**

**3:3:1**

The course is a predominantly methods-based course in which various means of presenting mathematical concepts are developed/devised/researched. Application of math principles to science topics will be stressed. The concepts to be dealt with will include, but not be limited to: factor-label (unit-analysis), metrics, proportionalities, triangulation, graphing, and data analysis, etc. The integration of NCTM standards with science instruction will be addressed.

Credit, three hours.

#### **PSED-626. SCIENCE, TECHNOLOGY, AND SOCIETY**

**3:3:0**

The course is designed to investigate the linkages that exist among science, technology, and society. An interdisciplinary approach will be assumed to convey the interrelationships that exist among science, technology, and the humanities, with a focus on various historic, current, and ongoing ethical issues in science a social policy.

Credit, three hours.

#### **PSED-627. RESEARCH EXPERIENCE IN SCIENCE**

**3:3:0**

The course will provide a field experience for science teachers that are designed to present science as dynamic problem-solving endeavors. Students will work towards the resolution of a problem with a practicing scientist in his or her discipline.

Credit, three hours.

#### **PSED-628. ANALYSIS OF RESEARCH ON TEACHING SCIENCE**

**3:3:1**

The course provides the student with the means by which they may systematically evaluate current classroom teaching practices, and analyze the dynamics of student-teacher interactions. Methods of educational research in naturalistic settings will be examined. The course will consist of classroom instruction, field work in various school settings, and laboratory work, on the SPSS-X computer system at the college.

Credit, three hours.

#### **PSED-629. CONTEMPORARY METHODS OF SCIENCE TEACHING**

**3:3:0**

A survey of methodologies will be presented that research has indicated are most effective for teaching science. Methods will be presented from a constructed perspective. Contemporary curriculum and assessment philosophies and materials will also be discussed.

Credit, three hours.

#### **PSED-630. INTERDISCIPLINARY SCIENCE**

**3:3:0**

The course is an interdisciplinary approach to the study of scientific principles. Common concepts and themes such as atomic theory, systems, and energy will be studied in a context that relates the concept to multiple scientific disciplines.

Credit, three hours.

#### **PSED-631. SELECTED TOPICS IN SCIENCE EDUCATION**

**3:3:0**

The course is designed to allow flexibility in the selection of specific educational topics to meet students' needs and interests, as well as professor expertise. Topics will be posted prior to the first class meetings.

Credit, one hour.

**PSED-632. SELECTED TOPICS IN SCIENCE EDUCATION 3:3:0**

The course is designed to allow flexibility in the selection of specific educational topics to meet students' needs and interests, as well as professor expertise. Topics will be posted prior to the first class meetings. Credit, two hours.

**PSED-633. SELECTED TOPICS IN SCIENCE EDUCATION 3:3:0**

The course is designed to allow flexibility in the selection of specific educational topics to meet students' needs and interests, as well as professor expertise. Topics will be posted prior to the first class meetings. Credit, three hours.

**PSED-634. COMPUTERS AND OTHER TECHNOLOGIES IN SCIENCE TEACHING 3:3:0**

The course is an introduction to the use of the computer and other technologies in interactive modes in the science classroom and laboratory. Emphasis will be placed upon the construction of inexpensive equipment and review of currently available software to accompany the equipment. Credit, three hours.

**PSED-636. THE SCIENCE OLYMPIAD AND OTHER COMPETITIONS 3:3:0**

The course is designed to give science teachers background information needed to prepare an Olympiad team for competition within the individual classroom, school, state, or nation. The course consists of an overview of the activities, with emphasis upon specific curricular topics that will help the teacher better prepare their team. Credit, three hours.

**EDUCATION (EDUC) (EDUC)**

**EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (EDUC) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

**EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

**EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY****3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

**EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT)****0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

**EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL****3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-EDUC to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.

Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS****4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

## **EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT**

**3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

## **EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION**

**3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

## **EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS**

**3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

## **EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION**

**3:3:0**

The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.

Credit, three hours.

## **EDUC-604. THEORIES AND METHODS OF INSTRUCTION**

**3:3:0**

The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.

Credit, three hours.

## **EDUC-605. CURRICULUM ORGANIZATION AND DESIGN**

**3:3:0**

The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.

Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM 3:3:0**

The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.

Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT 3:3:0**

This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-EDUC classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.

Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING 3:3:0**

The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.

Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED 3:3:0**

In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.

Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS 3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION****3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH****3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION****3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION****3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS****3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION****3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION**

**3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning.

Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction.

Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented.

Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented.

Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored.

Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed.

Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS 3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION****3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT****3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advanced students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS****3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES****3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS** **3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; EDUC.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP** **3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH** **1-EDUC:1-EDUC:0**

Credit, one to twelve hours.

**EDUC-699. THESIS** **6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE)** **3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION**

**3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

## **MASTER OF ARTS IN EDUCATIONAL LEADERSHIP**

### **OBJECTIVES**

The Master of Arts in Educational Leadership degree is a thirty-three (33) credit hour, two-year (24 month) program designed for the development and certification of educational leaders who can lead and manage local and district educational organizations while adapting to changing social, political and economic influences.

The program is structured to be flexible in meeting your professional objectives. Coursework and advisors will allow you to tailor your projects to your individual interests so that you can advance your skills in the area of classroom leadership or building/district level leadership positions.

The Master's degree in Educational Leadership provides a pathway to education careers at the school, district, and statewide levels. Combining theoretical study with practical experience, the program cultivates a broad range of leadership skills, including:

- Creating safe, effective learning environments for students.
- Providing support and guidance to teachers.
- Establishing constructive relationships with parents and community stakeholders.
- Conducting independent research and integrating research results into policy decisions.
- Working with diverse populations.
- Implementing effective business and financial practices.
- Upholding legal, ethical, and social-justice principles.
- Devising strategic frameworks to guide decision making.
- Communicating effectively with students, parents, teachers, and the public.

### **Professional Preparation**

The program adheres to the Interstate School Leaders Licensure Consortium (ISSLC) standards. Graduates will meet the State of Delaware certification requirements for School Leader I and Principal/Assistant Principal certification.

Graduates may also pursue a wide range of other career paths, including:

- District-level administration
- Educational policy analysis
- Curriculum development
- Research
- Assessment
- Independent consulting

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree and completed prerequisite courses as designated by the Department of Education. The quality of academic performance in undergraduate and graduate studies will be considered in evaluating applicants for admission to a graduate program at Delaware State University.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. Submit scholarly work. (Optional)
9. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

### **DEGREE REQUIREMENTS**

Several courses in the Master's program enable students to pursue research interests. The primary opportunity occurs in the required Capstone project that involves an internship and action research. During the internship, students participate in the everyday challenges of management and decision making, applying organizational techniques, communication skills, and problem solving abilities in a field setting. They also conduct an action-research project to examine possible solutions to a particular problem or issue, and then make recommendations supported by their data.

Each candidate will present a multimedia presentation outlining the results of his or her action research study, along with a portfolio documenting the internship experience.

### **FACULTY**

Faculty in the Department of Education combines academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world, and make wise career choices.

### **FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

**MASTER OF EDUCATION IN EDUCATIONAL LEADERSHIP**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-605	3	Curriculum Organization and Design
EDUC-680	3	Leadership with Vision for Changing School Culture in a Changing Society
EDUC-681	3	Human Relations in Diverse Populations
EDUC-682	3	Assessment of Instruction
EDUC-683	3	Using Technology to Enhance Student Learning and Organizational Management
EDUC-684	3	Legal Issues
EDUC-685	3	Business/Finance Practices
EDUC-686	3	Supervision and Leadership in K-EDUC
EDUC-688	3	Action Research in Education*
EDUC-690	6	Applied Educational Leadership Internship
<b>TOTAL CREDIT HOURS: 33</b>		
*This is not an accelerated format course.		

## **COURSE DESCRIPTIONS**

### **EDUCATION (EDUC) (EDUC)**

#### **EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (EDUC) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

#### **EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT) 0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

#### **EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL 3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-EDUC to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.

Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS****4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT****3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION****3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS****3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION****3:3:0**

The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.

Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION****3:3:0**

The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.

Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN 3:3:0**

The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.

Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM 3:3:0**

The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.

Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT 3:3:0**

This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-EDUC classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.

Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING 3:3:0**

The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.

Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED 3:3:0**

In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.

Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS 3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION**

**3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH**

**3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION**

**3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION**

**3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS**

**3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION**

**3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION 3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING 3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN 3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION 3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION 3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION 3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning.

Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction.

Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented.

Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS 3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented.

Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM 3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored.

Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY 3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed.

Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS 3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students.

Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION 3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models

of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT**

**3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advance students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields.

Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS**

**3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES**

**3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS**

**3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing

student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; EDUC.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION**

**3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP**

**3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH**

**12:12:0**

Credit, one to twelve hours.

**EDUC-699. THESIS**

**6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE)**

**3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION**

**3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

## **TEACHING (M.A.T.)**

### **OBJECTIVES**

The Master's degree in Teaching offers a pathway into the profession for individuals who hold bachelor's degrees in non-teaching fields. In just one (1) year, students can gain both a graduate degree and a teaching credential, rejoining the work force with a highly marketable set of skills. The program is focused on areas of critical teaching need, especially science and foreign languages. Applicants must hold a bachelor's degree in biology, chemistry, physics, science, math, English, French, Spanish, physical education, business, or history.

The program enables students to cultivate practical skills via direct experience in real-world classrooms, while gaining a broad theoretical background in areas such as cognitive development, assessment, and diverse classroom populations. Graduates possess the skills, techniques, and theoretical framework to move directly into a successful teaching career.

#### **EDUCATION PROGRAMS PARTICIPATING IN THE M.A.T.:**

1. Biology Education
2. Chemistry Education
3. Physics Education
4. Science Education
5. Math Education
6. English Education
7. French Education
8. Spanish Education
9. Physical Education (Elementary)
10. Physical Education (Secondary)
11. Business Education

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in a content area (i.e., English, Mathematics, Biology, etc.).
  - a. Minimum Baccalaureate degree GPA of 2.5 on a 4.0 scale.
  - b. Minimum content area GPA of 2.5 on a 4.0 scale.
  - c. “C” or better in English 101 and 102, Speech, and Mathematics (6 hours.)
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores or Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Passage of Praxis I exam (State of Delaware Department of Education minimum scores or above on all parts.
8. Submit an essay.
9. Submit scholarly work. (Optional)
10. International applicants must meet all requirements.

All admission criteria must be satisfied prior to being granted degree candidacy.

### **DEGREE REQUIREMENTS**

1. Passage of the PRAXIS II Exam in the respective content area must be documented by ETS to the University Office of Assessment and Testing prior to commencing the MAT Capstone experience.
2. Candidates in the MAT program will compile working and professional portfolios during their matriculation that documents their knowledge, skills and dispositions. Candidates will submit their professional portfolio for review during the supervised classroom teaching experience and assessed to be at the acceptable level of performance for successful program completion.
3. Candidates in the MAT program will compile the State of Delaware Department of Education required number of contact hours (65 days and 200 teaching hours) during the pre-service/student teaching experience.
4. Additional specialty content area courses required by the State of Delaware Department of Education for certification purposes cannot be substituted for core or required courses listed for the Master of Arts in Teaching Degree.
5. All field experiences and other pedagogical unit assessments associated with the courses listed in the program must be satisfactorily completed at the “B” level of performance for successful completion of the MAT program.
6. Passage of the PRAXIS II examination at or above the State of Delaware “cut” scores for the respective content area prior to participation in student teaching.
7. “B” or better in each student teaching placement.

**FACULTY**

Faculty members in the Department of Education combine academic expertise with direct experience in the field of education. They have served (or continue to serve) as classroom instructors, principals, policymakers, analysts, and advocates. Their experience enables them to offer practical guidance and mentorship, helping students adapt to the professional world and make wise career choices.

**FACILITIES**

The Education and Humanities Center accommodates the Department of Education. The facility also houses the Child Development Laboratory, and is also the site for the University's wide-ranging cultural enrichment programs.

## MASTER OF ARTS IN TEACHING

<b>CORE COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
EDUC-357/557	4	Effective Teaching Skills and Classroom Management
EDUC-611	3	Theories and Practices in Exceptionalities
EDUC-640	3	Multicultural Education
EDUC-614	3	Human Growth and Development
EDUC-322/522	3	Teaching Reading in the Secondary Schools
<b>OTHER REQUIRED COURSES</b>		
EDUC-644	3	Technology in Teaching
xx-4xx	3	Methods and Materials in the Content Area (or 500 or above graduate course in content area methods)
EDUC-625	3	Intro. to Statistics and Research Methods
<b>MAT CAPSTONE EXPERIENCE</b>		
EDUC-400/500	5	Pre-service/Student Teaching
<b>Total Credit Hours: 30</b>		

## **COURSE DESCRIPTIONS**

### **EDUCATION (EDUC) (EDUC)**

#### **EDUC-500. PRE-SERVICE/STUDENT TEACHING AND SEMINAR (MAT) 3:3:0**

Pre-service/Student teaching is the senior capstone experience that provides opportunities for students to integrate content, strategies, and theories into practice. The student teacher is expected to assimilate the culture of teaching, practice reflective teaching, function effectively in diverse class situations, manage a class of the 21st century, demonstrate content knowledge, and work effectively with students, cooperating teacher, and university supervisor. Students are placed in one (1) or two (2) student teaching settings according to the requirements of certification. Teaching responsibility gradually increases from one (1) or two (2) lessons daily up to a full day of lessons and then decreases gradually to one (1) or two (2) lessons daily. Student teachers are assigned to an appropriate school for twelve (EDUC) weeks under the supervision of a certified mentor and University supervisor. For MAT, take EDUC-500.

Prerequisites: Admission into the Teacher Education Program and successful completion of the total curriculum in the student's major field of study.

Credit, five hours.

#### **EDUC-501. FIRST YEAR TEACHER SEMINAR – ELEMENTARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-502. FIRST YEAR TEACHER SEMINAR – SECONDARY 3:3:0**

Beginning teachers will have the support of a faculty member to assist in analysis of the process and application of diagnostic and prescriptive teaching, the analysis of ways to improve classroom management, and the identification of ways to increase effectiveness as a team member within a school or school district.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, three hours.

#### **EDUC-516. ANALYSIS OF STUDENT TEACHING LAB (MAT) 0:3:0**

This course is designed to prepare DSU students for their upcoming teacher intern experience. The students will have the opportunity to complete all prerequisites that are required by participating school districts. It is mandatory that this course be taken the semester prior to student teaching due to the date/time sensitivity of some documents.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, none.

#### **EDUC-522. TEACHING READING IN THE SECONDARY SCHOOL 3:3:0**

Designed to develop the basic principles, concepts, and skills which will enable the classroom teacher in grades 9-EDUC to integrate the teaching of reading into the content areas. The goal of instructional strategies that incorporate listening, speaking, reading, writing, and viewing processes is to support both the literacy progress of students as well as their content knowledge acquisition. Current research on the development of comprehension, vocabulary, fluency, and metacognition will be covered in addition to the application of technology within the curriculum. Field experience is required (10 hours). Admission to the Teacher Education Program is required. Students admitted to the Master of Arts in Teaching program will take this course for graduate credit and will have some additional assignments to complete.

Credit, three hours.

**EDUC-536. METHODS OF TEACHING BUSINESS****4:4:0**

This course emphasizes research in business education topics that would prepare students for their role as teachers. Content areas, such as accounting, business law, career development, communication, computing, economics, and personal finance are among the areas that will be studied. Upon completion of this course, students will be acquainted with trends in business subjects; understand the role of business subjects in the school and know the secondary business curriculum. In addition, they will understand the research process.

Prerequisites: Open to graduates of Delaware State University and beginning teachers.

Credit, four hours.

**EDUC-557. EFFECTIVE TEACHING STRATEGIES AND CLASSROOM MANAGEMENT****3:3:0**

The course combines effective teaching strategies and classroom management into one (1) comprehensive course. The course is designed to provide basic pedagogical tools and conceptual frames necessary for creating effective teaching and learning environments. Students will be required to demonstrate through individual and small group experiential activities, the critical teaching skills that are embodied in the Delaware Teaching Standards, multiple assessment strategies, micro-teaching, mastery teaching, cooperative learning strategies, and other instructional models. Additionally the student will have the opportunity to develop reflective teaching skills in the planning, delivery, and evaluation of their cohort's teaching performances. Instructor and peers provide feedback on an individual's teaching related to performance-based objectives and learner outcomes. The course incorporates current research on the most effective strategies for improving classroom discipline, motivation, interpersonal relationships, and academic performance on all grade levels. Attention is given to aspects of diversity and/or cultural factors that influence perceptions about classroom management and also factor which may assist in facilitating mainstreaming efforts.

Credit, four credits.

**EDUC-601. CONTEMPORARY ISSUES IN AMERICAN EDUCATION****3:3:0**

The course analyzes current trends, problems, and theories based upon examination of recent educational literature. Students critically explore topics related to the formulation of curriculum, instructional policy, and methodology in education.

Credit, three hours.

**EDUC-602. IDENTIFICATION AND INSTRUCTION OF STUDENTS WHO COME FROM DISADVANTAGED SITUATIONS****3:3:0**

In the course, students learn to identify characteristics of the school population which have been classified as disadvantages. Students model and demonstrate approaches and techniques to ensure that all students access the curriculum which have proven successful at local and National levels.

Credit, three hours.

**EDUC-603. HISTORY AND PHILOSOPHY OF AMERICAN EDUCATION****3:3:0**

The course systematically explores the history of American education from colonial times to the present. Students examine selected educational theories and philosophies with particular emphasis on their application to instruction.

Credit, three hours.

**EDUC-604. THEORIES AND METHODS OF INSTRUCTION****3:3:0**

The course is a study of educational theories as applied to curriculum and instruction with emphasis on current trends and the identification of the instructional process, organizing operations, and skills for teaching.

Credit, three hours.

**EDUC-605. CURRICULUM ORGANIZATION AND DESIGN 3:3:0**

The course analyzes the historical, philosophical, sociological, epistemological, and pedagogical bases of curriculum patterns with emphasis on relationships to contemporary designs. Students explore models of curriculum organization by which to effect curriculum change.

Credit, three hours.

**EDUC-606. CAREER EDUCATION IN THE ELEMENTARY AND SECONDARY CURRICULUM 3:3:0**

The course explores resources for career information, instruments for assessing career awareness curricula, programs and centers, and examines application of techniques for career education.

Credit, three hours.

**EDUC-607. THEORIES AND PRACTICE OF CLASSROOM MANAGEMENT 3:3:0**

This course is designed to provide the conceptual frames necessary for applying current research-based theory on classroom management. Students will be required to demonstrate competence in utilizing a variety of models to establish positive learning environments in P-EDUC classrooms. Students will have the opportunity to practice management skills, interpersonal skills, and meta-analysis (reflection) as they plan and implement classroom management strategies.

Credit, three hours.

**EDUC-608. DIAGNOSTIC TEACHING OF READING 3:3:0**

The course consists of a review of current research and opinion, evaluation of materials techniques and programs for assessment, and prescription of reading techniques. A Practicum provides students the opportunity to implement and evaluate a diagnostic-prescriptive reading program.

Credit, three hours.

**EDUC-609. IDENTIFICATION AND INSTRUCTION OF THE GIFTED 3:3:0**

In the course, participants will learn and discuss the process and issues involved with identifying, instructing, and providing social and learning supports for students who are classified as having exceptional gifts and talents. They will become familiar with national incentives and various statewide programs for students in this category of special education services.

Credit, three hours.

**EDUC-610. DEVELOPMENT OF INSTRUCTIONAL MATERIALS 3:3:0**

The course reviews the theory and practice in selection and use of educational media, equipment, and materials. Students will review the research literature concerned with effective use of instructional materials. Each student will complete an individualized instructional materials package to be presented to the class.

Credit, two hours.

**EDUC-611. THEORIES AND PRACTICES IN EXCEPTIONALITIES 3:3:0**

The course is designed to identify exceptional learners and provide an understanding of their educational needs. Specific teaching techniques will be explored, as well as principles and practices of program development.

Credit, three hours.

**EDUC-614. HUMAN GROWTH AND DEVELOPMENT 3:3:0**

Educational implications of human development over the life-span are examined. Students will survey research with special attention to the applications to teaching and developmentally appropriate school programs.

Credit, three hours.

**EDUC-621. TECHNOLOGY IN SPECIAL EDUCATION 3:3:0**

The course examines the infusion of technology in special education and general education classrooms and settings to support the learning of students who require special educational services. Students in the course will compare and analyze the utilization of technology for this purpose in the United States of America and other countries. Human factors and resources will be considered in the selection of devices, adaptation, and modification to accommodate the instructional and curriculum access of learners with disabilities.

Prerequisites: EDUC-611.

Credit, three hours.

**EDUC-625. INTRODUCTION TO STATISTICS AND RESEARCH METHODS/ACTION RESEARCH 3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-627. SURVEY OF PRE-COLLEGE SCIENCE INSTRUCTION 3:3:0**

The course reviews contemporary issues and trends in science instruction and explores the methodologies and philosophies of the teaching of science, including various interdisciplinary characteristics of science instruction.

Credit, three hours.

**EDUC-628. CURRICULUM, METHODS, AND MATERIALS IN SECONDARY SPECIAL EDUCATION AND TRANSITION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, transition assessment and program planning, adaptations, modifications, and accommodations needed for individual students with disabilities to access curricula and make successful transitions to adult living and career development. The course is for Secondary Special Education only.

Credit, three hours.

**EDUC-629. ASSESSMENT OF INDIVIDUALS WITH EXCEPTIONAL NEEDS 3:3:0**

The course imparts specific knowledge and skills involved in utilizing formal and informal instruments and techniques to assess the strengths, needs, interests, and preferences of individuals with exceptional social and learning needs. Emphasis is placed on providing students with knowledge and skills necessary for selecting, administering, interpreting, evaluating, and reporting results from measurement and/or screening instruments and techniques commonly employed by professionals to facilitate special education placement, accommodations, and program decisions.

Credit, three hours.

**EDUC-630. CURRICULUM, METHODS, AND MATERIALS IN ELEMENTARY SPECIAL EDUCATION 3:3:0**

The course is designed to impart knowledge and skills in curriculum development, adaptations, modifications, and accommodations for individuals with exceptional needs in a variety of elementary educational settings. Students will model and practice the selection and use of commercially available and teacher-made materials. The course is for Elementary Special Education only.

Credit, three hours.

**EDUC-632. ADMINISTRATION AND SUPERVISION OF SPECIAL EDUCATION 3:3:0**

The course is focused on the areas of program planning, project development, and budgeting for special education programs and services using federal, state, and local funding sources, faculty and staff development in-service programs, program evaluation, and supervision of special education and related service personnel. Additional topics addressed in the course are the relationships among special educators, general educators, and vocational educators in transition and program planning, working with families and advocates, and inter-agency collaboration and cooperation in meeting the exceptional needs of individuals with disabilities.

Credit, three hours.

**EDUC-633. CLASSROOM MANAGEMENT AND POSITIVE BEHAVIORAL SUPPORT 3:3:0**

Study of techniques for managing the special education classroom. Behavioral and humanistic approaches are examined and evaluated in relation to managing both instructional programs and student behaviors. Individual and group management techniques will be explored. Consideration will be given to age, developmental level, behavioral, and learning characteristics of school students.

Credit, three hours.

**EDUC-634. CONTEMPORARY ISSUES IN SPECIAL EDUCATION 3:3:0**

The course provides for an intensive study of the educational implications and ramifications of current issues in the fields of special education, human services, employment, and housing for persons with disabilities. An in-depth study of a particular problem area is required of each student.

Credit, three hours.

**EDUC-635. COUNSELING AND GUIDANCE FOR INDIVIDUALS WITH DISABILITIES AND THEIR FAMILIES 3:3:0**

The course is designed for special educators, general educators, and vocational educators who need to be involved with research, methods, and techniques of guiding and counseling students, and their families. Topics include programming, services, and supports for students who are considered to have social and emotional maladjustment. Engineering group dynamics and structuring classroom activities to develop social awareness, knowledge, and skill-streaming are emphasized. Increased collaboration and cooperation with community mental health and developmental disabilities resources is promoted.

Credit, three hours.

**EDUC-636. LEGISLATION, LITIGATION, AND FINANCE IN SPECIAL EDUCATION 3:3:0**

Students in the course examine the impact of legislation, litigation, and funding that provides the basis for providing special education supports and services. Students explore and examine the roles of parents, educators, other professionals, and community representatives. They analyze how special education supports are financed at federal, state, and local levels.

Credit, three hours.

**EDUC-637. ISSUES IN SECONDARY TRANSITION AND VOCATIONAL EDUCATION 3:3:0**

Students in the course identify current issues related to secondary transition and vocational education (i.e., development and implementation of curriculum, using instructional strategies, infusing technologies, collaborating and coordinating to promote the development of self-determination skills and career development of individuals with disabilities). Participants intensely study the educational implications and issues in relation to increasingly diverse, inclusive educational settings and classroom learning environments. Special emphasis is placed on life-long career development, vocational education, the role of rehabilitation services, and transitions of students with disabilities from school to adult living. Program candidacy is required.

Credit, three hours.

**EDUC-638. SEMINAR IN SPECIAL EDUCATION RESEARCH AND PRACTICE 3:3:0**

Candidates in the course undertake a comprehensive study of specific topics in the education of individuals with disabilities. The study will be announced periodically and offered through the graduate seminar.

Prerequisites: Consent of the Program Coordinator or Department Chair must be secured in writing and filed in the Office of Graduate Programs prior to enrolling in the course.

Credit, three hours.

**EDUC-640. DIVERSITY IN EDUCATION**

**3:3:0**

The course explores the use of knowledge about culture in the schooling process. The course presents specific teaching strategies, classroom management techniques, and communication strategies that have proven effective with culturally diverse student populations. Students explore ways to identify and alleviate negative bias and prejudice in teaching materials, assessment instruments, school practices and school organization.

Credit, three hours.

**EDUC-641. SUPERVISION AND EVALUATION OF STAFF**

**3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations.

Credit, three hours.

**EDUC-644. TECHNOLOGY IN TEACHING**

**3:3:0**

The course presents current technological trends that will assist teachers in classroom instruction. Special emphasis is placed on the integration of multi-media software web-based materials. Students will plan and produce multi-media/Internet project in their content area using a systems approach.

Credit, three hours.

**EDUC-648. THEORIES OF INSTRUCTION AND CURRICULUM DESIGN**

**3:3:0**

The course design provides an opportunity for graduate candidates to supplement their theoretical knowledge of curriculum and instruction by developing units or courses in step-by-step fashion. Participants design an actual course of instruction with the asset of guidelines and theoretical base. The combination of theory and process provide educators with a unique approach to learning curriculum development and enhancement skills.

Credit, three hours.

**EDUC-651. OUTCOME-BASED CURRICULUM DESIGN IN ADULT EDUCATION**

**3:3:0**

The course will look at outcome-based instruction not just as a current trend, but as an efficient way to meet educational goals and to promote student interest. Participants will learn to look critically at classroom goals to determine educational and real-life relevancy. They will learn to develop appropriate goals that become outcome of the educational process.

Credit, three hours.

**EDUC-652. PROGRAM EVALUATION AND OUTCOMES IN ADULT EDUCATION**

**3:3:0**

The course focuses on theoretical background and practical application of program evaluation in Adult Basic Education. Program providers will design and apply evaluation techniques and strategies to

program management or teaching adults who are educationally disadvantaged. Participants will learn to determine the extent of program outcomes, quality, and impact on success in ABE programs.

Credit, three hours.

**EDUC-653. PRACTICUM IN ADULT EDUCATION EVALUATION 3:3:0**

The course provides an opportunity for students who have taken 652 to apply their learning, in depth, by evaluating a part or an entire adult education program from start to finish. Students design instruments, conduct interviews, analyze, and report the information collected. The authentic experience is designed to consolidate and extend their learning from the previous course.

Credit, three hours.

**EDUC-655. PHILOSOPHICAL FOUNDATIONS OF ADULT EDUCATION 3:3:0**

The unique philosophical foundations/principles of adult basic/secondary education will be discussed. The reasons for Delaware's model James H. groves Adult High School will be explored, as well as the current federal attitude toward adult literacy/education.

Credit, three hours.

**EDUC-657. COUNSELING THE ADULT LEARNER 3:3:0**

The course will explore developmental characteristics through adulthood and relate those characteristics to adult students who are educationally at-risk. Counseling theories that are appropriate in the classroom with adult learners will be considered. Specific behaviors that help the teacher identify adult student with problems will be identifies and used to help determine when, and to whom a student should be referred.

Credit, three hours.

**EDUC-658. UTILIZING TECHNOLOGY IN ADULT EDUCATION**

**3:3:0**

The course will examine current trends in the use of technology to assist in adult instruction and programming. The major emphasis will be computers and computer software packages. An exploration of multi-media and supplemental audio-visual techniques will be included. Students will be required to submit lesson plans with an emphasis on using technology.

Credit, three hours.

**EDUC-659. ADULT LEARNING CHARACTERISTICS AND ALTERNATIVE DELIVERY SYSTEMS 3:3:0**

The course is designed to describe and analyze three (3) broad dimensions of adult learning: motivation, cognition, and socio-cultural content. Teaching approaches that address these areas will be explored. Teachers will learn how to plan lessons that apply these three (3) dimensions of adult learning.

Credit, three hours.

**EDUC-660. INSTRUCTIONAL STRATEGIES IN ADULT BASIC EDUCATION 3:3:0**

The course will explore the process of helping adults learn basic academic and life skills. Topics covered will include: enhancing learning; assessing learner needs to set instructional objectives; choosing and implementing effective learning activities; building supportive and active learning environments; and strategies for improving instruction.

Credit, three hours.

**EDUC-661. APPROACHES TO ADULT ENGLISH FOR SECOND LANGUAGE (ESL INSTRUCTION) 3:3:0**

The course will consider the appropriate use of both structural and communicate ESL. ESL materials will be provided and reviewed. Model lessons (video) will be observed and analyzed. A variety of teaching strategies will be presented.

Credit, three hours.

**EDUC-662. DEVELOPING HIGHER LEVEL THINKING/READING SKILLS IN ADULTS**

**3:3:0**

The course will cover such areas as analyzing written materials to determine what higher order thinking/reading skills would be required to complete a task. The thinking/reading skills tested on the GED will receive special emphasis. Strategies for teaching and reinforcing these skills will be presented. Credit, three hours.

**EDUC-663. ORGANIZATION, ADMINISTRATION, AND SUPERVISION OF ADULT EDUCATION PROGRAM**

**3:3:0**

The course will identify the current adult education programs, from the Secondary Initiative Alternative School and the unique James H. Groves Adult High School, to Literacy Volunteers, Adult Basic Education (ABE) and work place ESL programs. Planning supervising and the complex administration of these and other nontraditional education programs will be discussed and explored. Credit, three hours.

**EDUC-680. LEADERSHIP WITH A VISION FOR CHANGING SCHOOL CULTURE IN A CHANGING SOCIETY**

**3:3:0**

The course focuses on the educational administrator's development of a vision for the creation of effective teaching that is shared by the school community. The course presents the conceptual underpinnings regarding building of effective learning organizations. The importance and relevance of decision-making; problem solving; effective verbal and written communication skills; relationship-building skills; good listening skills; ability to manage conflict; creation of a safe and secure learning environment; and ongoing effective reflective practice are discussed. Credit, three hours.

**EDUC-681. HUMAN RELATIONS IN DIVERSE POPULATIONS**

**3:3:0**

The course examines how administrators must react, understand and respond to a changing society to foster a true sense of community in school. The course primarily addresses three (3) dimensions: 1.) developing academic partnerships with parents and the members of the community; 2.) creating learning organizations (communities of practice) among teachers; and 3.) nurturing the development of personalized learning environments for students. Credit, three hours.

**EDUC-682. ASSESSMENT OF INSTRUCTION**

**3:3:0**

The course emphasizes the role of assistant principals and principals as the instructional leaders of the school and the official in charge of promoting a safe, secure student environment to make possible student learning and staff professional growth. Reflective assessment practices are thoroughly reviewed and discussed. Research is conducted by advanced students on the following topics: 1.) identifying effective models of instruction; 2.) student achievement; and 3.) frameworks for identifying and analyzing models of teaching, decision-making, and assessment. Additionally, the course focuses on defining supervisor responsibilities, understanding and implementing controls, solving problems and making decisions, effective communications, effective leadership, motivational techniques, problem-solving, and the supervisor's role in labor relations. Credit, three hours.

**EDUC-683. USING TECHNOLOGY TO ENHANCE STUDENT LEARNING AND ORGANIZATIONAL MANAGEMENT**

**3:3:0**

The course addresses current technologies from a practitioner's point of view. The Internet, World Wide Web, and production software are used with the intent to make informed decisions both administratively and instructionally. Advanced students will have the opportunity to focus on emerging technologies in their applications from the viewpoint of planning, enhanced communications, managing information, delivery of instruction, and the latest technologies used by professionals in their respective fields. Credit, three hours.

**EDUC-684. LEGAL ISSUES, ETHICAL CONDUCT, AND SOCIAL JUSTICE IN TODAY'S SCHOOLS** **3:3:0**

The course examines the following: 1.) prudent strategies, safe environments, ethical principles in decision making, and fair practices in a litigious society; 2.) school district judicial policies and student/employee rights; 3.) legal issues that impact today's schools; and; 4.) students' and teachers practices.

Credit, three hours.

**EDUC-685. SUPPORTING A SCHOOL VISION THROUGH EFFECTIVE BUSINESS AND FINANCE PRACTICES** **3:3:0**

The course provides advanced students with an understanding of the issues and challenges facing administrators with regards to the financing of education in an era of intense change. Some of the issues facing practicing school administrators, teachers, school board members, legislators, and other interested parties include, but are not limited to: The No Child Left Behind Act; budget cuts at the federal, state, local, and school levels; and changes in legislation allowing for school choice, voucher plans and charter schools. The course also addresses the various principles relating to the fiscal operations of a school's management and the entrepreneurial acts required to support the continuous improvement of instruction and learning for all students. Strategic planning, budgeting, accounting, auditing, and human resource management at the school level will be discussed through case studies.

Credit, three hours.

**EDUC-686. SUPERVISION AND LEADERSHIP IN ELEMENTARY AND SECONDARY SCHOOLS** **3:3:0**

The course focuses on the knowledge, dispositions, and performance skills required of school principals that include, but are not limited to, the following: 1.) development, articulation, implementation and stewardship of a vision of learning in a pluralistic society; 2.) encouraging and achieving high standards of learning; 3.) effective communication, consensus building, and negotiation skills; 4.) continuous school improvement; 5.) involvement of the school community; 6.) continuous staff professional growth; 7.) effective instruction (learning theories, motivational theories, assessment strategies, and recognizing student growth and development); 8.) technology in promoting student learning and professional growth; 9.) valuing student diversities and school cultures; 10.) creating a safe and supportive learning environment; 11.) implementing and evaluating curriculum and instruction; EDUC.) management of school operations; and 13.) selecting, supervising, and evaluating staff.

Credit, three hours.

**EDUC-688. ACTION RESEARCH IN EDUCATION** **3:3:0**

The course covers application of basic statistical techniques and research methodologies employed in qualitative and quantitative research in education. The focus of the course is primarily on action research and students will develop an action research plan as a course requirement.

Credit, three hours.

**EDUC-690. APPLIED EDUCATIONAL LEADERSHIP INTERNSHIP 3:3:0**

The internship experience is a supervised field experience that enables Master's degree candidates to practice knowledge and skill performances acquired in coursework and professional experiences in an authentic setting. The Master's degree candidate will experience firsthand the everyday challenges of making management decisions with the enhancement of learning and teaching in mind. Advanced students will develop and apply organizational techniques and communication and problem solving abilities in a field setting. In conjunction with the field-based administrator, master's degree candidates will execute an action-research project to examine possible solutions and to provide data to support data-based decision-making.

Credit, six hours.

**EDUC-698. SUSTAINING RESEARCH 12:12:0**

Credit, one to twelve hours.

**EDUC-699. THESIS 6:6:0**

Students seeking the Masters of Arts Degree in Education shall choose to complete one of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus approved program consisting of thirty (30) semester hours of credit.

Credit, six hours.

**EDUC-699A. THESIS OPTION – ADULT BASIC EDUCATION (ABE) 3:3:0**

Students seeking the Masters of Arts Degree in Education with Concentration in Non-Traditional Adult Education at Delaware State University shall complete one (1) of the following options: an approved program consisting of thirty-six (36) semester hours of credit; or a thesis plus an approved program consisting of thirty (30) semester hours of credit.

Credit, three hours.

**EDUC-699B. THESIS OPTION – SPECIAL EDUCATION 3:3:0**

Candidates seeking the Master of Arts Degree in Special Education at Delaware State University will complete one (1) of the following options: 1.) An approved program consisting of thirty-six (36) credit hours, or 2.) a thesis plus and approved program consisting of thirty (30) credit hours. Said thesis must be prepared according to the specifications of the Education Graduate Program Office.

Prerequisites: A preliminary application must be submitted to the Education Graduate Program Director in the semester prior to registration for the thesis credit.

Credit, six hours.

## **MASTER OF SCIENCE IN NURSING**

### **OBJECTIVES**

The major purpose of the Master of Science in Nursing program at Delaware State University in the Department of Nursing is to provide qualified students, from diverse backgrounds, opportunities to learn theoretical knowledge, to develop role competencies, and clinical expertise to perform at advance practice levels in professional nursing practice. Currently the program offers educational experiences in two areas of expertise. These include nursing educator and/or nursing faculty generalist and specialist in community and public health nursing.

The program also prepares advance practice nurses to continue to develop their human potential through preparation for higher level nursing practice including clinical experts, educators, researchers, leaders and agents of change to improve health care outcomes. Graduates of the program will have the educational prerequisites to pursue doctoral study.

In addition, purposes of the graduate program include meeting the needs of its stakeholders in Delaware and surrounding areas, for highly skilled clinicians and educators, and/or nursing faculty. Students will benefit from the academic environment that facilitates scholarly pursuits such as engaging in research, identifying best practices, and evidence based practice that seeks to identify and add to the scientific basis of nursing practice.

### **GOALS**

General program goals are to prepare a graduate of the MSN program who will be able to perform the following advanced practice nursing competencies.

- Synthesizes comprehensive assessment data, and interpret clinical findings with normal and abnormal variations in formulating differential diagnoses for individuals, families, communities and populations.
- Identifies expected outcomes that incorporate evidence based practices, clinical effectiveness, cultural appropriateness with ethical considerations and supports the use of clinical guidelines that are linked with positive client outcomes.
- Designs planning strategies that meet the needs of clients experiencing complex health problems and participates in ongoing quality improvement of organizational systems that supports the planning process.
- Implements identified plans of client care using principles of nursing care management and provides organizational leadership through coordination, health teaching and promotion, consultation, prescriptive authority, and treatment (when appropriate) according to established regulations.
- Performs interventions that result in assisting clients to fulfill human needs through internal and external environmental adaptation, including the impacting of political change.
- Evaluates effectiveness of nursing interventions in relationship to client's attainment of identified outcomes and analyzes findings to determine needs for subsequent actions that result in ongoing quality improvement.
- Practices and provides health care with respect for human dignity, worth and uniqueness of all individuals regardless of social, economic or ethical status, personal attributes or the characteristics of health status (ANA, 2001).
- Synthesizes research evidence on teaching-learning theories, behavioral change theories, motivational theories, epidemiology and population based approaches to nursing practice.

- Demonstrates a commitment to life long learning, continuing formal and informal education, self development and seeking experiences to enhance clinical expertise and nursing roles.
- Participates in ongoing systematic performance evaluation by peers, administrators, clients and others and takes appropriate actions to improve any deficiencies identified in evaluation process.
- Directs the coordination of health care by providing leadership to nurses and other staff in professional organizations by using documented evidence upon which to make decisions.
- Participates in decision making and leadership to improve client care through discovery of new knowledge upon which to base evidence based practice through research, writing, publishing and presentations to effect change in practice and health outcomes.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Nursing (BSN).
  - a. Minimum Baccalaureate degree GPA of 2.5 on a 4.0 scale.
  - b. Minimum scholastic average of 3.00 in their undergraduate major. They should have successfully completed specific courses at the undergraduate level in the field in which they plan to pursue a graduate degree and a minimum number of courses in a designated area approved by the specific department.
2. Complete an application for admission.
3. Submit official transcript(s).
4. Submit Official Graduate Record Examination (GRE) scores, Graduate Management Admission Test (GMAT), or the Miller Analogies Test (MAT). Testing must be within five (5) years of applying for admission to the degree program. Applicants who have not taken the required test(s) can be admitted provisionally, but must satisfy the requirements during the first semester of graduate study in order to continue.
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay.
8. International applicants must meet all requirements.

### **DEGREE REQUIREMENTS**

#### **Community Health Nursing**

Students seeking certification in Community Health Nursing as an Advance Practice Nurse-Clinical Nurse Specialist must complete 500 clinical practice hours in addition to earning the MSN in Nursing that provide approximately 100 hours in the course 28.580. The eligibility requirement is a total of 500 clinical practice hours to take the certification exam.

#### **Prescriptive Authority**

Students seeking prescriptive authority in Delaware must complete an Advanced Pharmacology course: NURS.511 Pharmacology for CNS three (3) credits.

#### **Nurse Educator (CNE)**

Teachers who desire to become a Certified Nurse Educator may apply to the National League for Nursing Academic Nurse Educator Certification Program and Certification Examination.

**FACILITIES**

John R. Price Building houses the College of Health and Public Policy and the Department of Nursing.

## MASTER OF SCIENCE IN NURSING

<b>YEAR ONE COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
NURS-500	2	Theoretical & Evidence Based Nursing Practice
NURS-508	3	Advanced Health Assessment
NURS-510	2	Advanced Concepts of Pathophysiology in Nursing
NURS-520	2	Advanced Concepts of Pharmacology in Nursing
NURS-5EDUC	2	Health Policy, Finance, Disparities & Leadership
NURS-530	3	Nursing Research & Applied Statistics in Community Health Nursing
NURS-580	4	Theory & Practice in Promoting Health in Community Health Care Setting
<b>YEAR TWO COURSES</b>		
NURS-640	3	Theories & Principles of Teaching & Learning in Nursing
NURS-641	3	Curriculum Development in Nursing Education
NURS-642	3	Evaluation & Outcome Measurement & Statistics in Nursing
NURS-650	3	Teaching Methods, Strategies & Technology in Nursing
NURS-680	3	Teaching Practicum in Nursing Education
NURS-689	3	Masters Seminar <b>OR</b>
NURS-699	6	Master's Thesis
<b>TOTAL CREDIT HOURS: 36-39</b>		

### With Certification = 54-57 credits

Students seeking certification in *Community Health Nursing* as an Advance Practice Nurse must complete 432 clinical practice hours in addition to earning the MSN in nursing that provide approximately 70 hours. The eligibility requirement is a total of 500 clinical practice hours to take the certification exam. Students seeking prescriptive authority in Delaware must complete an Advanced Pharmacology course: *NURS-511 Pharmacology* 3 credits.

### Certification as a Nurse Educator (CNE)

Teachers who desire to become a Certified Nurse Educator may apply to the National League for Nursing Academic Nurse Educator Certification Program and Certification Examination.

### Summer Session Year One

NURS-670	9 credits	Clinical Practicum in Community Health Nursing I
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9 weeks x 24 hours = 216 hours [3 (8) hour day weekly]

### Summer Session Year Two

NURS-671	9 credits	Clinical Practicum in Community Health Nursing II
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9 weeks x 24 hours = 216 hours [3 (8) hour day weekly]

## **COURSE DESCRIPTIONS**

### **NURSING (NURS) (28)**

#### **NURS-500. THEORETICAL AND EVIDENCE BASED PRACTICE IN NURSING 2:2:0**

Conceptualize a theoretical and evidence research base for understanding nursing practice. Analyze selected nursing theories and conceptual models and their implementation in clinical nursing practice. Relationships between evidence based practice based on documented research findings and intuitive practice are analyzed. Approaches to understanding and expanding the scientific body of knowledge in nursing are emphasized. Fall semester year one (1). Course may be web enhanced.

Prerequisites: Admission to the MSN program.

Credit, two hours.

#### **NURS-508. ADVANCED HEALTH ASSESSMENT 3:2:1**

Students will continue to develop in assessment, communication, and observational skills to identify alterations in health and physical deviations in individuals, families, and communities. The course will use critical thinking, systems, and case study approaches to assist students to determine fulfillment of human needs and physiological, spiritual, cultural, and psychosocial functioning and integrity. Ability to use health assessment to promote, maintain, and restore high level wellness and prevent disease across the life span will be emphasized. The ability to make differential diagnoses and apply epidemiological concepts is emphasized.

Credit, three hours.

#### **NURS-510. ADVANCED CONCEPTS OF PATHOPHYSIOLOGY AND PHARMACOLOGY IN NURSING 2:2:0**

Exploration of system-focused pathophysiology and disease processes. Mechanisms of disease serves as an important foundation for clinical assessment, decision making, and management. The student ability to relate the knowledge to the assessment of an individual's response to pharmacologic management is emphasized. An integration of both pathophysiology and pharmacology is the focus of the course.

Credit, four hours.

#### **NURS-511. PHARMACOLOGY FOR ADVANCED PRACTICE NURSES 2:2:0**

The course will provide students with in-depth knowledge and skills necessary to have understanding of pharmacological and principles and responses to drugs at the cellular levels of human functioning. Knowledge necessary to analyze relationships between pharmacological agents, physiology, and treatment of common disease processes are emphasized. An understanding of the legal requirements for writing prescriptions as advanced practice nurses is an important focus of the course. The course is only required for students seeking certification as clinical nurse specialist.

Credit, three hours.

#### **NURS-5EDUC. HEALTH POLICY, FINANCE, DISPARITIES AND LEADERSHIP 2:2:0**

Enhance students' knowledge of the ongoing changes in health care and policy development. An understanding of how health policy is formulated and the process impacts clinical nursing practice and health care delivery is emphasized. Preparation of students to provide cost effective care, to participate in the design and managing human, fiscal, and physical health care resources is explored. Assuming the leadership role in addressing health care delivery, issues related to poverty, cultural differences related to health care disparities, and outcomes of patient care are analyzed.

Credit, two hours.

**NURS-520. ADVANCED PHARMACOLOGY IN NURSING****2:2:0**

This course provides graduate level students with advanced knowledge of physiological responses to drugs used in the treatment of disease. Issues of drug interactions, polypharmacy, drug misuses, and abuse are explored. The nurse's role in facilitating client compliance to treatment regimens is emphasized.

Credit, two hours.

**NURS-530. NURSING RESEARCH AND APPLIED STATISTICS IN PUBLIC AND COMMUNITY HEALTH NURSING****3:3:0**

Prepare the advanced practice nurse to utilize evidence based and new knowledge to provide high quality health care, initiate change, and improve nursing practice. Proficiency in the utilization of research and statistical processes to evaluate research findings, problem identification within clinical practice settings, and awareness of clinical practice and outcomes is developed. The clinical application of research and concepts of epidemiology, specifically to solving public health problems in communities are emphasized.

Credit, three hours.

**NURS-580. THEORY AND PRACTICE IN PUBLIC AND COMMUNITY HEALTH NURSING****4:2:6**

A graduate level clinical course in community and public health nursing. Theoretical and conceptual frameworks in this specialization, and interventions related to primary, secondary, and tertiary prevention of health problems in a variety of community health settings are explored. Application of conceptual models and epidemiology, and the nursing process will be used by advanced practice nurses to provide to communities, families, and individuals care that promotes the highest level of health possible are utilized. National and international aspects of health care will be emphasized.

Credit, four hours.

**NURS-640. THEORIES AND PRINCIPLES OF TEACHING AND LEARNING IN NURSING****3:3:0**

The role of nurse educator and theories and principles of teaching and learning are explored. Program planning and evaluation of undergraduate and other nursing education programs are emphasized. Historical and current trends, educational research findings, and applications to changing societal forces that influence students and faculty are emphasized.

Credit, three hours.

**NURS-641. CURRICULUM DEVELOPMENT IN EDUCATION****3:3:0**

Theories and principles of curriculum development as they apply to nursing education, planning, implementing, and evaluation of undergraduate academic and other health related education programs are explored.

Credit, three hours.

**NURS-642. EVALUATION AND OUTCOME MEASUREMENT IN NURSING****3:3:0**

The course covers the exploration of the program evaluation process in nursing practice and its relationship to ongoing quality improvement of community health care and nursing education. Development of reliable and valid measures of learning and health behaviors resulting from nursing interventions including health care and teaching and learning processes are emphasized.

Credit, three hours.

**NURS-650. TEACHING METHODS, STRATEGIES AND TECHNOLOGY IN NURSING EDUCATION****3:3:0**

Develop selected teaching strategies to achieve educational objectives in the cognitive affective and psychomotor domains. Experience in clinical and classroom settings that provide opportunities to develop in the role of nursing educator and the use of technology are explored.

Credit, three hours.

**NURS-670. CLINICAL PRACTICUM IN COMMUNITY HEALTH NURSING I 9:0:0**

The course is required of graduate students seeking national Certification in Community Health Nursing. The course provides in-depth clinical practice in the specialty area. The course prepares students to meet requirements of American Nurses Credentialing Association.

Credit, nine hours.

**NURS-671. CLINICAL PRACTICUM IN COMMUNITY HEALTH NURSING II 9:0:0**

Part II of an intensive clinical experience in community health nursing. The course emphasizes providing nursing care to individuals, complex families, communities, and populations.

Credit, nine hours.

**NURS-680. TEACHING PRACTICUM IN NURSING 3:3:0**

Opportunities to practice in the roles of nursing faculty and educator will be provided. Students will develop lesson plans, present lectures, participate in clinical teaching, and evaluation of student learning.

Credit, three hours.

**NURS-689. MASTER'S SEMINAR IN NURSING 3-6:3-6:0**

Research focused pursuit of a special topic in clinical or theoretical inquiry that results in a scholarly production. Close collaboration with advisor and instructor, and approval by the director of graduate programs and/or department chair are required.

Credit, three hours.

**NURS-690. RESEARCH SEMINAR IN NURSING 3:3:0**

An advanced research course that will provide students opportunities to analyze, synthesize, and evaluate existing research using application of prior knowledge to develop beginning steps of formulating their research proposals. The course is designed to assist students in developing a research proposal suitable to meet requirements of the program including a master's thesis or a research seminar paper. An expectation of the course is that students will complete formulating problems statements, research questions, hypotheses, conceptualization of methods, and a research design of their study by the end of the course.

Credit, three hours.

**NURS-698. SUSTAINING THESIS IN NURSING 0:0:0**

The Sustaining Thesis in Nursing course is for those students continuing work on their Thesis.

Credit, none.

**NURS-699. MASTER'S THESIS 3-6:3-6:0**

Research focused pursuit of a special topic in clinical or theoretical inquiry that results in a scholarly production. Close collaboration with advisor and instructor, and approval by the director of graduate programs and/or department chair are required. Student will conduct an actual research study that includes collecting and analyzing data.

Credit, six hours.

## **MASTER OF SOCIAL WORK (MSW)**

### **OBJECTIVES**

The mission of the Department of Social Work is to prepare culturally competent professionals guided by values, ethics, and evidence-based practice for professional and leadership roles; thus enhancing the quality of life of individuals, families, groups, communities, and organizations in a global society.

The curriculum of the Graduate Program in Social Work is designed to prepare individuals to offer professional social work intervention at an advanced level of practice in the generalist perspective to residents of the State of Delaware, in specific, and the nation, in general. Graduates are enabled to provide intervention and preventative services to individuals, families, groups, organizations, and communities in a range of traditional and non-traditional public and private social welfare settings. The foundation courses present a generalist perspective to social work practice and consist of fundamental content in human behavior and the social environment, social welfare policies, social work practice, research, and the field practicum. From this base, an advanced body of knowledge, practice principles, and skills are offered in the concentration to provide an integrated system of courses which collectively educate students for "advanced generalist" professional social work practice. Academic credit is not given for life experience. Students have the option of gaining in-depth knowledge in a selected field of practice through specialization courses and electives.

The Graduate Social Work Program received full accreditation status by the Council on Social Work Education (CSWE) in Summer 1990.

### **GOALS**

The goals of the program are listed below:

1. Prepare social work practitioners to develop an understanding of the importance of a Black perspective based on strengths-based empowerment approach for social work practice.
2. Prepare culturally competent professionals guided by values and ethics who are capable of promoting social and economic justice when working with diverse and at risk populations in a global society.
3. Prepare practitioners for evidence-based professional practice and leadership roles.
4. Educate students to think critically and to evaluate their own practice.

### **TEN CORE COMPETENCIES THAT PROVIDES EDUCATIONAL FRAMEWORK**

1. Identify as a professional social worker and conduct oneself accordingly.
2. Apply social work ethical principles to guide professional practice.
3. Apply critical thinking to inform and communicate professional judgments.
4. Engage diversity and difference in practice.
2. Advance human rights and social and economic justice.
3. Engage in research-informed practice and practice-informed research.
4. Apply knowledge of human behavior and the social environment.
5. Engage in policy practice to advance social and economic well-being and to deliver effective social work services.
6. Respond to contexts that shape practice.
7. Engage, assess, intervene, and evaluate with individuals, families, groups, organizations, and communities.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Nursing (BSN).
  - a. The applicant must have an undergraduate Liberal Arts foundation as defined by the program faculty. A background in the social and behavioral sciences is preferred.
  - b. The applicant's undergraduate transcript must reflect a Cumulative Point Average (CPA) of 2.75 or above on a 4.00 point scale (4.00 – “A”). A “B” average in the major field of study is required. Higher scholastic achievement is strongly preferred.
  - c. Advanced Standing applicants - earlier application date (May 30). Only applicants with a BSW are eligible to apply for Advanced Standing.
2. Official scores on the Graduate Record Examination (GRE) are required.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit an essay. Please write an essay explaining why you want to obtain a MSW degree. Also, how you plan to use the knowledge and skills you will obtain to impact social and economic justice and improve services for populations at risk. (Essay must be no longer than four (4) typed pages, double spaced, EDUC point Times New Roman font.)
8. International applicants must meet all requirements.

### **Type of Admission**

- Full-time status, two (2) year.
- Part-time status, three (3) or four (4) year status.
- Advanced standing status, one (1) calendar year.
- Advanced standing credits or Transfer credit.
- Conditional

Application deadline is May 15th for Advanced Standing and June 15th for other admissions.

### **Curriculum Requirements**

The Graduate Program in Social Work requires the successful completion (3.00 or above on a 4.00 scale) of sixty (60) credit hours of graduate courses. The curriculum consists of twenty-four (24) credit hours of generalist professional foundation courses, twelve (EDUC) credit hours of advanced practice in the generalist perspective concentration courses, and twenty (20) credit hours of specialization or elective courses, including eighty (80) hours of field practicum.

### **Residency Requirements**

According to standards established by the Council on Social Work Education (CSWE) and defined by the Graduate Program, students must complete their residency requirement in two consecutive semesters at Delaware State University during the first year of degreed admission.

### **Medical Statement**

After admission, each student is required to submit a health history and a recent physical examination, to include a Serology Test. The report must be signed by a licensed physician stating that the student is physically capable and free of contagion.

Students who do not submit completed reports by the end of the first two (2) weeks of the semester for which they are admitted may be subject to dismissal.

**Practice Liability Insurance Requirement**

All students are required to purchase or show proof of social work practice liability insurance prior to placement in field practicum. The insurance may be purchased through the National Association of Social Workers (NASW).

**DEGREE REQUIREMENTS**

The Graduate Program in Social Work requires the successful completion (3.00 or above on a 4.00 scale) of sixty (60) credit hours of graduate courses. The curriculum consists of twenty-four (24) credit hours of generalist professional foundation courses, twelve (EDUC) credit hours of advanced practice in the generalist perspective concentration courses, and twenty (20) credit hours of specialization or elective courses, including eighty (80) hours of field practicum.

## MASTER OF SOCIAL WORK

<b>FOUNDATION COURSES*</b>		
<b>CREDIT NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
MSW-601	2	Policy & Services in Social Welfare I
MSW-603	3	Human Behavior & the Social Environment I
MSW-605	3	Generalist Practice I
MSW-607	3	Research & Evaluation Methods in Social Work I
MSW-633	2	Field Instruction I
MSW-634	2	Policy & Services in Social Welfare II
MSW-608	3	Human Behavior & the Social Environment II
MSW-606	3	Generalist Practice II
MSW-604	3	Research & Evaluation Methods in Social Work II
MSW-602	2	Field Instruction II
<b>*Foundation courses must be completed prior to enrollment in any Concentration courses.</b>		
<b>CONCENTRATION COURSES</b>		
MSW-611	3	Ethical, Ethnic & Cultural Considerations for Social Work Practice
MSW-646	3	Advanced Generalist Practice I
MSW-xxx	3	Methods Elective
MSW-635	4	Field Instruction III
MSW-654	3	Advanced Social Work Practices in Mental Health I <b>OR</b>
MSW-658	3	Advanced Social Work Practices with Families, Children & Youth I
MSW-610	3	Administration, Management & Supervision for Social Work
MSW-647	3	Advanced Generalist Practice II
MSW-xxx	3	Methods Elective
MSW-636	4	Field Instruction IV
MSW-655	3	Advanced Social Work Practices in Mental Health II <b>OR</b>
MSW-659	3	Advanced Social Work Practices with Families, Children & Youth II
<b>TOTAL CREDIT HOURS: 60</b>		

## COURSE DESCRIPTIONS

### SOCIAL WORK (SCWK) (39)

#### **SCWK - 599. ADVANCED STANDING SEMINAR.**

**3:3:0**

The Advanced Standing Seminar is designed to prepare students for the advanced year (second year) of the Master of Social Work Program at Delaware State University. Accordingly, the seminar imparts content that enables the student to enter the second year having grasped the unique conceptualizations and practice definitions specific to DSU's MSW program. Having satisfied course requirements, students are eligible for enrollment in the MSW program as a second year, full-time student. **Prerequisite:** BSW degree earned from a program accredited by the Council on Social Work Education. The student must have been awarded the degree within five years of application to DSU and acceptance as an Advanced Standing student.

**Credits, six (6)**

#### **SCWK - 601. POLICIES AND SERVICES IN SOCIAL WELFARE I.**

**3:3:0**

This course has a dual focus. Major attention is given to the history of social welfare in the United States. Social welfare policies, services and institutions are examined from a historical perspective. Particular attention is given to the ways economic, political and organization systems impacted and continue to influence who can receive services and the methods of service delivery. These themes are discussed within a context of oppression and social injustice; that is, how social welfare policies and program address or ignore inequalities in the form of racism, discrimination and prejudice. Social Work's historical record as an advocate for social change to eradicate social injustices is reviewed. The course also examines the emergence of prevention as an orientation for programs and services for individuals, families and communities.

The course also presents and analyzes the evolution of social work in America. Concepts and events important to understanding Social Work's response to need and its efforts to eradicate social injustice from a global perspective are also examined.

**Credits, three (3)**

#### **SCWK - 602. POLICIES AND SERVICES IN SOCIAL WELFARE II.**

**3:3:0**

This course is the second class in the policy sequence. It explores the contemporary American welfare state from local, state and federal perspectives, while presenting rural and urban conditions that contribute to the social problems social welfare policies are mandated to address.

The course provides a framework for analyzing policies and programs in terms of their goals, recipients, entitlements, finances and effectiveness. Students are provided concepts and principles for policy practice that aims to advocate for and implement policies and services that promote well-being for individuals and communities. **Prerequisite:** SCWK 601 Policies and Services in Social Welfare I.

**Credits, three (3)**

#### **SCWK - 603. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT I.**

**3:3:0**

This course is the first of two courses in the HBSE sequence. It provides a framework for studying the person and environment from an ecological perspective. This perspective is also employed to examine human development and social functioning within the context of transactional influences according to the biological, psychological, and socio-cultural domains of growth and development. Recognizing the significance of ethnicity, gender, culture and class on development and how these realities should influence social workers' responses to people and their problems, the course explores a range of traditional and alternative theories for human growth and development. In addition, the course provides a conceptual model for viewing human behavior from a holistic perspective with particular emphasis on utilizing a Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective and the

global perspectives for understanding behaviors and applying the change process with individuals, families, communities, groups and organizations. The course focuses on human growth and development from conception to late childhood.

**Credits, three (3)**

**SCWK - 604. HUMAN BEHAVIOR AND THE SOCIAL ENVIRONMENT II. 3:3:0**

This course is the second class in the Human Behavior and Social Environment (HBSE) sequence. HBSE II builds on HBSE I which provided knowledge and understanding of theory, research, and practice issues of human development within the context of biological, psychological, and socio-cultural factors. HBSE I used an eco-systemic theoretical framework to cover normal lifespan development from conception through late childhood.

HBSE II continues this life span overview, covering normal development from adolescence to death.

Throughout the course an eco-systemic framework is utilized to study issues and life events significant to social work practice, such as teen pregnancy/parenthood, crime and delinquency, mental illness, chemical/substance abuse, long term care, dying and death.

HBSE II stresses a non-linear perspective of development in which there is a continuous, reciprocal interchange and influence in, between, and among different systems. Students are expected to complete the course with a heightened awareness of this dynamic and its implications for understanding and addressing the needs/problems of vulnerable populations as well-informed social workers. Critical thinking is cultivated through the process of analyzing extant knowledge while recognizing realities for which reliable facts are unknown, and valuing the usefulness of research in discovering, expanding and disseminating knowledge and information to field.

The course recognizes that prevention is an effective intervention for preventing behaviors and problems that adversely impact human growth and development. Hence, the course explores ways behaviors such as chemical dependency, mental health problems among adolescents, adults and the elderly can be prevented. The course specifically focuses on the life span stages emphasizing adolescence through death.

**Prerequisite:** SCWK 603 HSBE I.

**Credits, three (3)**

**SCWK - 605. GENERALIST PRACTICE I. 3:3:0**

This course is the first of two that comprise the foundation practice sequence. The course presents the generalist foundation for micro and mezzo social work practice centering on the interactive and dynamic processes of assessment, intervention, and evaluation with individuals, families and groups. The course presents knowledge, and skills for generalist practice according to eco-systems and person and social environment perspectives for understand people and responding their needs and problems. Students are introduced to a Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective and the global perspective as core concepts for not only assessing clients' problems but, most importantly, assessing their strengths, gifts and talents for resolving and overcoming obstacle to their well-being. By the end of the course students learn to view clients as central resources in the problem solving process.

The course emphasizes that social work values and ethics, promotion of social and economic justice, and service to diverse groups, exemplified by cultural competence, overlie all social work practice in all settings with all clients. The grade "B" must be earned in this course. Students enrolled in this course must also be enrolled in the appropriate first year field instruction course.

**Credits, three (3)**

**SCWK - 606. GENERALIST PRACTICE II. 3:3:0**

This is the second of two courses that comprise the foundation practice sequence. The course builds on the knowledge, values and skills for generalist practice that were imparted in Generalist Practice I by teaching

students how to apply dynamic and interactive processes of assessment, intervention, and evaluation at the macro level in communities and organizations. The course teaches communities and organizations as settings where the social worker and the client work together in an attempt to reduce or ameliorate problems that adversely impact client well-being. Guided by a Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective, and the global perspective, students learn to focus on clients' strengths as a potential solution to the problem(s) for which the client is receiving assistance.

The course directs students to look to evidence based practices and related research when considering effective ways to assist clients. Consequently, the course familiarizes students with resources for evidence based interventions and promotes evaluation of practice using reliable research methods.

Guided by a prevention orientation to generalist practice at the macro level, students learn to examine risk and protective factors that should be taken into account when developing interventions to prevent problems before they emerge.

The course emphasizes that social work values and ethics, promotion of social and economic justice, and service to diverse groups, exemplified by cultural competence, overlie all social work practice in all settings with all clients. The grade "B" must be earned in this course. Students enrolled in this course must also be enrolled in the appropriate first year field instruction course.

**Credits, three (3)**

### **SCWK – 607. RESEARCH AND EVALUTATION METHODS IN SOCIAL WORK I. 3:3:0**

This is the first of a three course courses that comprise the research sequence. It is designed to introduce students to the scientific method of inquiry within the context of advanced generalist practice and research problems, germane to social work. Issues relating to research, theory, goals and methodological procedures are examined. Students are introduced to the various ways in which these underpinnings are designed to aid in the development of the appropriate language, knowledge and skills for the application of research methods associated with advanced generalist social work practice. Substantive topics include: framing hypotheses and delineating the components of the hypotheses; stages involved in conducting social scientific research projects; the logic of such procedures; values and ethics; conceptualization and operationalization; research design; and sampling. Ethnology and ecological fallacies provide the conceptual frame of reference for issues relating to cultural diversity, working with at-risk populations, and achieving social justice.

**Credits, three (3)**

### **SCWK - 608. RESEARCH AND EVALUATION METHODS IN SOCIAL WORK II. 3:3:0**

This is the second course in a three course research sequence that introduces students to concepts in data analyses. Content includes analyses and interpretation of univariate, bivariate, and multivariate statistics appropriate for various kinds of data and levels of measurement used in social work practice. Students will learn data collection, data entry, data processing, and data analysis using the SPSS software package and will use the knowledge to complete their own research projects. Thus, at this level, students become active participants in conducting self-directed social work research. Additionally, students continue to deepen and extend their knowledge and skills as they relate to social work research and evaluation at the generalist practice level. Substantive topics include: frequency distributions, measures of central tendency and variability, hypothesis testing, inferential statistics, including correlation and regression. Focus will also be on the application of research methods to the evaluation of interventions at various levels. In follow up to Research and Evaluation Methods I, this course continues to explore social research as a means for promoting a Black perspective, strengths perspective, empowerment, rural, and global perspective, and for attending to cultural diversity and social and economic justice for all, especially populations-at-risk.

**Prerequisite:** 607 Research and Evaluation Methods in Social Work.

**Credits, three (3)**

**SCWK - 610. ADMINISTRATION MANAGEMENT AND SUPERVISION FOR SOCIAL WORK PRACTICE. 3:3:0**

This course is designed to increase students' knowledge and skills for social work macro practice in organizations. The course aims to prepare students for leadership positions as administrator, manager and supervisor. Accordingly, students will be encouraged to think from an organizational point of view; specifically, looking at systems dynamics and the functioning of the organization as an entity and to critically think and behave like managers and leaders, with a broad, visionary perspective and an emphasis on both results and process.

The course is taught with the point of view that organizations provide services in a manner reflecting its orientation to service delivery. Hence, students are challenged to consider how an organization should organize and deliver services and manage its diverse human resources in a manner consistent with strengths, empowerment, and global perspectives. **Prerequisite:** Second year status.

**Credits, three (3)**

**SCWK - 633 FIELD PRACTICUM I. 3:3:0**

To be taken by first year students in the field. Provides students with opportunities to employ the knowledge, values, skills and conceptual frameworks that are related to the generalist perspective in agency settings while under the supervision of an approved field instructor. Students are able to develop and refine the skills necessary for effective advanced practice and to integrate the concepts and philosophy of empowerment, the generalist perspective to social work practice and a Black perspective in the helping process with all client systems.

**Credits, two (2)**

**SCWK - 634 FIELD PRACTICUM II. 3:3:0**

This course is taken by first year students in the field. Provides students with opportunities to employ the knowledge, values, skills and conceptual frameworks that are related to the generalist perspective in agency settings while under the supervision of an approved field instructor. Students are able to develop and refine the skills necessary for effective advanced practice and to integrate the concepts and philosophy of empowerment, the generalist perspective to social work practice and a Black perspective in the helping process with all client systems.

**Credits, two (2)**

**SCWK - 635 FIELD PRACTICUM III. 3:3:0**

This course provides students with opportunities to employ the knowledge, values, skills and conceptual frameworks that are related to the advanced generalist perspective in agency settings while under the supervision of an approved field instructor. Students are able to develop and refine the skills necessary for effective advanced practice and to integrate the concepts and philosophy of empowerment, the generalist perspective to social work practice and a Black perspective in the helping process with all client systems.

**Credits, four (4)**

**SCWK - 636 FIELD PRACTICUM IV. 3:3:0**

This course provides students with opportunities to employ the knowledge, values, skills and conceptual

frameworks that are related to the advanced generalist perspective in agency settings while under the supervision of an approved field instructor. Students are able to develop and refine the skills necessary for effective advanced practice and to integrate the concepts and philosophy of empowerment, the generalist perspective to social work practice and a Black perspective in the helping process with all client systems.  
**Credits, four (4)**

**SCWK - 643. THEORIES OF PERSONALITY AND PSYCHOPATHOLOGY. 3:3:0**

This is a required second year course that builds on Human Behavior and Social Environment I & II by expanding students' understanding of mental disorders over the life course that social workers are likely to encounter in their practice with individuals, families, communities, groups and organizations. The critical influence of culture, class, ethnicity, social values and other distinguishing characteristics of the individual, family, and communities is emphasized. Disparities in mental health delivery system and their implications for advanced generalist practitioners as advocates for equal access to mental health services by all persons is a major focus of the course.

The course expands students' knowledge and skills in assessing, developing intervention plans and intervening with clients experiencing mental disorders. Personality and behavioral symptoms in children, adolescents and adults, including development disorders, learning disorders, developmental delays and mental retardation through class discussion and case presentations. The Diagnostic and Statistical Manual of Mental Disorders is used as a framework for identification key elements of mental disorders. Alternative models for assessing mental disorders from a bio-psychosocial perspective are examined. Several child and adult diagnostic categories are addressed from a person and environment perspective.

Current research pertaining to the biological, psychological and environmental explanations for mental disorders is reviewed. **Prerequisite:** Completion of all foundation courses.

**Credits, three (3)**

**SCWK - 646. ADVANCED GENERALIST PRACTICE I. 3:3:0**

This is a required second year course that builds on the vertical integration of Generalist Practice I & II and the other across the curriculum foundation content areas that include human behavior and social environment, policy, research, and field across the foundation curriculum. The course focuses on engagement and assessment phases of the planned change process with individuals, families and treatment groups, and is designed to develop advanced knowledge and skills for advanced generalist practice at the micro and mezzo levels. In addition, the course enables students to independently integrate social work values and ethics with clients experiencing serious, complex problems. Problem solving processes of engagement and assessment are taught according to an ecological and holistic social work perspective. Core organizing frameworks for assisting clients are a Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective, and the global perspective. These underpinnings mean that the course necessarily provides students with advanced level skills that support clients' capacities to recover from serious problems and, in addition, addresses the ways social injustices, e.g., health disparities, institutionalized racism, etc., negatively impact the well-being of individuals and families. Implications of such injustices on advanced practice with treatment groups. The grade "B" must be earned in this course. **Prerequisite:** Completion of all foundation year courses. Students enrolled in the appropriate second year field instruction course.

**Credits, three (3)**

**SCWK - 647. ADVANCED GENERALIST PRACTICE II. 3:3:0**

This is the second of a four part advanced generalist practice sequence. It is a required second year course that builds on the vertical integration of Generalist Practice I & II and the other across the curriculum foundation content areas that include human behavior and social environment, policy, research, and field. The course focuses on the engagement and assessment phases of the planned change process in and with communities and organizations, and is designed to develop advanced knowledge and skills for advanced generalist practice at the micro and mezzo levels. The course focuses on effective models for engaging communities and organizations as a necessary step for assessing needs and problems that are impediments

to community well-being and the effective administration and management of human service organizations. Reflecting the program's underpinnings — a Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective and the global perspective — the course gives special attention the significance of such factors as ethnicity, culture, class, and community values when assisting communities and organizations that are experiencing complex, difficulty needs and problems. The grade "B" must be earned in this course. Students enrolled in this course must be also enrolled in the appropriate second year field instruction course.

**Credits, three (3)**

**SCWK - 651. PRACTICE AND PROGRAM EVALUATION FOR THE ADVANCED GENERALIST PRACTITIONER.**

**3:3:0**

This is the third course in a three course research sequence that introduces students to concepts in program evaluation. It focuses on the knowledge skills and procedures used for practice and program evaluation. Practice evaluation emphasizes the integration of research and practice by utilizing single subject/case design methodology and group designs. The course focuses on analysis of evaluation studies concerned with special populations. Values and ethic of ethics of the social work profession in relation to research methods used in evaluation are addressed. Content includes needs assessment, formative evaluation, program monitoring, outcome evaluation, and cost-benefit analysis. Students will also learn about qualitative research, focus group interviews, action research and participatory research. Additionally, students continue to deepen and extend their knowledge and skills as they relate to social work research and evaluation at the generalist practice level. This course continues to explore social research as a means for promoting strengths perspective, empowerment, and rural perspectives, and for attending to cultural diversity and social and economic justice for all, especially populations-at-risk. **Prerequisite:** Successful completion of all foundation year courses.

**Credits, three (3)**

**SCWK - 660. ADVANCED GENERALIST PRACTICE IN PUBLIC HEALTH.**

**3:3:0**

This course examines public health and prevention as an approach to addressing the social and economic problems advanced generalist practitioners face in their practice with individuals, families, communities, groups and organizations. A major focus of the course is prevention as an effective approach with populations, e.g., Blacks, Latinos, etc., who are overrepresented in the incidents of problematic health conditions. The course will define public health, and examine its foci, functions and its mission. The course will also review the history of public health social work, the roles and functions of public health social workers in a variety of arenas, as well as, interventions and strategies public health social workers utilize to insure equal access to public health services by vulnerable populations, particularly e.g., poor populations facing HIV/AIDS, mental disorders and substance abuse. The course will also present an introduction to the cross-cutting areas of public health including: communication and informatics, diversity and culture, leadership, public health biology, professionalism, program planning and systems thinking.

**Credits, three (3)**

**SCWK - 668. ADVANCED GENERALIST PRACTICE III.**

**3:3:0**

This is the third course in the four part advanced generalist practice sequence. It is a required second year course that builds on the vertical integration of Generalist Practice I & II and the other across the curriculum foundation content areas that include human behavior and social environment, policy, research, and field. The course prepares students for advanced generalist social work practice with an emphasis on intervention and evaluation with individuals, families, and treatment groups. Building on the advanced skills for engagement and assessment derived from Advanced Generalist Practice I, this course provides concepts, and principles that enable students to assist clients experiencing serious, complex problems. A Black perspective for social work practice, empowerment, the strengths perspective, the rural perspective

and the global perspective are utilized to increase students' proficiency in tapping clients' internal and external resources to face and overcome problems that could prevent productive relations and functioning in society. Major attention is given cultural competence for effective practice with populations, e.g., African American, Latinos, gays, lesbians, the poor and elderly, who have long histories as targets of racism, discrimination and prejudice. **Prerequisite:** 646 Advanced Generalist Practice I

The grade "B" must be earned in this course. Students enrolled in this course must be also enrolled in the appropriate second year field instruction course.

**Credits, three (3)**

#### **SCWK - 669. ADVANCED GENERALIST PRACTICE IV.**

This is the final course of the four part advanced generalist practice sequence. It is a required second year course that builds on the vertical integration of Generalist Practice I & II and the other across the curriculum foundation content areas that include human behavior and social environment, policy, research, and field. It focuses on the intervention and evaluation of the planned change process. The course considers models for problem solving inside organizations and for understanding communities, intervening with them and evaluating the effectiveness of practice with communities. Strategies for initiating and pursuing change in communities and organization are identified, including different points of intervention.

Throughout the course, special attention is given to factors affecting diverse population groups, including, but not limited to, groups distinguished by race, ethnicity, culture, class, gender, sexual orientation, religion, physical or mental ability, age, and national origin. Strategies for mobilizing communities to address problems before they emerge are explored. The grade "B" must be earned in this course. Students enrolled in this course must be also enrolled in the appropriate second year field instruction course. **Prerequisite:**

647 Advanced Generalist Practice II

**Credits, three (3)**

# COLLEGE OF MATHEMATICS, NATURAL SCIENCES AND TECHNOLOGY



## **Department of Biological Sciences**

Master of Science in Biological Sciences  
Master of Arts in Biological Sciences  
Master of Science in Biology Education  
Master of Science in Molecular and Cellular Neuroscience  
Doctor of Philosophy in Neuroscience

## **Department of Chemistry**

Master of Science in Applied Chemistry  
Doctor of Philosophy in Applied Chemistry

## **Department of Computer and Information Sciences**

Master of Science in Computer Science

## **Department of Mathematics**

Doctor of Philosophy in Interdisciplinary Applied Math & Mathematical Physics  
Applied Mathematics (concentration)  
Mathematical Physics (concentration)  
Master of Science in Applied Mathematics  
Applied Mathematics (concentration)  
Pure Mathematics (concentration)  
Master of Science in Mathematics Education

## **Department of Physics**

Master of Science in Applied Optics  
Doctor of Philosophy in Optics  
Master of Science in Physics  
Master of Science in Physics Teaching

## **MASTER OF SCIENCE IN BIOLOGICAL SCIENCES**

### **OBJECTIVES**

The Department of Biological Sciences prepares students for career opportunities in professional studies and further graduate studies in areas related to biological sciences and neuroscience. Many graduates pursue careers in state and federal agencies, health care, private industry, research, and teaching. The program strives to develop a clear and unbiased method of critical and logistic thinking, an appreciation and understanding of the natural world, and knowledge of biological principles required to make intelligent and effective decisions.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Have earned a Baccalaureate degree in Biological Sciences or a related field.
  - a. Applicants must have earned a cumulative grade point average of at least 2.75 with 3.00 minimum in the major.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit Statement of Intent defining your career goal.
8. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

#### **DEGREE REQUIREMENTS**

The M.S. Degree Program in Biological Sciences is a traditional degree program designed to prepare students for further graduate studies in areas related to biological sciences, pursue careers in state and federal agencies, health care, private industry, and research technical positions. The program capitalizes on the expertise of a number of faculty across campus who are active in various areas of research. The degree requirements include and emphasize a research thesis based on mentored research. The program requires thirty (30) graduate credits and is designed to allow completion over a two (2) year period on a full-time basis.

#### **FACULTY**

The Department of Biological Sciences is comprised of dedicated and well prepared faculty with diverse educational backgrounds and areas of research specialization. Small class sizes for graduate courses ensure that students interact closely with faculty in the learning experience. All faculty have published in their respective fields, and they maintain active research involvement. Scholarly involvement and continuous professional development in research keeps the faculty current and able to offer exciting research opportunities to the students in a variety of areas. The Department's faculty is involved not only with individual research projects but also participate in joint collaborative research themes, for example in neuroscience. The students have the opportunity to select their projects from these various arenas.

## **FACILITIES**

The Department of Biological Sciences is housed in the Science Center (original) and the Mishoe Science Center. The Department consists of eleven (11) active research laboratories, a common biotechnology-equipped laboratory, six (6) laboratory classrooms with prep rooms, faculty offices, a science reading room, an animal room, and a research greenhouse. These facilities provide strong support capabilities in teaching and research areas of modern Biology. The faculty has active research programs that are funded by research grants in various areas of biology but especially in plant biotechnology, cancer, and neuroscience.

In addition, the department is a cosponsor of the Claude E. Phillips Herbarium. The herbarium is the largest collection of preserved plant materials at any historically black institution in the country and the only such collection on the Delmarva Peninsula.

**MASTER OF SCIENCE IN BIOLOGY  
REQUIRED COURSES**

**Year 1**

<b>CREDIT NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
BIOL-520	3	Cell Biology
BIOL-505	3	Experimental Design and Biostatistics
BIOL-590	2	Professional Development Workshop I
BIOL-521	3	Molecular Biology
BIOL-535	3	Current Techniques in Biology
BIOL-591	1	Professional Development Workshop II

**Year 2**

BIOL-650	3	Biological Mechanisms (or equivalent offered by the Chemistry Department)
BIOL-690	3	Thesis Research I
BIOL-xxx	6	Electives (2)
BIOL-691	3	Thesis Research II

**TOTAL CREDIT HOURS: 30**

## **COURSE DESCRIPTIONS**

All courses require that students have, as minimal prerequisites, one (1) year of Biology courses on the undergraduate level. Additional prerequisites are noted in each course description. While a degree in Biological Sciences or its equivalent is an admission requirement for the graduate degree programs in Biology, not all courses require this extensive background. Certain courses will thus also be appropriate for graduate students in other fields who may not have undergraduate degrees in Biology.

### **BIOLOGICAL SCIENCES (BIOL) (23)**

#### **23-503. INTRODUCTION TO NEUROSCIENCE**

**3:3:0**

The course is a broad overview of the field of neuroscience covering three levels of analysis: 1.) molecular and cellular; 2.) systems neuroscience; and 3.) behavioral neuroscience. The course provides a common foundation in neuroscience for students planning further study or for those interested in learning about the area.

Credit, three hours.

#### **23-505. EXPERIMENTAL DESIGN AND BIO-STATISTICS**

**3:3:0**

A survey of statistical methods used in biological research. Topics include parametric and nonparametric statistics, aspects of experimental design, and use of the computer in statistical analysis.

Credit, three hours.

#### **23-511. PHARMACOLOGY**

**3:3:0**

A study of how drugs are used to achieve therapeutic benefits. The mechanism of action of various drug types at the molecular, cellular, and interactive-system levels will be addressed. Topics will include the basis for rationale uses of medically-relevant drugs in biological systems and detailing their effectiveness in various diseases and disorders. Focus will be on understanding the balance between pharmacodynamic, pharmacokinetic, and toxicological side-effects that underlies effective treatments.

Credit, three hours.

#### **23-515. MOLECULAR FOUNDATIONS OF BEHAVIOR**

**3:3:0**

The course explores the broad and diverse spectrum of behaviors demonstrated by living things. The scope of the course is, taxonomically speaking, broad-based, although most of attention will be directed within the animal kingdom. The course will examine behaviors in both proximate and ultimate contexts and will include analysis of their mechanisms, origins, transmission, development, and significance. Thus it is clear that the study of behavior is multidimensional and embraces many primary biological arenas including anatomy, physiology, heredity, ontogeny, ecology, and evolution. Many approaches have been employed in the study of behavior. These include comparative and physiological psychology, neurobiology, ethology, behavioral ecology, and sociobiology. In the course our study will consider all of these elements, but the focus will concentrate on the ethological and ecological perspectives.

Credit, three hours.

#### **23-520. CELL BIOLOGY**

**3:3:0**

The course offers a study of cellular and subcellular biology.

Credit, three hours.

#### **23-521. MOLECULAR BIOLOGY**

**3:3:0**

The molecular biology course is rooted in the most basic understanding of life, at the molecular level.

Credit, three hours.

**23-535. CURRENT TECHNIQUES IN BIOLOGY****3:0:3**

The purpose of this course is to expose the new graduate student to various key biological techniques within various laboratories in the department and college. The course will be team taught with the student spending about two (2) weeks in each faculty lab. It will also acquaint the student with the various research options for their thesis. Credit, three hours.

**23-575. MOLECULAR GENETICS AND GENOMICS****3:3:0**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences. Equivalent to AGRI-575. Credit, three hours.

**23-590. PROFESSIONAL DEVELOPMENT WORKSHOP I****2:2:0**

The course focuses on developing professional skills and experiences by participation and presentation in workshops, seminars, grant writing, and research reviews. Credit, two hours.

**23-591. PROFESSIONAL DEVELOPMENT WORKSHOP II****1:1:0**

The course assigns credit for continued participation as described in 23-590 and for the student to identify a research advisor to initiate a faculty-supervised research leading to development and writing of a thesis project proposal. Credit, one hour.

**BIOL-595. CAREERS SEMINAR IN BIOTECHNOLOGY/PHARMACOLOGY****1:1:0**

This course will introduce students to leaders in industrial research companies and government regulatory agencies that hire large numbers of biologists. Each week a speaker from industry or government will present about their industry or agency and will present a case study of a related issue or problem. Prerequisites: MA graduate student in Department of Biological Sciences or related area; Bioscience major

Credit, one credit hour

**23-599. SPECIAL PROJECTS****3:3:0**

The course is for continued participation in research, or other special needs. Prerequisites: Consent of the Chair. Credit, three hours.

**23-600. MOLECULAR ENDOCRINOLOGY****3:3:0**

The graduate level course is designed to: 1.) engage students in mastering a working knowledge of advanced principles in endocrinology, 2.) broaden student comprehension and discussion of current topics in endocrinology, in particular current journal articles, and 3.) develop experimental design / grant writing techniques relevant to endocrinology. Credit, three hours.

**23-603. STRATEGIES FOR EFFECTIVE TEACHING IN BIOLOGY****3:3:0**

The course provides an introduction to the principles and techniques of effective pedagogy as it applies to teaching in the life sciences. While the course is focused on college-level instruction, secondary school teaching will be considered. This course is required for graduate students planning to teach in DSU's biology department. Prerequisites: Second year biology graduate student status. Credit, three hours.

**23-604. SCIENTIFIC INTEGRITY****3:3:0**

The course provides an introduction to the principles of ethical conduct of research including scientific integrity and relevant human subjects and animal use regulations. The course will be taught using a case-study method where students will read and discuss situations that they might encounter in the practice of research. Prerequisites: Second year graduate student status. Credit, three hours.

**BIOL-605. CELL MORPHOGENESIS****3:3:0**

Current topics related to basic processes of molecular aspects of differentiation and development in living cells. Credit, three hours.

**BIOL-607. CANCER BIOLOGY 3:3:0**

This course is designed to extend the concepts introduced in Cell Biology and Genetics and apply them to a well-known human disease. Cancer Biology covers current concepts and knowledge of cancer, including cancer research and cancer treatment. This course will explore the cellular and molecular mechanisms underlying cancer development with the aim of understanding how changes in the normal growth and division processes lead to the formation of tumors. Lecture topics include the natural history of cancer, oncogenes, tumor suppressors, cancer-causing viruses, signal transduction, other genetic alternations in cancer, epidemiology, health care policy and current therapeutic approaches to cancer treatment.

Prerequisites: Graduate student in Department of Biological Sciences or related area

Credit, three credit hours

**BIOL-608. PATHOPHYSIOLOGY 3:3:0**

Pathophysiology is the study of abnormal function in living tissue. This course describes the basic biology of various disease processes, building upon the knowledge gained in Genetics, Cell Biology, and Principles of Physiology. Physiological principles underlying the causes, signs, symptoms, and pattern of development of human disease will be examined. Building upon a basic background in human biology, the manifestations of various human diseases will be explained by the way these diseases disrupt normal physiology, anatomy, and biochemistry. Knowing how diseases disrupt normal physiology will also help in understanding the rationale behind many types of treatment. Health disparities will also be addressed.

Prerequisites: Graduate student in Department of Biological Sciences or related area

Credit, three credit hours

**23-610. FUNCTIONAL NEUROANATOMY****3:3:0**

The course is designed for graduate students in the life sciences who are interested in becoming familiar with the structure and function of the vertebrate nervous system at both the gross and microstructure levels. The course will include computer exercises and microscopic examinations.

Credit, three hours.

**23-611. ADVANCED GENETICS****3:3:0**

The course offers an in depth exploration of principles of modern genetics as they apply to plants, animals, and micro-organisms ranging from the molecular to the population level. Four (4) hours lecture/laboratory.

Credit, three hours.

**23-6EDUC. NEUROCHEMISTRY****3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge about neurotransmitters, their receptors and cellular effectors, and their relationship to disease. The course will help students understand the history and development of the current understanding of the chemistry of the nervous system by presenting some of the experimental evidence on which the knowledge is based.

Credit, three hours.

**23-621. ADVANCED MICROBIOLOGY****3:3:0**

The course will emphasize the role of micro-organisms in the diseases of man. The history of microbiology and the anatomy, physiology, ecology, and applications of bacteria will be emphasized.

Credit, three hours.

**23-622. THE PHYSIOLOGY OF EXCITABLE CELLS****3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge of the physiology of nerve, muscle, and sensory cells. The course will help students understand

the history and development of the current understanding of excitable cell physiology by presenting some of the experimental evidence on which the knowledge is based.

Credit, three hours.

**23-625. IMMUNOLOGY**

**3:3:0**

The course offers a study of cellular, humoral, and molecular aspects of immune reactions. There will be an introduction to immunobiology and immunochemistry. The use of antigen-antibody reactions will be emphasized.

Credit, three hours.

**23-631. CELL BIOCHEMISTRY/HISTOCHEMISTRY**

**3:2:2**

The course offers a comparative and correlative study of cellular chemistry as related to the physiological functions and metabolism of various tissues and organs from a diverse range of vertebrates. Some human biomedical correlations will be included. Demonstrations and laboratory exercises are included. Two (2) lecture hours and one (1) two-hour lab each week.

Credit, three hours.

**23-650. BIOLOGICAL MECHANISMS****3:3:0**

The course provides an integration of the molecular and cellular functions within a cell and how these relate to overall system operations. The course will emphasize regulatory, homeostatic, and biochemical approaches to understanding cell function.

Credit, three hours.

**23-651. PROTEINS: STRUCTURES AND MOLECULAR PROPERTIES****3:3:0**

The course will examine the chronological events in the life of a protein. These events include protein composition, biosynthesis, and molecular dynamics. Evolutionary aspects of ancestral proteins will be used to explore the origins of contemporary primary structures. A laboratory will be included to examine the various protein separation schema that are currently used in modern molecular labs. Background in genetics, molecular, and cell biology required.

Credit, three hours.

**BIOL-653. DISEASES OF THE NERVOUS SYSTEM 3:3:0**

With the dramatic advances in neuroscience and psychiatry, we are able to identify the anatomical, chemical, and psychological anomalies underlying many mental and nervous system disorders. These advances may help us find better treatment options as well as potential preventative measures. Using several different reading sources, the present course will cover epidemiology, symptoms, known causes, neurobiology and treatment of nervous system disorders that include Schizophrenia, addiction, autism, depression, bipolar disorder, anxiety disorder, Alzheimer's, Parkinson's and Huntington's diseases.

Prerequisites: Graduate student in Department of Biological Sciences or related area

Credit, three credit hours

**23-666. BIOTECHNOLOGY****3:3:0**

The course provides a series of lecture presentations featuring speakers from academics and industry in the expanding field of Biotechnology. An extensive research paper will be required of each student.

Credit, three hours.

**23-689. PROBLEMS IN BIOLOGY****1-3:0:1-3**

The course offers an in-depth individualized literature investigation of a research problem conducted under supervision of advisor. The course includes use of library, integrating data from various sources, and conceptual thinking to produce a final Review paper. The outcome will be reviewed by faculty and the student must defend to a committee in a seminar.

Prerequisites: Graduate Biology student in M.A. program.

Credit, typically three hours but may be one hour.

**23-690. THESIS RESEARCH I****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-691. THESIS RESEARCH II****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-692. THESIS RESEARCH III****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected

that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-698. THESIS SUSTAINING - BIOLOGY**

**0:0:0**

Upon completion of all courses and research, this course is used to maintain registration until graduation.

Credit, none.

## **MASTER OF ARTS IN BIOLOGICAL SCIENCES**

### **OBJECTIVES**

The M.A. Degree Program in Biological Sciences is designed to expand the scientific background and competency of secondary school teachers and to advance the careers of persons in industry, government agencies, and other related positions. The degree course requirements are tailored for three independent tracks (General Biology, Biology Education, and Applied Biosciences) and in place of a laboratory research thesis an extensive literature review article is required on a topic appropriate for the given track.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Have earned a Baccalaureate degree in Biological Sciences or a related field.
  - a. Applicants must have earned a cumulative grade point average of at least 2.75 with 3.00 minimum in the major.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit Statement of Intent defining your career goal.
8. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

#### **DEGREE REQUIREMENTS**

The M.A. Degree Program in Biological Sciences is designed to provide part-time, employed students with additional skills in biological sciences and related areas. The program capitalizes on course work and faculty mentors. The degree requirements include a literature based thesis that is reviewed by a committee. The program requires thirty (30) graduate credits.

#### **FACULTY**

The Department of Biological Sciences is comprised of dedicated and well-prepared faculty with diverse educational backgrounds and areas of research specialization. Small class sizes for graduate courses ensure that students interact closely with faculty in the learning experience. All faculty have published in their respective fields, and they maintain active research involvement. Scholarly involvement and continuous professional development in research keeps the faculty current and able to offer exciting research opportunities to the students in a variety of areas. The Department's faculty is involved not only with individual research projects but also participate in joint collaborative research themes, for example in neuroscience. The students have the opportunity to select their projects from these various arenas.

**FACILITIES**

The Department of Biological Sciences is housed in the Science Center (original) and the Mishoe Science Center. The Department consists of eleven (11) active research laboratories, a common biotechnology-equipped laboratory, six (6) laboratory classrooms with prep rooms, faculty offices, a science reading room, an animal room, and a research greenhouse. These facilities provide strong support capabilities in teaching and research areas of modern Biology. The faculty has active research programs that are funded by research grants in various areas of biology but especially in plant biotechnology, cancer, and neuroscience.

In addition, the department is a cosponsor of the Claude E. Phillips Herbarium. The herbarium is the largest collection of preserved plant materials at any historically black institution in the country and the only such collection on the Delmarva Peninsula.

# **MASTER OF SCIENCE IN BIOLOGY EDUCATION**

## **OBJECTIVES**

The Department of Biological Sciences prepares students for career opportunities in professional studies and further graduate studies in areas related to biological sciences and neuroscience. Many graduates pursue careers in state and federal agencies, health care, private industry, research, and teaching. The program strives to develop a clear and unbiased method of critical and logistic thinking, an appreciation and understanding of the natural world, and knowledge of biological principles required to make intelligent and effective decisions.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Have earned a Baccalaureate degree in Biological Sciences or a related field.
  - a. Applicants must have earned a cumulative grade point average of at least 2.75 with 3.00 minimum in the major.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit a resume.
6. Submit three (3) letters of recommendation.
7. Submit a Statement of Intent defining your career goal.
8. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

### **DEGREE REQUIREMENTS**

The M.S. Degree Program in Biology Education is designed for certified secondary or middle school teachers who desire a course of study which is strongly based in Biology, yet includes coverage of current areas of significance in Science Education. The program requires thirty-six (36) DSU graduate credits and is designed for completion over a three (3) year period on a part-time basis. The program is currently undergoing revision and the new curriculum will be available the Fall 2010 semester.

### **FACULTY**

The Department of Biological Sciences is comprised of dedicated and well prepared faculty with diverse educational backgrounds and areas of research specialization. Small class sizes for graduate courses ensure that students interact closely with faculty in the learning experience. All faculty have published in their respective fields, and they maintain active research involvement. Scholarly involvement and continuous professional development in research keeps the faculty current and able to offer exciting research opportunities to the students in a variety of areas. The Department's faculty is involved not only with individual research projects but also participate in joint collaborative research themes, for example in neuroscience. The students have the opportunity to select their projects from these various arenas.

## **FACILITIES**

The Department of Biological Sciences is housed in the Science Center (original) and the Mishoe Science Center. The Department consists of eleven (11) active research laboratories, a common biotechnology-equipped laboratory, six (6) laboratory classrooms with prep rooms, faculty offices, a science reading room, an animal room, and a research greenhouse. These facilities provide strong support capabilities in teaching and research areas of modern Biology. The faculty has active research programs that are funded by research grants in various areas of biology but especially in plant biotechnology, cancer, and neuroscience.

In addition, the department is a cosponsor of the Claude E. Phillips Herbarium. The herbarium is the largest collection of preserved plant materials at any historically black institution in the country and the only such collection on the Delmarva Peninsula.

## COURSE DESCRIPTIONS

All courses require that students have, as minimal prerequisites, one (1) year of Biology courses on the undergraduate level. Additional prerequisites are noted in each course description. While a degree in Biological Sciences or its equivalent is an admission requirement for the graduate degree programs in Biology, not all courses require this extensive background. Certain courses will thus also be appropriate for graduate students in other fields who may not have undergraduate degrees in Biology.

### BIOLOGICAL SCIENCES (BIOL) (23)

#### **23-503. INTRODUCTION TO NEUROSCIENCE**

**3:3:0**

The course is a broad overview of the field of neuroscience covering three levels of analysis: 1.) molecular and cellular; 2.) systems neuroscience; and 3.) behavioral neuroscience. The course provides a common foundation in neuroscience for students planning further study or for those interested in learning about the area.

Credit, three hours.

#### **23-505. EXPERIMENTAL DESIGN AND BIO-STATISTICS**

**3:3:0**

A survey of statistical methods used in biological research. Topics include parametric and nonparametric statistics, aspects of experimental design, and use of the computer in statistical analysis.

Credit, three hours.

#### **23-507. LABORATORY/FIELD TEACHING METHODS IN BIOLOGY**

**3:3:0**

The course offers a practical experience in planning, developing, organizing, and conducting laboratory and field activities in the life sciences. Two (2) two-hour class periods.

Credit, three hours.

#### **23-511. PHARMACOLOGY**

**3:3:0**

A study of how drugs are used to achieve therapeutic benefits. The mechanism of action of various drug types at the molecular, cellular, and interactive-system levels will be addressed. Topics will include the basis for rationale uses of medically-relevant drugs in biological systems and detailing their effectiveness in various diseases and disorders. Focus will be on understanding the balance between pharmacodynamic, pharmacokinetic, and toxicological side-effects that underlies effective treatments.

Credit, three hours.

#### **23-515. MOLECULAR FOUNDATIONS OF BEHAVIOR**

**3:3:0**

The course explores the broad and diverse spectrum of behaviors demonstrated by living things. The scope of the course is, taxonomically speaking, broad-based, although most of attention will be directed within the animal kingdom. The course will examine behaviors in both proximate and ultimate contexts and will include analysis of their mechanisms, origins, transmission, development, and significance. Thus it is clear that the study of behavior is multidimensional and embraces many primary biological arenas including anatomy, physiology, heredity, ontogeny, ecology, and evolution. Many approaches have been employed in the study of behavior. These include comparative and physiological psychology, neurobiology, ethology, behavioral ecology, and sociobiology. In the course our study will consider all of these elements, but the focus will concentrate on the ethological and ecological perspectives.

Credit, three hours.

#### **23-520. CELL BIOLOGY**

**3:3:0**

The course offers a study of cellular and subcellular biology.

Credit, three hours.

#### **23-521. MOLECULAR BIOLOGY**

**3:3:0**

The molecular biology course is rooted in the most basic understanding of life, at the molecular level.

Credit, three hours.

**23-535. CURRENT TECHNIQUES IN BIOLOGY****3:3:0**

The purpose of this course is to expose the new graduate student to various key biological techniques within various laboratories in the department and college. The course will be team taught with the student spending about two (2) weeks in each faculty lab. It will also acquaint the student with the various research options for their thesis. Credit, three hours.

**23-552. ENVIRONMENTAL EDUCATION WORKSHOPS****3:3:0**

The course offers an opportunity for practical experience in development and implementation of environmental education concepts from pre-school to adult. May be elected whenever offered. Credit, three hours.

**23-555. POPULATION-ENVIRONMENT CURRICULUM, K-12****3:3:0**

The integration of a conceptual framework for population-environmental studies in school curriculum as a part of a program in environmental studies.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**23-575. MOLECULAR GENETICS AND GENOMICS****3:3:0**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences. Equivalent to 29-575.

Credit, three hours.

**23-590. PROFESSIONAL DEVELOPMENT WORKSHOP I****2:2:0**

The course focuses on developing professional skills and experiences by participation and presentation in workshops, seminars, grant writing, and research reviews.

Credit, two hours.

**23-591. PROFESSIONAL DEVELOPMENT WORKSHOP II****1:1:0**

The course assigns credit for continued participation as described in 23-590 and for the student to identify a research advisor to initiate a faculty-supervised research leading to development and writing of a thesis project proposal.

Credit, one hour.

**23-599. SPECIAL PROJECTS****3:3:0**

The course is for continued participation in research, or other special needs.

Prerequisites: Consent of the Chair.

Credit, three hours.

**23-600. MOLECULAR ENDOCRINOLOGY****3:3:0**

The graduate level course is designed to: 1.) engage students in mastering a working knowledge of advanced principles in endocrinology, 2.) broaden student comprehension and discussion of current topics in endocrinology, in particular current journal articles, and 3.) develop experimental design / grant writing techniques relevant to endocrinology.

Credit, three hours.

**23-603. STRATEGIES FOR EFFECTIVE TEACHING IN BIOLOGY****3:3:0**

The course provides an introduction to the principles and techniques of effective pedagogy as it applies to teaching in the life sciences. While the course is focused on college-level instruction, secondary school teaching will be considered. This course is required for graduate students planning to teach in DSU's biology department.

Prerequisites: Second year biology graduate student status.

Credit, three hours.

**23-604. SCIENTIFIC INTEGRITY****3:3:0**

The course provides an introduction to the principles of ethical conduct of research including scientific integrity and relevant human subjects and animal use regulations. The course will be taught using a case-study method where students will read and discuss situations that they might encounter in the practice of research.

Prerequisites: Second year graduate student status.

Credit, three hours.

**23-605. CELL MORPHOGENESIS****3:3:0**

Current topics related to basic processes of molecular aspects of differentiation and development in living cells.  
Credit, three hours.

**23-610. FUNCTIONAL NEUROANATOMY****3:3:0**

The course is designed for graduate students in the life sciences who are interested in becoming familiar with the structure and function of the vertebrate nervous system at both the gross and microstructure levels. The course will include computer exercises and microscopic examinations.  
Credit, three hours.

**23-611. ADVANCED GENETICS****3:3:0**

The course offers an in depth exploration of principles of modern genetics as they apply to plants, animals, and micro-organisms ranging from the molecular to the population level. Four (4) hours lecture/laboratory.  
Credit, three hours.

**23-612. NEUROCHEMISTRY****3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge about neurotransmitters, their receptors and cellular effectors, and their relationship to disease. The course will help students understand the history and development of the current understanding of the chemistry of the nervous system by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**23-621. ADVANCED MICROBIOLOGY****3:3:0**

The course will emphasize the role of micro-organisms in the diseases of man. The history of microbiology and the anatomy, physiology, ecology, and applications of bacteria will be emphasized.  
Credit, three hours.

**23-622. THE PHYSIOLOGY OF EXCITABLE CELLS****3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge of the physiology of nerve, muscle, and sensory cells. The course will help students understand the history and development of the current understanding of excitable cell physiology by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**23-625. IMMUNOLOGY****3:3:0**

The course offers a study of cellular, humoral, and molecular aspects of immune reactions. There will be an introduction to immunobiology and immunochemistry. The use of antigen-antibody reactions will be emphasized.  
Credit, three hours.

**23-631. CELL BIOCHEMISTRY/HISTOCHEMISTRY****3:2:2**

The course offers a comparative and correlative study of cellular chemistry as related to the physiological functions and metabolism of various tissues and organs from a diverse range of vertebrates. Some human biomedical correlations will be included. Demonstrations and laboratory exercises are included. Two (2) lecture hours and one (1) two-hour lab each week.  
Credit, three hours.

**23-635. METHODS IN EXPERIMENTAL BIOLOGY****3:3:0**

The course offers an introduction to the history, development, theory, and practical application of a variety of techniques (simple and sophisticated) in quantitative and qualitative biochemical analysis. In depth emphasis will be given to techniques such as chromatography, densitometry, and in situ and in vitro enzymology. The course is intended to provide laboratory experience in selective aspects of modern biotechnology and their applications in bioassays.  
Credit, three hours.

**23-650. BIOLOGICAL MECHANISMS****3:3:0**

The course provides an integration of the molecular and cellular functions within a cell and how these relate to overall system operations. The course will emphasize regulatory, homeostatic, and biochemical approaches to understanding cell function.

Credit, three hours.

**23-651. PROTEINS: STRUCTURES AND MOLECULAR PROPERTIES****3:3:0**

The course will examine the chronological events in the life of a protein. These events include protein composition, biosynthesis, and molecular dynamics. Evolutionary aspects of ancestral proteins will be used to explore the origins of contemporary primary structures. A laboratory will be included to examine the various protein separation schema that are currently used in modern molecular labs. Background in genetics, molecular, and cell biology required.

Credit, three hours.

**23-666. BIOTECHNOLOGY****3:3:0**

The course provides a series of lecture presentations featuring speakers from academics and industry in the expanding field of Biotechnology. An extensive research paper will be required of each student.

Credit, three hours.

**23-689. PROBLEMS IN BIOLOGY****1-3:0:1-3**

The course offers an in-depth individualized literature investigation of a research problem conducted under supervision of advisor. The course includes use of library, integrating data from various sources, and conceptual thinking to produce a final Review paper. The outcome will be reviewed by faculty and the student must defend to a committee in a seminar.

Prerequisites: Graduate Biology student in M.A. program.

Credit, typically three hours but may be one hour.

**23-690. THESIS RESEARCH I****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-691. THESIS RESEARCH II****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-692. THESIS RESEARCH III****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**23-698. THESIS SUSTAINING - BIOLOGY****0:0:0**

Upon completion of all courses and research, this course is used to maintain registration until graduation.

Credit, none.

# **MASTER OF SCIENCE IN MOLECULAR AND CELLULAR NEUROSCIENCE**

## **OBJECTIVES**

The Department of Biological Sciences prepares students for career opportunities in professional studies and further graduate studies in areas related to biological sciences and neuroscience. Many graduates pursue careers in state and federal agencies, health care, private industry, research, and teaching. The program strives to develop a clear and unbiased method of critical and logistic thinking, an appreciation and understanding of the natural world, and knowledge of biological principles required to make intelligent and effective decisions.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Have earned a Baccalaureate degree in Biological Sciences or a related field.
  - a. Applicants must have earned a cumulative grade point average of at least 2.75 with 3.00 minimum in the major.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation.
6. Submit an essay defining your career goal in neuroscience.
7. Submit a Statement of Intent.
8. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

### **DEGREE REQUIREMENTS**

The degree program in Molecular and Cellular Neuroscience is a specialty degree program designed to prepare students for advanced study in the area of neuroscience. The program capitalizes on the neuroscience expertise of a number of faculty who are active in this area of research. The degree requirements include and emphasize a neuroscience-based research thesis based on mentored research conducted in our neuroscience research laboratories. The program is supplemented by a partnership with local universities. The program requires thirty-three (33) graduate credits and is designed to allow completion over a two (2) year period on a full-time basis.

### **FACULTY**

The Department of Biological Sciences is comprised of dedicated and well-prepared faculty with diverse educational backgrounds and areas of research specialization. Small class sizes for graduate courses ensure that students interact closely with faculty in the learning experience. All faculty have published in their respective fields, and they maintain active research involvement. Scholarly involvement and continuous professional development in research keeps the faculty current and able to offer exciting research opportunities to the students in a variety of areas. The Department's faculty is involved not only with individual research projects but also participate in joint collaborative research themes, for example in neuroscience. The students have the opportunity to select their projects from these various arenas.

## **FACILITIES**

The Department of Biological Sciences is housed in the Science Center (original) and the Mishoe Science Center. The Department consists of eleven (11) active research laboratories, a common biotechnology-equipped laboratory, six (6) laboratory classrooms with prep rooms, faculty offices, a science reading room, an animal room, and a research greenhouse. These facilities provide strong support capabilities in teaching and research areas of modern Biology. The faculty has active research programs that are funded by research grants in various areas of biology but especially in plant biotechnology, cancer, and neuroscience.

In addition, the department is a cosponsor of the Claude E. Phillips Herbarium. The herbarium is the largest collection of preserved plant materials at any historically black institution in the country and the only such collection on the Delmarva Peninsula.

## **Master of Science (MS) in Molecular and Cellular Neuroscience**

Core Courses (required for all students pursuing MS degrees):

Molecular Biology (BIOL-521)  
Experimental Design and Biostatistics (BIOL -505)  
Current Techniques in Biology (BIOL -535)  
Professional Development Workshop I & II (BIOL -590, BIOL -591)  
Thesis Research I and II (BIOL -690, BIOL -691)

Additional Required Courses:

Introduction to Neuroscience (BIOL -503)  
Functional Neuroanatomy (BIOL -610)  
Neurochemistry (BIOL -6EDUC)  
The Physiology of Excitable Cells (BIOL -622)  
Open Neuroscience Elective (see below)

**Total credit hours for graduation: 33 (27 course credits + 6 research credits)**

Open Neuroscience Electives:

BIOL-520 Cell Biology  
BIOL -511 Pharmacology  
BIOL -515 Behavior  
CHEM-521 Biochemistry  
BIOL -600 Molecular Endocrinology  
BIOL -605 Cell Morphogenesis  
BIOL -625 Immunology  
BIOL -650 Biological Mechanisms  
BIOL -651 Proteins: Structure and Function  
BIOL -653 Nervous System Disorders  
or, any other graduate level 'biological' courses approved by the student's Research Advisor and Department Chair

## **COURSE DESCRIPTIONS**

All courses require that students have, as minimal prerequisites, one (1) year of Biology courses on the undergraduate level. Additional prerequisites are noted in each course description. While a degree in Biological Sciences or its equivalent is an admission requirement for the graduate degree programs in Biology, not all courses require this extensive background. Certain courses will thus also be appropriate for graduate students in other fields who may not have undergraduate degrees in Biology.

### **BIOLOGICAL SCIENCES (BIOL) (23)**

#### **BIOL-503. INTRODUCTION TO NEUROSCIENCE**

**3:3:0**

The course is a broad overview of the field of neuroscience covering three levels of analysis: 1.) molecular and cellular; 2.) systems neuroscience; and 3.) behavioral neuroscience. The course provides a common foundation in neuroscience for students planning further study or for those interested in learning about the area.

Credit, three hours.

#### **BIOL-505. EXPERIMENTAL DESIGN AND BIO-STATISTICS**

**3:3:0**

A survey of statistical methods used in biological research. Topics include parametric and nonparametric statistics, aspects of experimental design, and use of the computer in statistical analysis.  
Credit, three hours.

**BIOL-507. LABORATORY/FIELD TEACHING METHODS IN BIOLOGY** **3:3:0**

The course offers a practical experience in planning, developing, organizing, and conducting laboratory and field activities in the life sciences. Two (2) two-hour class periods.  
Credit, three hours.

**BIOL-511. PHARMACOLOGY** **3:3:0**

A study of how drugs are used to achieve therapeutic benefits. The mechanism of action of various drug types at the molecular, cellular, and interactive-system levels will be addressed. Topics will include the basis for rationale uses of medically-relevant drugs in biological systems and detailing their effectiveness in various diseases and disorders. Focus will be on understanding the balance between pharmacodynamic, pharmacokinetic, and toxicological side-effects that underlies effective treatments.  
Credit, three hours.

**BIOL-515. MOLECULAR FOUNDATIONS OF BEHAVIOR** **3:3:0**

The course explores the broad and diverse spectrum of behaviors demonstrated by living things. The scope of the course is, taxonomically speaking, broad-based, although most of attention will be directed within the animal kingdom. The course will examine behaviors in both proximate and ultimate contexts and will include analysis of their mechanisms, origins, transmission, development, and significance. Thus it is clear that the study of behavior is multidimensional and embraces many primary biological arenas including anatomy, physiology, heredity, ontogeny, ecology, and evolution. Many approaches have been employed in the study of behavior. These include comparative and physiological psychology, neurobiology, ethology, behavioral ecology, and sociobiology. In the course our study will consider all of these elements, but the focus will concentrate on the ethological and ecological perspectives.  
Credit, three hours.

**BIOL-520. CELL BIOLOGY** **3:3:0**

The course offers a study of cellular and subcellular biology.  
Credit, three hours.

**BIOL-521. MOLECULAR BIOLOGY** **3:3:0**

The molecular biology course is rooted in the most basic understanding of life, at the molecular level.  
Credit, three hours.

**BIOL-535. CURRENT TECHNIQUES IN BIOLOGY****3:0:3**

The purpose of this course is to expose the new graduate student to various key biological techniques within various laboratories in the department and college. The course will be team taught with the student spending about two (2) weeks in each faculty lab. It will also acquaint the student with the various research options for their thesis.  
Credit, three hours.

**BIOL-552. ENVIRONMENTAL EDUCATION WORKSHOPS****3:3:0**

The course offers an opportunity for practical experience in development and implementation of environmental education concepts from pre-school to adult. May be elected whenever offered.  
Credit, three hours.

**BIOL-555. POPULATION-ENVIRONMENT CURRICULUM, K-EDUC****3:3:0**

The integration of a conceptual framework for population-environmental studies in school curriculum as a part of a program in environmental studies.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**BIOL-575. MOLECULAR GENETICS AND GENOMICS****3:3:0**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences. Equivalent to AGRI-575.

Credit, three hours.

**BIOL-590. PROFESSIONAL DEVELOPMENT WORKSHOP I****2:2:0**

The course focuses on developing professional skills and experiences by participation and presentation in workshops, seminars, grant writing, and research reviews.

Credit, two hours.

**BIOL-591. PROFESSIONAL DEVELOPMENT WORKSHOP II****1:1:0**

The course assigns credit for continued participation as described in BIOL-590 and for the student to identify a research advisor to initiate a faculty-supervised research leading to development and writing of a thesis project proposal.

Credit, one hour.

**BIOL-599. SPECIAL PROJECTS****3:3:0**

The course is for continued participation in research, or other special needs.

Prerequisites: Consent of the Chair.

Credit, three hours.

**BIOL-600. MOLECULAR ENDOCRINOLOGY****3:3:0**

The graduate level course is designed to: 1.) engage students in mastering a working knowledge of advanced principles in endocrinology, 2.) broaden student comprehension and discussion of current topics in endocrinology, in particular current journal articles, and 3.) develop experimental design / grant writing techniques relevant to endocrinology.

Credit, three hours.

**BIOL-603. STRATEGIES FOR EFFECTIVE TEACHING IN BIOLOGY****3:3:0**

The course provides an introduction to the principles and techniques of effective pedagogy as it applies to teaching in the life sciences. While the course is focused on college-level instruction, secondary school teaching will be considered. This course is required for graduate students planning to teach in DSU's biology department.

Prerequisites: Second year biology graduate student status.

Credit, three hours.

**BIOL-604. SCIENTIFIC INTEGRITY****3:3:0**

The course provides an introduction to the principles of ethical conduct of research including scientific integrity and relevant human subjects and animal use regulations. The course will be taught using a case-study method where students will read and discuss situations that they might encounter in the practice of research.

Prerequisites: Second year graduate student status.

Credit, three hours.

**BIOL-605. CELL MORPHOGENESIS**

**3:3:0**

Current topics related to basic processes of molecular aspects of differentiation and development in living cells.  
Credit, three hours.

**BIOL-610. FUNCTIONAL NEUROANATOMY**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in becoming familiar with the structure and function of the vertebrate nervous system at both the gross and microstructure levels. The course will include computer exercises and microscopic examinations.  
Credit, three hours.

**BIOL-611. ADVANCED GENETICS**

**3:3:0**

The course offers an in depth exploration of principles of modern genetics as they apply to plants, animals, and micro-organisms ranging from the molecular to the population level. Four (4) hours lecture/laboratory.  
Credit, three hours.

**BIOL-6EDUC. NEUROCHEMISTRY**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge about neurotransmitters, their receptors and cellular effectors, and their relationship to disease. The course will help students understand the history and development of the current understanding of the chemistry of the nervous system by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**BIOL-621. ADVANCED MICROBIOLOGY**

**3:3:0**

The course will emphasize the role of micro-organisms in the diseases of man. The history of microbiology and the anatomy, physiology, ecology, and applications of bacteria will be emphasized.  
Credit, three hours.

**BIOL-622. THE PHYSIOLOGY OF EXCITABLE CELLS**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge of the physiology of nerve, muscle, and sensory cells. The course will help students understand the history and development of the current understanding of excitable cell physiology by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**BIOL-625. IMMUNOLOGY**

**3:3:0**

The course offers a study of cellular, humoral, and molecular aspects of immune reactions. There will be an introduction to immunobiology and immunochemistry. The use of antigen-antibody reactions will be emphasized.  
Credit, three hours.

**BIOL-631. CELL BIOCHEMISTRY/HISTOCHEMISTRY**

**3:2:2**

The course offers a comparative and correlative study of cellular chemistry as related to the physiological functions and metabolism of various tissues and organs from a diverse range of vertebrates. Some human biomedical correlations will be included. Demonstrations and laboratory exercises are included. Two (2) lecture hours and one (1) two-hour lab each week.  
Credit, three hours.

**BIOL-635. METHODS IN EXPERIMENTAL BIOLOGY**

**3:3:0**

The course offers an introduction to the history, development, theory, and practical application of a variety of techniques (simple and sophisticated) in quantitative and qualitative biochemical analysis. In depth emphasis will be given to techniques such as chromatography, densitometry, and in situ and in vitro enzymology. The course is intended to provide laboratory experience in selective aspects of modern biotechnology and their applications in bioassays.  
Credit, three hours.

**BIOL-650. BIOLOGICAL MECHANISMS****3:3:0**

The course provides an integration of the molecular and cellular functions within a cell and how these relate to overall system operations. The course will emphasize regulatory, homeostatic, and biochemical approaches to understanding cell function.

Credit, three hours.

**BIOL-651. PROTEINS: STRUCTURES AND MOLECULAR PROPERTIES****3:3:0**

The course will examine the chronological events in the life of a protein. These events include protein composition, biosynthesis, and molecular dynamics. Evolutionary aspects of ancestral proteins will be used to explore the origins of contemporary primary structures. A laboratory will be included to examine the various protein separation schema that are currently used in modern molecular labs. Background in genetics, molecular, and cell biology required.

Credit, three hours.

**BIOL-666. BIOTECHNOLOGY****3:3:0**

The course provides a series of lecture presentations featuring speakers from academics and industry in the expanding field of Biotechnology. An extensive research paper will be required of each student.

Credit, three hours.

**BIOL-689. PROBLEMS IN BIOLOGY****1-3:0:1-3**

The course offers an in-depth individualized literature investigation of a research problem conducted under supervision of advisor. The course includes use of library, integrating data from various sources, and conceptual thinking to produce a final Review paper. The outcome will be reviewed by faculty and the student must defend to a committee in a seminar.

Prerequisites: Graduate Biology student in M.A. program.

Credit, typically three hours but may be one hour.

**BIOL-690. THESIS RESEARCH I****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-691. THESIS RESEARCH II****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-692. THESIS RESEARCH III****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-698. THESIS SUSTAINING - BIOLOGY****0:0:0**

Upon completion of all courses and research, this course is used to maintain registration until graduation.

Credit, none.

## DOCTOR OF PHILOSOPHY IN NEUROSCIENCE

### OBJECTIVES

The objective of the Ph.D. in Neuroscience is to prepare students for a teaching and research professional career in neuroscience. While DSU provides students with a comfortable, familiar, and nurturing environment in which they can pursue their Ph.D. in Neuroscience, the program also has linkages with faculty researchers at the University of Delaware and the A.I. DuPont Children's Hospital that provide diverse opportunities for DSU students to access a broad range of research training with high-profile investigators working at the cutting edge of neuroscience research.

In order to best prepare our students for the fast growing and opportunity rich field of neuroscience, our Ph.D. program brings together students and faculty throughout the state making neuroscience a truly inter-institutional program. Currently, DSU has thirteen (13) faculty conducting neuroscience research in three (3) departments plus research opportunities at the A.I. DuPont Children's Hospital that has an active basic neuroscience research program and the University of Delaware which has neuroscientists scattered across six (6) departments. Both UD and A.I. DuPont Hospital are less than a one (1) hour drive from DSU, and all three (3) institutions have videoconferencing capabilities making joint seminars, classes, and an inter-institutional research training program easily managed. Faculty at DSU are supported by grants from the National Institute of Health (NIH), National Science Foundation (NSF), and private foundations. As students of the only biology-based neuroscience degree program in the state, DSU students will be recruited by neuroscience researchers at all institutions, while our specialized neuroscience graduate courses and seminars will be attractive to students in other programs who are interested in neuroscience.

### ADMISSION AND DEGREE REQUIREMENTS

#### ADMISSION REQUIREMENTS

All applicants are required to:

1. Have earned a Baccalaureate degree in Biological Sciences or a related field.
  - a. Applicants must have earned a cumulative grade point average of at least 2.75 with 3.00 minimum in the major.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation.
6. Submit an essay defining your career goal in neuroscience.
7. Submit a Statement of Intent.
8. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

## **DEGREE REQUIREMENTS**

The Ph.D. in Neuroscience program is a specialty degree program designed to prepare students for professional careers in the area of neuroscience. The degree requirements include and emphasize a neuroscience-based research dissertation based on mentored research conducted in one (1) of our neuroscience research laboratories. The program will require at least sixty (60) credit hours, with thirty-six (36) from coursework. To become a candidate for the Ph.D., the student must complete all courses and pass a two-part qualifying exam; part I consists of a written examination covering any material related to the coursework taken within the first two (2) years, and in part II, the students must write and defend a research proposal choosing from a list of topics generated by the faculty. Each student, upon achieving candidacy, is required to complete the teaching strategies course and to teach the equivalent of four (4) credit hours, or one (1) lecture course, before completion of the degree program.

## **FINANCIAL SUPPORT**

A best effort will be made to support Students in the Ph.D. program with either research or teaching assistantships and tuition support so that they may focus full-time on their studies and research.

## **FACULTY**

Because the Ph.D. program in Neuroscience is interdisciplinary and multi-institutional, doctoral candidates work with a broad array of faculty and are exposed to diverse perspectives, techniques, and theoretical approaches. Faculty members at Delaware State and its partner institutions are engaged in pioneering research funded by the National Science Foundation, National Institute of Health, and other agencies.

## **FACILITIES**

The Department of Biological Sciences is housed in the Science Center (original) and the Mishoe Science Center. The Department consists of eleven (11) active research laboratories, a common biotechnology-equipped laboratory, six (6) laboratory classrooms with prep rooms, faculty offices, a science reading room, an animal room, and a research greenhouse. These facilities provide strong support capabilities in teaching and research areas of modern Biology. The faculty has active research programs that are funded by research grants in various areas of biology but especially in plant biotechnology, cancer, and neuroscience.

In addition, the department is a cosponsor of the Claude E. Phillips Herbarium. The herbarium is the largest collection of preserved plant materials at any historically black institution in the country and the only such collection on the Delmarva Peninsula.

The Department of Biological Science has a dedicated and well-prepared faculty with diverse backgrounds and areas of specialization. All faculty have published in their respective fields, and they maintain active research involvement. The faculty are serious and talented teachers. The small class size insures that students interact closely with faculty in the learning experience. Scholarly involvement in research keeps the faculty current and able to offer exciting research opportunities to the students in a variety of areas.

**Strike curriculum (outdated) and replace with (needs to be reformatted to fit the tabular format of other curricula):**

**Core Courses (required)**

Course #	Course Name	Credits
BIOL-503	Introduction to Neuroscience	3
BIOL -505	Experimental Design and Biostatistics	3
BIOL -6EDUC	Neurochemistry	3
BIOL -622	The Physiology of Excitable Cells	3
BIOL -610	Functional Anatomy From Neuron to Brain	3
BIOL -535	Current Techniques in Biology	3

**Foundation Courses (must take two of these three)**

Course #	Course Name	Credits
BIOL -520	Cell Biology	3
BIOL -521	Molecular Biology	3
BIOL -650 <i>or</i>	Biological Mechanisms	3
CHEM-521 <i>or</i>	Advanced Biochemistry	3
CHEM-671	Bioorganic Chemistry	3

**Seminar Courses (required)**

Course #	Course Name	Credits
BIOL -590	Professional Development I	2
BIOL -591	Professional Development II	1
BIOL -700	Current Topics I	1
BIOL -701	Current Topics II	1
BIOL -603	Strategies for Effective Teaching in Biology	1
BIOL -604	Scientific Integrity	1

**Electives**

BIOL -xxx	Electives (at least three; <b>with advisor's approval</b> )	9
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**Research**

BIOL -690,691,692	Thesis Research	3 (each)
BIOL -800	Dissertation Research	8 (at least)

**CREDITS TOTAL      60**

**Suggested Electives for Neuroscience doctoral program (3 credits each):**

BIOL -511 Pharmacology	BIOL -605 Cell Morphogenesis
BIOL -515 Behavior	BIOL -625 Immunology
BIOL -575 Molecular Genetics & Genomics	BIOL -651 Proteins: Structure and Function
BIOL -600 Molecular Endocrinology	BIOL -653 Nervous System Disorders

- In addition to the electives listed above, other courses at **DSU or UD** may count towards elective credits pending prior approval by the dissertation advisor and departmental graduate programs committee or Chair of the Department of Biological Sciences at DSU

**COURSE DESCRIPTIONS**

All courses require that students have, as minimal prerequisites, one (1) year of Biology courses on the

undergraduate level. Additional prerequisites are noted in each course description. While a degree in Biological Sciences or its equivalent is an admission requirement for the graduate degree programs in Biology, not all courses require this extensive background. Certain courses will thus also be appropriate for graduate students in other fields who may not have undergraduate degrees in Biology.

## **BIOLOGICAL SCIENCES (BIOL) (BIOL)**

### **BIOL-503. INTRODUCTION TO NEUROSCIENCE**

**3:3:0**

The course is a broad overview of the field of neuroscience covering three levels of analysis: 1.) molecular and cellular; 2.) systems neuroscience; and 3.) behavioral neuroscience. The course provides a common foundation in neuroscience for students planning further study or for those interested in learning about the area.

Credit, three hours.

### **BIOL-505. EXPERIMENTAL DESIGN AND BIO-STATISTICS**

**3:3:0**

A survey of statistical methods used in biological research. Topics include parametric and nonparametric statistics, aspects of experimental design, and use of the computer in statistical analysis.

Credit, three hours.

### **BIOL-507. LABORATORY/FIELD TEACHING METHODS IN BIOLOGY**

**3:3:0**

The course offers a practical experience in planning, developing, organizing, and conducting laboratory and field activities in the life sciences. Two (2) two-hour class periods.

Credit, three hours.

### **BIOL-511. PHARMACOLOGY**

**3:3:0**

A study of how drugs are used to achieve therapeutic benefits. The mechanism of action of various drug types at the molecular, cellular, and interactive-system levels will be addressed. Topics will include the basis for rationale uses of medically-relevant drugs in biological systems and detailing their effectiveness in various diseases and disorders. Focus will be on understanding the balance between pharmacodynamic, pharmacokinetic, and toxicological side-effects that underlies effective treatments.

Credit, three hours.

### **BIOL-515. MOLECULAR FOUNDATIONS OF BEHAVIOR**

**3:3:0**

The course explores the broad and diverse spectrum of behaviors demonstrated by living things. The scope of the course is, taxonomically speaking, broad-based, although most of attention will be directed within the animal kingdom. The course will examine behaviors in both proximate and ultimate contexts and will include analysis of their mechanisms, origins, transmission, development, and significance. Thus it is clear that the study of behavior is multidimensional and embraces many primary biological arenas including anatomy, physiology, heredity, ontogeny, ecology, and evolution. Many approaches have been employed in the study of behavior. These include comparative and physiological psychology, neurobiology, ethology, behavioral ecology, and sociobiology. In the course our study will consider all of these elements, but the focus will concentrate on the ethological and ecological perspectives.

Credit, three hours.

### **BIOL-520. CELL BIOLOGY**

**3:3:0**

The course offers a study of cellular and subcellular biology.

Credit, three hours.

### **BIOL-521. MOLECULAR BIOLOGY**

**3:3:0**

The molecular biology course is rooted in the most basic understanding of life, at the molecular level.

Credit, three hours.

**BIOL-535. CURRENT TECHNIQUES IN BIOLOGY****3:0:3**

The purpose of this course is to expose the new graduate student to various key biological techniques within various laboratories in the department and college. The course will be team taught with the student spending about two (2) weeks in each faculty lab. It will also acquaint the student with the various research options for their thesis.  
Credit, three hours.

**BIOL-552. ENVIRONMENTAL EDUCATION WORKSHOPS****3:3:0**

The course offers an opportunity for practical experience in development and implementation of environmental education concepts from pre-school to adult. May be elected whenever offered.  
Credit, three hours.

**BIOL-555. POPULATION-ENVIRONMENT CURRICULUM, K-EDUC****3:3:0**

The integration of a conceptual framework for population-environmental studies in school curriculum as a part of a program in environmental studies.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**BIOL-575. MOLECULAR GENETICS AND GENOMICS****3:3:0**

An in-depth discussion of molecular genetic principles and genomic methods as applied to model and commercially relevant biological organisms. Review of cutting edge technology, literature, and methods applied on a genomic scale; this course will also investigate evolutionary relationships between various organisms and utilization of tools from the genomic era to better elucidate similarities and differences. Equivalent to AGRI-575.

Credit, three hours.

**BIOL-590. PROFESSIONAL DEVELOPMENT WORKSHOP I****2:2:0**

The course focuses on developing professional skills and experiences by participation and presentation in workshops, seminars, grant writing, and research reviews.

Credit, two hours.

**BIOL-591. PROFESSIONAL DEVELOPMENT WORKSHOP II****1:1:0**

The course assigns credit for continued participation as described in BIOL-590 and for the student to identify a research advisor to initiate a faculty-supervised research leading to development and writing of a thesis project proposal.

Credit, one hour.

**BIOL-599. SPECIAL PROJECTS****3:3:0**

The course is for continued participation in research, or other special needs.

Prerequisites: Consent of the Chair.

Credit, three hours.

**BIOL-600. MOLECULAR ENDOCRINOLOGY****3:3:0**

The graduate level course is designed to: 1.) engage students in mastering a working knowledge of advanced principles in endocrinology, 2.) broaden student comprehension and discussion of current topics in endocrinology, in particular current journal articles, and 3.) develop experimental design / grant writing techniques relevant to endocrinology.

Credit, three hours.

**BIOL-603. STRATEGIES FOR EFFECTIVE TEACHING IN BIOLOGY****3:3:0**

The course provides an introduction to the principles and techniques of effective pedagogy as it applies to teaching in the life sciences. While the course is focused on college-level instruction, secondary school teaching will be considered. This course is required for graduate students planning to teach in DSU's biology department.

Prerequisites: Second year biology graduate student status.

Credit, three hours.

**BIOL-604. SCIENTIFIC INTEGRITY****3:3:0**

The course provides an introduction to the principles of ethical conduct of research including scientific integrity and relevant human subjects and animal use regulations. The course will be taught using a case-study method where students will read and discuss situations that they might encounter in the practice of research.

Prerequisites: Second year graduate student status.

Credit, three hours.

**BIOL-605. CELL MORPHOGENESIS**

**3:3:0**

Current topics related to basic processes of molecular aspects of differentiation and development in living cells.  
Credit, three hours.

**BIOL-610. FUNCTIONAL NEUROANATOMY**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in becoming familiar with the structure and function of the vertebrate nervous system at both the gross and microstructure levels. The course will include computer exercises and microscopic examinations.  
Credit, three hours.

**BIOL-611. ADVANCED GENETICS**

**3:3:0**

The course offers an in depth exploration of principles of modern genetics as they apply to plants, animals, and micro-organisms ranging from the molecular to the population level. Four (4) hours lecture/laboratory.  
Credit, three hours.

**BIOL-6EDUC. NEUROCHEMISTRY**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge about neurotransmitters, their receptors and cellular effectors, and their relationship to disease. The course will help students understand the history and development of the current understanding of the chemistry of the nervous system by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**BIOL-621. ADVANCED MICROBIOLOGY**

**3:3:0**

The course will emphasize the role of micro-organisms in the diseases of man. The history of microbiology and the anatomy, physiology, ecology, and applications of bacteria will be emphasized.  
Credit, three hours.

**BIOL-622. THE PHYSIOLOGY OF EXCITABLE CELLS**

**3:3:0**

The course is designed for graduate students in the life sciences who are interested in learning the current state of scientific knowledge of the physiology of nerve, muscle, and sensory cells. The course will help students understand the history and development of the current understanding of excitable cell physiology by presenting some of the experimental evidence on which the knowledge is based.  
Credit, three hours.

**BIOL-625. IMMUNOLOGY**

**3:3:0**

The course offers a study of cellular, humoral, and molecular aspects of immune reactions. There will be an introduction to immunobiology and immunochemistry. The use of antigen-antibody reactions will be emphasized.  
Credit, three hours.

**BIOL-631. CELL BIOCHEMISTRY/HISTOCHEMISTRY**

**3:2:2**

The course offers a comparative and correlative study of cellular chemistry as related to the physiological functions and metabolism of various tissues and organs from a diverse range of vertebrates. Some human biomedical correlations will be included. Demonstrations and laboratory exercises are included. Two (2) lecture hours and one (1) two-hour lab each week.  
Credit, three hours.

**BIOL-635. METHODS IN EXPERIMENTAL BIOLOGY**

**3:3:0**

The course offers an introduction to the history, development, theory, and practical application of a variety of techniques (simple and sophisticated) in quantitative and qualitative biochemical analysis. In depth emphasis will be given to techniques such as chromatography, densitometry, and in situ and in vitro enzymology. The course is intended to provide laboratory experience in selective aspects of modern biotechnology and their applications in bioassays.  
Credit, three hours.

**BIOL-650. BIOLOGICAL MECHANISMS****3:3:0**

The course provides an integration of the molecular and cellular functions within a cell and how these relate to overall system operations. The course will emphasize regulatory, homeostatic, and biochemical approaches to understanding cell function.

Credit, three hours.

**BIOL-651. PROTEINS: STRUCTURES AND MOLECULAR PROPERTIES****3:3:0**

The course will examine the chronological events in the life of a protein. These events include protein composition, biosynthesis, and molecular dynamics. Evolutionary aspects of ancestral proteins will be used to explore the origins of contemporary primary structures. A laboratory will be included to examine the various protein separation schema that are currently used in modern molecular labs. Background in genetics, molecular, and cell biology required.

Credit, three hours.

**BIOL-666. BIOTECHNOLOGY****3:3:0**

The course provides a series of lecture presentations featuring speakers from academics and industry in the expanding field of Biotechnology. An extensive research paper will be required of each student.

Credit, three hours.

**BIOL-689. PROBLEMS IN BIOLOGY****1-3:0:1-3**

The course offers an in-depth individualized literature investigation of a research problem conducted under supervision of advisor. The course includes use of library, integrating data from various sources, and conceptual thinking to produce a final Review paper. The outcome will be reviewed by faculty and the student must defend to a committee in a seminar.

Prerequisites: Graduate Biology student in M.A. program.

Credit, typically three hours but may be one hour.

**BIOL-690. THESIS RESEARCH I****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-691. THESIS RESEARCH II****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-692. THESIS RESEARCH III****1-6:0:1-6**

An in-depth individualized investigation of a research problem conducted under close supervision of the thesis advisor. Includes training in experimental techniques, problem design, testing, data collection, data analysis, and preparation of thesis. University and departmental guidelines are to be followed in preparing and defending the thesis. It is expected that the research will be of sufficient quality to be published as a scholarly paper coauthored by the thesis advisor in an appropriate refereed journal.

Credit, typically three hours each, but may be taken for one to six.

**BIOL-698. THESIS SUSTAINING - BIOLOGY****0:0:0**

Upon completion of all courses and research, this course is used to maintain registration until graduation.

Credit, none.

**BIOL-700. CURRENT TOPICS I****1:1:0**

The course will be a combination of presentations in both “Journal Club” and “lab meeting” format. Students will make presentations and discuss primary literature describing new and exciting scientific advances in the field of neuroscience. At least once each semester students will also make a presentation and lead a discussion about their own research project.

Prerequisites: Ph.D. Candidate status.

Credit, one hour. May be repeated to maximum of three (3) credits.

**BIOL-701. CURRENT TOPICS II****1:1:0**

The course is a continuation of BIOL-700.

Prerequisites: BIOL-700, Ph.D. Candidate status.

Credit, one hour. May be repeated to maximum of three (3) credits.

**BIOL-800. DISSERTATION RESEARCH****6-8:0:6-8**

The course is for students who have advanced to candidacy in a Ph.D. program in the Department of Biological Sciences and who are working on their dissertation research under the supervision of a faculty mentor.

Prerequisites: Ph.D. Candidate status.

Credit, six to eight per semester. May be repeated; no maximum.

## **MASTER OF SCIENCE IN APPLIED CHEMISTRY (THESIS REQUIRED)**

### **OBJECTIVES**

The conventional Master's Degree Program in Applied Chemistry is designed to prepare students for further advanced study in Chemistry, to expand the chemical knowledge and skills of secondary school and junior college teachers, and to advance the careers of persons in industry, government service, and other fields of endeavor.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Chemistry.
  - a. Applicants must have earned a minimum GPA of 3.0.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit a resume.
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation.
7. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

#### **DEGREE REQUIREMENTS**

The Master's Degree in Applied Chemistry Program requires the completion of thirty (30) credit hours. Thesis Research (6 credit hours) is required in the Master of Science in Chemistry Program. Specific course requirements are available upon request.

#### **FACILITIES**

During the 1995 Fall Semester, the department obtained approximately 19,000 ft<sup>2</sup> of additional space of a new science facility shared with the departments of biology and physics. The new chemistry area includes six (6) spacious research laboratories, three (3) advanced instructional laboratories, a 900 ft<sup>2</sup> instrument laboratory, computer laboratory, work room with a refrigerated walk-in laboratory, seminar and chemistry resource rooms, eight (8) faculty offices, and department suite offices. The department has a wide selection of modern instruments and equipment to support teaching and research. Available equipment include gas chromatograph with a variety of detectors, a head space auto sampler for gas chromatograph, a gas chromatograph/mass selective detector/infrared detector/computer system; one (1) nuclear magnetic resonance spectrometer (400MHz); and instrumentation for flame and flameless atomic absorption, dispersion infrared and FTIR (3), and several ultraviolet-visible spectrophotometers; capillary electrophoresis unit, microwave digestion/extraction system, high performance liquid chromatograph with data collection system; and electroanalytical system.

**MASTER OF SCIENCE IN APPLIED CHEMISTRY  
(THESIS REQUIRED)**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
CHEM-506	3	Structural Inorganic Chemistry
CHEM-508	3	Theory and Application of Chromatography
CHEM-509	3	The Chemical Bond
CHEM-518	3	Molecular Spectroscopy
CHEM-520	3	Advanced Organic Chemistry
CHEM-521	3	Biochemistry
CHEM-556/557	2	Seminar
CHEM-560	1	Chemical Literature
CHEM-573	3	Advanced Physical Chemistry
CHEM-590/591	6	Thesis Research
<b>TOTAL CREDIT HOURS: 30</b>		

## COURSE DESCRIPTIONS

### CHEMISTRY (CHEM) (24)

#### **CHEM-501. ADVANCED LABORATORY TECHNIQUES**

**3:3:1**

The course covers advanced techniques and sophisticated equipment used in the preparation and/or purification of chemical compounds. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### **CHEM-502. PHYSICAL METHODS IN INORGANIC CHEMISTRY**

**3:3:1**

The course covers advanced methods in inorganic preparations and compound analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### **CHEM-503. PHYSICAL METHODS IN BIOCHEMISTRY**

**3:3:1**

The course covers advanced methods in the study of biochemical molecules and the use of physical methods in their investigations. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-403 or equivalent courses.

Credit, three hours.

#### **CHEM-504. PHYSICAL METHODS IN ORGANIC CHEMISTRY**

**3:3:1**

The course covers advanced studies in organic preparations and reactions, and chemical analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306 or equivalent courses.

Credit, three hours.

#### **CHEM-505. INORGANIC SOLUTION CHEMISTRY**

**3:3:0**

The course provides a study of the chemical kinetics of chemical forces and their effects on structure and reactivity of coordination compounds. Two (2) 75-minute lectures per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### **CHEM-506. STRUCTURAL INORGANIC CHEMISTRY**

**3:3:0**

The course provides detailed discussions of the nature of chemical forces and their effects on structure and reactivity of coordination compounds. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### **CHEM-507. THEORY AND APPLICATIONS OF SPECTROSCOPY**

**3:3:0**

The course offers a presentation of molecular spectra and structure correlations demonstrating the use of IR, Visible UV, NMR, and AA. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

#### **CHEM-508. THEORY AND APPLICATIONS OF CHROMATOGRAPHY**

**3:3:0**

The course provides investigations of the separation and identification of substances via packed and capillary column gas chromatography. HPLC and GLC using various detectors. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

#### **CHEM-509. THE CHEMICAL BOND**

**3:3:0**

The course covers the study of electronics in atoms, molecular orbitals bonding in organic compounds, and "d" valence orbitals. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### **CHEM-510. ENVIRONMENTAL CHEMISTRY**

**3:3:0**

The course covers the analyses of water, soil, plant, and animal tissues for various parameters including traces organics and metals using classical and instrumental methods of analysis. One (1) 150-minute lecture per week.  
Credit, three hours.

**CHEM-511. SELECTED TOPICS IN CHEMISTRY** **3:3:0**

The course covers advanced topics in the various fields of chemistry. Topics may vary from year to year. One (1) 150-minute lecture per week.  
Credit, three hours.

**CHEM-516. QUANTUM CHEMISTRY** **3:3:0**

The course covers the wave equation and approximate treatments of the hydrogen molecular ion, the hydrogen molecule, diatomic molecules, and polyatomic molecules. Two (2) 75-minute lectures per week.  
Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304 or equivalent courses.  
Credit, three hours.

**CHEM-518. MOLECULAR SPECTROSCOPY** **3:3:0**

The course covers the use of molecular symmetry and group theory to study rotational, vibrational, and electronic spectra of molecules. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-301, CHEM-302 or equivalent.  
Credit, three hours.

**CHEM-519. APPLICATIONS OF SPECTROSCOPY** **3:3:0**

The course covers an introduction to chemical research. The use of spectroscopy as a research tool and a review of the literature in this area will be conducted. Projects may be assigned. Two (2) 75-minute lectures per week.  
Prerequisites: CHEM-507 or equivalent.  
Credit, three hours.

**CHEM-520. ADVANCED ORGANIC CHEMISTRY** **3:3:0**

The course covers an advanced study of reaction mechanisms, stereochemistry, and organic chemical bonding. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-301, CHEM-302.  
Credit, three hours.

**CHEM-521. ADVANCED BIOCHEMISTRY** **3:3:0**

The course covers an advanced study of biochemical reactions and reaction mechanisms. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-403 or equivalent.  
Credit, three hours.

**CHEM-540. ADVANCED METHODS OF TEACHING CHEMISTRY** **3:3:0**

The course includes discussions and problem solving sessions concerning improved techniques of teaching high school chemistry. Two (2) 75-minute lectures per week.  
Credit, three hours.

**CHEM-552. TECHNIQUES IN PHYSICAL CHEMISTRY** **3:3:1**

The course provides a study of the use of physical measurements in determining composition, structures, and properties of matter. Two (2) lectures and one (1) 150-minute laboratory per week.  
Credit, three hours.

**CHEM-556. SEMINAR IN CHEMISTRY I** **1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week.  
Credit, one hour.

**CHEM-557. SEMINAR IN CHEMISTRY II** **1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week.  
Credit, one hour.

**CHEM-560. CHEMICAL LITERATURE** **1:1:0**

The course requires the use of the chemistry library, chemical journals, reference works, other technical publications, assembling and data use, and computer assisted literature searches. One (1) lecture per week.  
Credit, one hour.

**CHEM-562. CHEMICAL TOXICOLOGY**

**3:3:0**

The course provides a study of the adverse effects of chemical substances. The course includes the general principles of toxicology, the toxicology of systems, toxic agents, environmental toxicology, forensic toxicology, applications toxicology, and the effect of toxic substances on reproduction and the body. One (1) lecture per week.  
Credit, one hour.

**CHEM-569. POLYMER CHEMISTRY**

**3:3:0**

The course provides an introduction to the chemistry of macromolecules including biologically molecules, plastics, and other important classes of industrial polymers. One (1) 150-minute lecture per week.

Prerequisites: CHEM-301, CHEM-302.

Credit, three hours.

**CHEM-573. ADVANCED PHYSICAL CHEMISTRY**

**3:3:0**

The course provides an introduction to the thermodynamics of large molecular collections and the quantum statistics of these systems. One (1) 150-minute lecture per week.

Prerequisites: CHEM-303, CHEM-304.

Credit, three hours.

**CHEM-590. RESEARCH AND THESIS**

**3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis.

Credit, three hours each semester.

**CHEM-591. RESEARCH AND THESIS**

**3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis.

Credit, three hours each semester.

**CHEM-630. ELECTROANALYTICAL CHEMISTRY**

**3:3:0**

The course introduces students to the basic principles involved in electroanalytical chemistry. The course will cover modern electrochemical methods such as cyclic, pulse and hydrodynamic voltammetry, chronoamperometry, chronocoulometry, polarography, and stripping analysis. Instrumentation and some practical aspects of electroanalytical chemistry will also be covered. Experiments of most of the electrochemical methods introduced will either be carried out by the students or will be demonstrated.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-670. ORGANIC SPECTROSCOPY**

**3:3:0**

The course will provide an in-depth presentation of recent advances in Infrared Spectroscopy, Nuclear Magnetic Spectroscopy, Ultraviolet and Visible Spectroscopy, Mass Spectroscopy, and other spectroscopic methods.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-671. BIOORGANIC CHEMISTRY**

**3:3:0**

This course will provide an in-depth understanding of Bioorganic Chemistry of Amino Acids and Polypeptides, Bioorganic Chemistry of DNA, Enzyme Chemistry & Enzyme Models, Metalloenzymes, and Molecular Devices.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

## **MASTER OF SCIENCE IN APPLIED CHEMISTRY**

### **OBJECTIVES**

The Master of Science Degree Program in Applied Chemistry is a specific degree program designed to provide the student with a broader understanding of the areas of chemical laboratory practices and advanced concepts for the educator. Courses will enhance the student's professional skills and capabilities for dealing with the complex laboratory hardware common to the chemical industry. Additionally, the student will be informed of recent trends in research, industrial, and environmental chemistry. Students involved in teaching will be exposed to the latest innovations in computer technology as related to laboratory practices and safety. The program is designed for individuals employed in industrial or educational positions, as well as those planning to enter such positions.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree: B.S., B.A., or B.T. in a science area (Biology, Mathematics, Physics, Chemistry, Science Education, etc.).
  - a. Applicants must have earned a minimum GPA of 3.0.
  - b. Applicants must have at least twenty-four (CHEM) credit hours in Chemistry including two (2) semesters in Organic Chemistry, eight (8) hours in Physics, and six (6) hours in Mathematics.
  - c. Students not meeting the minimum requirements may be accepted into the program with provisional status upon departmental approval.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit a resume.
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation.
7. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

#### **DEGREE REQUIREMENTS**

The Master's Degree in Applied Chemistry Programs requires the completion of thirty (30) credit hours. Specific course requirements are available upon request.

#### **FACILITIES**

During the 1995 Fall Semester, the department obtained approximately 19,000 ft. of additional space of a new science facility shared with the departments of biology and physics. The new chemistry area includes six (6) spacious research laboratories, three (3) advanced instructional laboratories, a 900 ft<sup>2</sup> instrument laboratory, computer laboratory, work room with a refrigerated walk-in laboratory, seminar and chemistry resource rooms, eight (8) faculty offices and department suite offices. The department has a wide selection of modern instruments and equipment to support teaching and research. Available equipment include gas chromatograph with a variety of detectors, a head space auto sampler for gas chromatograph, a gas chromatograph/mass selective detector/infrared detector/computer system; one (1) nuclear magnetic resonance spectrometer (400MHz); and instrumentation for flame and flameless atomic absorption, dispersion infrared and FTIR (3), and several ultraviolet-visible spectrophotometers; capillary electrophoresis unit, microwave digestion/extraction system, high performance liquid chromatograph with data collection system; and electroanalytical system.



## MASTER OF SCIENCE IN APPLIED CHEMISTRY

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
CHEM-507	3	Theory and Application of Spectroscopy
CHEM-508	3	Theory and Application of Chromatography
CHEM-510	3	Environmental Chemistry
CHEM-520	3	Advanced Organic Chemistry
CHEM-521	3	Biochemistry
CHEM-556/557	2	Seminar
CHEM-560	1	Chemical Literature
CHEM-562	3	Chemical Toxicology
CHEM-569	3	Polymer Chemistry
<b>ELECTIVES (Select 6 credit hours)</b>		
CHEM-506	3	Structural Inorganic Chemistry
CHEM-509	3	The Chemical Bond
CHEM-511	3	Selected Topics in Chemistry
CHEM-573	3	Advanced Physical Chemistry
CHEM-590/591	6	Research and Thesis
<b>TOTAL CREDIT HOURS: 30</b>		

## COURSE DESCRIPTIONS

### CHEMISTRY (CHEM) (CHEM)

#### CHEM-501. ADVANCED LABORATORY TECHNIQUES

3:3:1

The course covers advanced techniques and sophisticated equipment used in the preparation and/or purification of chemical compounds. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### CHEM-502. PHYSICAL METHODS IN INORGANIC CHEMISTRY

3:3:1

The course covers advanced methods in inorganic preparations and compound analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### CHEM-503. PHYSICAL METHODS IN BIOCHEMISTRY

3:3:1

The course covers advanced methods in the study of biochemical molecules and the use of physical methods in their investigations. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-403 or equivalent courses.

Credit, three hours.

#### CHEM-504. PHYSICAL METHODS IN ORGANIC CHEMISTRY

3:3:1

The course covers advanced studies in organic preparations and reactions, and chemical analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306 or equivalent courses.

Credit, three hours.

#### CHEM-505. INORGANIC SOLUTION CHEMISTRY

3:3:0

The course provides a study of the chemical kinetics of chemical forces and their effects on structure and reactivity of coordination compounds. Two (2) 75-minute lectures per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### CHEM-506. STRUCTURAL INORGANIC CHEMISTRY

3:3:0

The course provides detailed discussions of the nature of chemical forces and their effects on structure and reactivity of coordination compounds. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### CHEM-507. THEORY AND APPLICATIONS OF SPECTROSCOPY

3:3:0

The course offers a presentation of molecular spectra and structure correlations demonstrating the use of IR, Visible UV, NMR, and AA. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

#### CHEM-508. THEORY AND APPLICATIONS OF CHROMATOGRAPHY

3:3:0

The course provides investigations of the separation and identification of substances via packed and capillary column gas chromatography. HPLC and GLC using various detectors. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

#### CHEM-509. THE CHEMICAL BOND

3:3:0

The course covers the study of electronics in atoms, molecular orbitals bonding in organic compounds, and "d" valence orbitals. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### CHEM-510. ENVIRONMENTAL CHEMISTRY

3:3:0

The course covers the analyses of water, soil, plant, and animal tissues for various parameters including traces organics and metals using classical and instrumental methods of analysis. One (1) 150-minute lecture per week.  
Credit, three hours.

**CHEM-511. SELECTED TOPICS IN CHEMISTRY** **3:3:0**

The course covers advanced topics in the various fields of chemistry. Topics may vary from year to year. One (1) 150-minute lecture per week.  
Credit, three hours.

**CHEM-516. QUANTUM CHEMISTRY** **3:3:0**

The course covers the wave equation and approximate treatments of the hydrogen molecular ion, the hydrogen molecule, diatomic molecules, and polyatomic molecules. Two (2) 75-minute lectures per week.  
Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304 or equivalent courses.  
Credit, three hours.

**CHEM-518. MOLECULAR SPECTROSCOPY** **3:3:0**

The course covers the use of molecular symmetry and group theory to study rotational, vibrational, and electronic spectra of molecules. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-301, CHEM-302 or equivalent.  
Credit, three hours.

**CHEM-519. APPLICATIONS OF SPECTROSCOPY** **3:3:0**

The course covers an introduction to chemical research. The use of spectroscopy as a research tool and a review of the literature in this area will be conducted. Projects may be assigned. Two (2) 75-minute lectures per week.  
Prerequisites: CHEM-507 or equivalent.  
Credit, three hours.

**CHEM-520. ADVANCED ORGANIC CHEMISTRY** **3:3:0**

The course covers an advanced study of reaction mechanisms, stereochemistry, and organic chemical bonding. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-301, CHEM-302.  
Credit, three hours.

**CHEM-521. ADVANCED BIOCHEMISTRY** **3:3:0**

The course covers an advanced study of biochemical reactions and reaction mechanisms. One (1) 150-minute lecture per week.  
Prerequisites: CHEM-403 or equivalent.  
Credit, three hours.

**CHEM-540. ADVANCED METHODS OF TEACHING CHEMISTRY** **3:3:0**

The course includes discussions and problem solving sessions concerning improved techniques of teaching high school chemistry. Two (2) 75-minute lectures per week.  
Credit, three hours.

**CHEM-552. TECHNIQUES IN PHYSICAL CHEMISTRY** **3:3:1**

The course provides a study of the use of physical measurements in determining composition, structures, and properties of matter. Two (2) lectures and one (1) 150-minute laboratory per week.  
Credit, three hours.

**CHEM-556. SEMINAR IN CHEMISTRY I** **1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week.  
Credit, one hour.

**CHEM-557. SEMINAR IN CHEMISTRY II** **1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week.  
Credit, one hour.

**CHEM-560. CHEMICAL LITERATURE** **1:1:0**

The course requires the use of the chemistry library, chemical journals, reference works, other technical publications, assembling and data use, and computer assisted literature searches. One (1) lecture per week.  
Credit, one hour.

**CHEM-562. CHEMICAL TOXICOLOGY**

**3:3:0**

The course provides a study of the adverse effects of chemical substances. The course includes the general principles of toxicology, the toxicology of systems, toxic agents, environmental toxicology, forensic toxicology, applications toxicology, and the effect of toxic substances on reproduction and the body. One (1) lecture per week.  
Credit, one hour.

**CHEM-569. POLYMER CHEMISTRY**

**3:3:0**

The course provides an introduction to the chemistry of macromolecules including biologically molecules, plastics, and other important classes of industrial polymers. One (1) 150-minute lecture per week.

Prerequisites: CHEM-301, CHEM-302.

Credit, three hours.

**CHEM-573. ADVANCED PHYSICAL CHEMISTRY**

**3:3:0**

The course provides an introduction to the thermodynamics of large molecular collections and the quantum statistics of these systems. One (1) 150-minute lecture per week.

Prerequisites: CHEM-303, CHEM-304.

Credit, three hours.

**CHEM-590. RESEARCH AND THESIS**

**3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis.

Credit, three hours each semester.

**CHEM-591. RESEARCH AND THESIS**

**3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis.

Credit, three hours each semester.

**CHEM-630. ELECTROANALYTICAL CHEMISTRY**

**3:3:0**

The course introduces students to the basic principles involved in electroanalytical chemistry. The course will cover modern electrochemical methods such as cyclic, pulse and hydrodynamic voltammetry, chronoamperometry, chronocoulometry, polarography, and stripping analysis. Instrumentation and some practical aspects of electroanalytical chemistry will also be covered. Experiments of most of the electrochemical methods introduced will either be carried out by the students or will be demonstrated.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-670. ORGANIC SPECTROSCOPY**

**3:3:0**

The course will provide an in-depth presentation of recent advances in Infrared Spectroscopy, Nuclear Magnetic Spectroscopy, Ultraviolet and Visible Spectroscopy, Mass Spectroscopy, and other spectroscopic methods.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-671. BIOORGANIC CHEMISTRY**

**3:3:0**

This course will provide an in-depth understanding of Bioorganic Chemistry of Amino Acids and Polypeptides, Bioorganic Chemistry of DNA, Enzyme Chemistry & Enzyme Models, Metalloenzymes, and Molecular Devices.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

# DOCTOR OF PHILOSOPHY IN APPLIED CHEMISTRY

## OBJECTIVES

The program is focused on several areas of applied chemistry including polymer chemistry, biochemistry, environmental chemistry, hydrogen storage, and spectroscopy, etc. Students entering the program must formulate a course of study and research in consultation with the graduate program director (or with the student's thesis advisor once an advisor has been chosen). Although coursework and seminar presentation/oral exam are important aspects in the program, the student's primary focus and devotion is on an independent research project in their chosen field. To accomplish this objective students are expected to join a research group in their second semester in the program, but no later than their third semester. A Ph.D. dissertation based on independent publishable original research must be defended in an oral presentation before the student's Ph.D. dissertation committee in a formal presentation once the research is completed.

## ADMISSION AND DEGREE REQUIREMENTS

### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree in Chemistry or a related field.
  - a. Must possess the ability to carry out graduate work of high quality.
  - b. Applicants must have earned a minimum cumulative GPA of 3.0 on a 4-point scale, and a scholastic average of 3.00 in their undergraduate major.
  - c. If a student has a GPA less than 3.0, the student may be conditionally recommended for acceptance into the program with the recommendation of the Chemistry Department Ph.D. program committee.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit a resume.
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation.
7. International applicants must meet all requirements.

NOTE: Only complete applications will be considered for admission.

### DEGREE REQUIREMENTS

Applicants must submit a completed application package that includes the application, the application fee, three (3) letters of recommendation by persons who are acquainted with their potential for graduate study in their discipline, one (1) official transcript from each college or university attended, and a completed essay. Official scores on the Graduate Record Examination (GRE) or its equivalent will be required during matriculation. The test scores must not be more than five (5) years old. For foreign students, the official score of TOEFL will be required. The test score must be no more than two (2) years old. The Chemistry Department Ph.D. program committee will review and recommend for approval/disapproval all applications to the Ph.D. program.

## DOCTOR OF PHILOSOPHY IN APPLIED CHEMISTRY

COURSE NO	CREDIT HOURS	COURSE NAME
CHEM-506	3	Structural Inorganic Chemistry
CHEM-507	3	Theory and Application of Spectroscopy
CHEM-508	3	Theory and Application of Chromatography
CHEM-510	3	Environmental Chemistry
CHEM-518	3	Molecular Spectroscopy
CHEM-520	3	Advanced Organic Chemistry
CHEM-521	3	Biochemistry
CHEM-556/557	2	Seminar
CHEM-560	1	Chemistry Literature
CHEM-562	3	Chemical Toxicology
CHEM-569	3	Polymer Chemistry
CHEM-573	3	Advanced Physical Chemistry
CHEM-590	1-3	Research and Thesis (Repeatable)
CHEM-591	1-6	Research and Thesis (Repeatable)
CHEM-xxx		Electives
<b>Total credit hours for graduation: 60</b>		

Allowed electives		
COURSE NO	CREDIT HOURS	COURSE NAME
CHEM-501	3	Advanced Laboratory Techniques
CHEM-502	3	Physical Methods in Inorganic Chemistry
CHEM-503	3	Physical Methods in Biochemistry
CHEM-504	3	Physical Methods in Organic Chemistry
CHEM-505	3	Inorganic Solution Chemistry
CHEM-509	3	The Chemical Bond
CHEM-511	3	Selected Topics in Chemistry
CHEM-516	3	Quantum Chemistry
CHEM-552	3	Techniques in Physical Chemistry
CHEM-630	3	Electro analytical Chemistry
CHEM-670	3	Organic Spectroscopy
CHEM-671	3	Bio-Organic Chemistry
CHEM-999	3	Doctoral Sustaining
Or any graduate courses offered in the Chemistry Department.		

**Additional Courses in Other Departments for Electives**

<b>Additional Courses from Biology</b>		
<b>COURSE NO</b>	<b>HOURS</b>	<b>COURSE NAME</b>
BIOL-505	3	Experiment Design and Bio-Statistics
BIOL-511	3	Pharmacology
BIOL-520	3	Cell Biology
BIOL-521	3	Molecular Biology
BIOL-575/AGRI-575	3	Genetics and Molecular Genomics
BIOL-600	3	Molecular Endocrinology
BIOL-611	3	Advanced Genetics
BIOL-6EDUC	3	Neurochemistry
BIOL-621	3	Advanced Microbiology
BIOL-622	3	The Physiology of Excitable Cells
BIOL-625	3	Immunology
BIOL-650	3	Biological Mechanisms
BIOL-651	3	Proteins: Structure and Molecular Properties
MBABIOL-666	3	Biotechnology
<b>Additional Courses from Physics</b>		
PHYS-667	3	Mathematical Methods IV
PHYS-665	3	Statistical Mechanics
PHYS-671	3	Advanced Electromagnetic Theory I
PHYS-672	3	Advanced Electromagnetic Theory II
PHYS-675	3	Quantum Mechanics I
PHYS-676	3	Quantum Mechanics II

## COURSE DESCRIPTIONS

### CHEMISTRY (CHEM) (CHEM)

#### **CHEM-501. ADVANCED LABORATORY TECHNIQUES**

**3:3:1**

The course covers advanced techniques and sophisticated equipment used in the preparation and/or purification of chemical compounds. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### **CHEM-502. PHYSICAL METHODS IN INORGANIC CHEMISTRY**

**3:3:1**

The course covers advanced methods in inorganic preparations and compound analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-308 or equivalent courses.

Credit, three hours.

#### **CHEM-503. PHYSICAL METHODS IN BIOCHEMISTRY**

**3:3:1**

The course covers advanced methods in the study of biochemical molecules and the use of physical methods in their investigations. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306, CHEM-403 or equivalent courses.

Credit, three hours.

#### **CHEM-504. PHYSICAL METHODS IN ORGANIC CHEMISTRY**

**3:3:1**

The course covers advanced studies in organic preparations and reactions, and chemical analyses via physical methods. Two (2) lectures and one (1) 150-minute laboratory period per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304, CHEM-306 or equivalent courses.

Credit, three hours.

#### **CHEM-505. INORGANIC SOLUTION CHEMISTRY**

**3:3:0**

The course provides a study of the chemical kinetics of chemical forces and their effects on structure and reactivity of coordination compounds. Two (2) 75-minute lectures per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### **CHEM-506. STRUCTURAL INORGANIC CHEMISTRY**

**3:3:0**

The course provides detailed discussions of the nature of chemical forces and their effects on structure and reactivity of coordination compounds. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

#### **CHEM-507. THEORY AND APPLICATIONS OF SPECTROSCOPY**

**3:3:0**

The course offers a presentation of molecular spectra and structure correlations demonstrating the use of IR, Visible UV, NMR, and AA. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

#### **CHEM-508. THEORY AND APPLICATIONS OF CHROMATOGRAPHY**

**3:3:0**

The course provides investigations of the separation and identification of substances via packed and capillary column gas chromatography. HPLC and GLC using various detectors. One (1) 150-minute lecture per week.

Prerequisites: CHEM-306 or equivalent.

Credit, three hours.

**CHEM-509. THE CHEMICAL BOND****3:3:0**

The course covers the study of electronics in atoms, molecular orbitals bonding in organic compounds, and "d" valence orbitals. One (1) 150-minute lecture per week.

Prerequisites: CHEM-308 or equivalent.

Credit, three hours.

**CHEM-510. ENVIRONMENTAL CHEMISTRY****3:3:0**

The course covers the analyses of water, soil, plant, and animal tissues for various parameters including traces organics and metals using classical and instrumental methods of analysis. One (1) 150-minute lecture per week.

Credit, three hours.

**CHEM-511. SELECTED TOPICS IN CHEMISTRY****3:3:0**

The course covers advanced topics in the various fields of chemistry. Topics may vary from year to year. One (1) 150-minute lecture per week.

Credit, three hours.

**CHEM-516. QUANTUM CHEMISTRY****3:3:0**

The course covers the wave equation and approximate treatments of the hydrogen molecular ion, the hydrogen molecule, diatomic molecules, and polyatomic molecules. Two (2) 75-minute lectures per week.

Prerequisites: CHEM-301, CHEM-302, CHEM-303, CHEM-304 or equivalent courses.

Credit, three hours.

**CHEM-518. MOLECULAR SPECTROSCOPY****3:3:0**

The course covers the use of molecular symmetry and group theory to study rotational, vibrational, and electronic spectra of molecules. One (1) 150-minute lecture per week.

Prerequisites: CHEM-301, CHEM-302 or equivalent.

Credit, three hours.

**CHEM-519. APPLICATIONS OF SPECTROSCOPY****3:3:0**

The course covers an introduction to chemical research. The use of spectroscopy as a research tool and a review of the literature in this area will be conducted. Projects may be assigned. Two (2) 75-minute lectures per week.

Prerequisites: CHEM-507 or equivalent.

Credit, three hours.

**CHEM-520. ADVANCED ORGANIC CHEMISTRY****3:3:0**

The course covers an advanced study of reaction mechanisms, stereochemistry, and organic chemical bonding. One (1) 150-minute lecture per week.

Prerequisites: CHEM-301, CHEM-302.

Credit, three hours.

**CHEM-521. ADVANCED BIOCHEMISTRY****3:3:0**

The course covers an advanced study of biochemical reactions and reaction mechanisms. One (1) 150-minute lecture per week.

Prerequisites: CHEM-403 or equivalent.

Credit, three hours.

**CHEM-540. ADVANCED METHODS OF TEACHING CHEMISTRY****3:3:0**

The course includes discussions and problem solving sessions concerning improved techniques of teaching high school chemistry. Two (2) 75-minute lectures per week.

Credit, three hours.

**CHEM-552. TECHNIQUES IN PHYSICAL CHEMISTRY****3:3:1**

The course provides a study of the use of physical measurements in determining composition, structures, and properties of matter. Two (2) lectures and one (1) 150-minute laboratory per week.

Credit, three hours.

**CHEM-556. SEMINAR IN CHEMISTRY I****1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week. Credit, one hour.

**CHEM-557. SEMINAR IN CHEMISTRY II****1:1:0**

The course includes presentations of current topics and/or research by faculty and students. One (1) lecture per week. Credit, one hour.

**CHEM-560. CHEMICAL LITERATURE****1:1:0**

The course requires the use of the chemistry library, chemical journals, reference works, other technical publications, assembling and data use, and computer assisted literature searches. One (1) lecture per week. Credit, one hour.

**CHEM-562. CHEMICAL TOXICOLOGY****3:3:0**

The course provides a study of the adverse effects of chemical substances. The course includes the general principles of toxicology, the toxicology of systems, toxic agents, environmental toxicology, forensic toxicology, applications toxicology, and the effect of toxic substances on reproduction and the body. One (1) lecture per week. Credit, one hour.

**CHEM-569. POLYMER CHEMISTRY****3:3:0**

The course provides an introduction to the chemistry of macromolecules including biologically molecules, plastics, and other important classes of industrial polymers. One (1) 150-minute lecture per week.

Prerequisites: CHEM-301, CHEM-302.

Credit, three hours.

**CHEM-573. ADVANCED PHYSICAL CHEMISTRY****3:3:0**

The course provides an introduction to the thermodynamics of large molecular collections and the quantum statistics of these systems. One (1) 150-minute lecture per week.

Prerequisites: CHEM-303, CHEM-304.

Credit, three hours.

**CHEM-590. RESEARCH AND THESIS****3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis. Credit, three hours each semester.

**CHEM-591. RESEARCH AND THESIS****3:3:9**

The course requires publishable research work by students and the writing and defense of a thesis. Credit, three hours each semester.

**CHEM-630. ELECTROANALYTICAL CHEMISTRY****3:3:0**

The course introduces students to the basic principles involved in electroanalytical chemistry. The course will cover modern electrochemical methods such as cyclic, pulse and hydrodynamic voltammetry, chronoamperometry, chronocoulometry, polarography, and stripping analysis. Instrumentation and some practical aspects of electroanalytical chemistry will also be covered. Experiments of most of the electrochemical methods introduced will either be carried out by the students or will be demonstrated.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-670. ORGANIC SPECTROSCOPY****3:3:0**

The course will provide an in-depth presentation of recent advances in Infrared Spectroscopy, Nuclear Magnetic Spectroscopy, Ultraviolet and Visible Spectroscopy, Mass Spectroscopy, and other spectroscopic methods.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

**CHEM-671. BIOORGANIC CHEMISTRY**

**3:3:0**

This course will provide an in-depth understanding of Bioorganic Chemistry of Amino Acids and Polypeptides, Bioorganic Chemistry of DNA, Enzyme Chemistry & Enzyme Models, Metalloenzymes, and Molecular Devices.

Prerequisites: B.S. degree in Chemistry or consent of the Department Chair.

Credit, three hours.

## **MASTER OF SCIENCE IN COMPUTER SCIENCE**

The Department of Computer and Information Sciences prepares students for career opportunities research, technology development, professional studies, and further graduate studies in areas related to computer sciences and informatics. Graduates pursue careers in state and federal agencies, private industry, research, teaching, and entrepreneurial opportunities. The program provides rigorous training in computer science with a focus on inquiry, critical thinking, and experimentation.

### **ADMISSIONS AND DEGREE REQUIREMENTS**

All applicants are required to:

1. Have earned a Bachelor's degree in Computer Science or related technical field such as math, physics, psychology, or engineering. It is expected that incoming graduate students have had undergraduate preparation equivalent to the following courses in the Computer Science curriculum at Delaware State: Calculus I, Calculus II, Linear Algebra, Probability, Discrete Math, Data Structures and Algorithms I, Data Structures and Algorithms II, Theory of Operating Systems, Communication and Networking, Principles of Programming Languages, Microprocessor Based Systems, Theory of Computing.  
Students who are deficient in one or two areas may receive conditional admissions into the degree program. Accepted students who are deficient are expected to address deficiencies immediately by enrolling in and completing an appropriate undergraduate course with a minimum 3.0 average in the first year of their degree program.  
Incoming students must have a minimum 3.0 GPA on a 4.0 scale
2. Incoming students are expected to have mathematical maturity (ability to read proofs) expected of a person beginning graduate studies as well as proficiency in high level programming languages (such as C, C++, or Java).
3. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application. Typical scores of applicants should be in the 65<sup>th</sup> percentile range
4. Complete an application for admission
5. Submit official transcript(s)
6. Submit three (3) letters of reference. Letters of reference must be submitted directly to the Department of Computer and Information Sciences by the references. The applicant must specify the name, address, and contact information of all references in their application.
7. International applicants must submit a World Education Services (WES) evaluation.
8. Personal Statement and Resume are accepted but not required
9. Non-English speaking international students applying for admissions must demonstrate a satisfactory level of proficiency in the English language by taking the TOEFL. Typical scores for an applicant should be in the 575 range. A telephone interview may also be required
10. Include payment of non-refundable application fee.

## **FACULTY**

The Department of Computer and Information Sciences is comprised of dedicated and well prepared faculty with diverse educational backgrounds and areas of research specialization. Small class sizes for graduate courses ensure that students interact closely with faculty in the learning experience. All faculty have published in their respective fields, and maintain active research involvement. Scholarly involvement and continuous professional development in research keeps faculty current and able to offer exciting research opportunities to the students in a variety of areas. Faculty in the Department also engage in collaborative research with faculty at Delaware State University as well as outside of Delaware State University. The students have opportunity to select research projects from a variety of areas.

### **FACILITIES**

The Department of Computer and Information Sciences is housed in Mishoe Science Center (original) and Grossley Hall. A majority of the faculty are actively engaged in research and maintain research laboratories. Laboratories consists of a combination of physical research laboratory space and virtual laboratory compute resources for research in machine learning, video surveillance and analysis, bioinformatics, robotics, machine perception, and mobile systems. The department maintains a number of teaching laboratories as well as generally available workstations running Windows and Linux. The department also maintains high end printers/print servers available to graduate students. Classrooms are equipped with state of the art Smartboard teaching tools as well as projection equipment. The research network includes connectivity to Internet2.

## CURRICULUM

In order to accommodate nontraditional, full-time employed, part-time students, whose career goals and objectives may not require a thesis, the M.S. program includes **a project option**. Students who utilize this option will propose, design, and implement a major Computer Science-related project, preferably related to their area of interest and expertise. The process for the project option is not different from the thesis option. A student who selects the project option must select a committee responsible for approving and guiding the project work. The student must also conduct an oral examination for the project. It is expected that the project will solve a substantial engineering problem in an area of Computer Science. The deliverables will vary depending on the project. Every project will have a writing component that will take one of a number of different forms (scholarly article, manual, etc.). A project will also include artifacts from the execution of the project work. This will also take one of a number of different forms (mathematical proof, software implementation, constructed system or prototype). The project option is optimized to benefit graduate students from various branches of industry.

Furthermore, to emphasize the research-oriented aspects of graduate studies, as well as to bolster critical thinking and analysis skills in our students, graduate students will complete **two graduate seminars** typically within the first two semesters. The seminars, in addition to boosting the aforementioned skills, will allow the students to make a selection of their specific area of interest to be pursued in the form of a dissertation or a project in the second year of study.

Graduate students will have the opportunity to enroll in elective courses in a few areas of computer science. The area of specialization for elective courses will change from semester-to-semester varying among the broad categories: **1) Theory, 2) Systems, and 3) Computational Intelligence and Informatics**. Typically, students will take elective courses from one of those groups, which would provide an in-depth knowledge in a chosen sub-specialization.

Consequently, the program requires a total of 32 credit hours. This includes 18 credit hours of required core courses, 2 credit hours of graduate seminar, 6 credit hours of elective courses, and 6 credit hours of thesis or project research. The outline of the curriculum, assuming full-time attendance, is given in the following table. It is anticipated that, for part-time attendance (1 or 2 courses per semester), the curriculum would span a total of 3.5 to 5 years. It is important to note that the statute of limitations for the Master of Science degree is 5 years.

	<b>Fall</b>	<b>Spring</b>
<b>Year 1</b>	Algorithmics (3 credits)	Theory of Computing (3 credits)
	Operating systems (3 credits)	Computer Networking and Communications (3 credits)
	Computational Intelligence and Informatics (3 credits)	Machine Learning (3 credits)
	Graduate seminar -- Survey (1 credit)	Graduate seminar -- Critical Analysis (1 credit)
<b>Year 2</b>	Thesis research or project (3 credits)	Thesis research or project (3 credits)
	Elective 1 (3 credits)	Elective 2 (3 credits)

**Table 1: M.S. Curriculum in Computer Science.**

The course offerings:

**List of Core Courses**

CSCI-501 Algorithmics  
CSCI-502 Theory of Computing  
CSCI-510 Advanced Operating Systems  
CSCI-520 Advanced Computer Networking and Communications  
CSCI-530 Computational Intelligence and Informatics  
CSCI-540 Machine Learning  
CSCI-691 Graduate Seminar: Survey  
CSCI-692 Graduate Seminar: Critical Analysis  
CSCI-695 Thesis/Project

**List of Approved Electives***Group: Theory*

CSCI-560 Numerical Analysis  
CSCI-561 Computational Geometry  
CSCI-562 Computer Simulation  
CSCI-563 Scientific Computing  
CSCI-564 Graph Theory  
CSCI-565 Computational Learning Theory  
CSCI-566 Advanced Statistics

*Group: Systems*

CSCI-511 Distributed Systems and Parallel Computing  
CSCI-5EDUC Computer and Network Security  
CSCI-521 Mobile Networking and Computing  
CSCI-531 Software Engineering  
CSCI-541 Human-Computer Interaction  
CSCI-542 Virtual Worlds  
CSCI-543 Advanced Computer Graphics  
CSCI-544 Game Programming  
CSCI-550 Advanced Database Management Systems

*Group: Computational Intelligence and Informatics*

CSCI-551 Data Warehousing  
CSCI-552 Data Mining and Visualization  
CSCI-554 Pattern Recognition  
CSCI-555 Artificial Neural Networks  
CSCI-556 Emergent Algorithms  
CSCI-557 Expert Systems  
CSCI-558 Evolutionary Computation  
CSCI-567 Image Processing  
CSCI-570 Computer Vision  
CSCI-571 Robotics  
CSCI-580 Bioinformatics  
CSCI-585 Medical Informatics  
CSCI-590 Informatics for Homeland Security

CSCI-599 Topics in Computer Science  
CSCI-698 Thesis/Project Sustaining

## **COURSE DESCRIPTIONS**

### **CSCI-501, ALGORITHMICS**

Main purpose of the course is to provide students with systematic overview of techniques for analysis and design of algorithms and to familiarize the students with notions related to computational complexity, intractability and approximation algorithms. Students will become more capable of designing efficient algorithms for specific tasks in computer sciences and their applications, including but not limited to computational geometry, image processing, video surveillance analysis, data mining, etc.

### **CSCI-502, THEORY OF COMPUTING**

This course is a graduate level introduction to formal languages and the theoretical aspects of computing. It covers regular and context-free languages, as well as a hierarchy of formal languages and automata, finite and pushdown automata, the Turing machine, computability, decidability, and computational complexity.

### **CSCI-510, ADVANCED OPERATING SYSTEMS**

This class will provide an advanced coverage of operating systems through examination of significant recent contributions in operating systems. This will be accomplished through 3 major components consisting of (1) examination of major operating system concepts through regular readings and writings on recent research literature, (2) reduction to practice through the identification of, and experimental design for, a topic of interest, (3) preparation of a research report and oral presentation.

### **CSCI-520, ADVANCED COMPUTER NETWORKING AND COMMUNICATIONS**

This course will provide advanced coverage of computer networking through examination of modern topics. This will be accomplished through 3 major components consisting of (1) examination of modern computer networking topics through regular readings and writings on recent research literature, (2) reduction to practice through the identification of, and experimental design for a topic of interest, (3) preparation of a research report and oral presentation.

### **CSCI-530, COMPUTATIONAL INTELLIGENCE AND INFORMATICS**

The purpose of this course is to provide students with a broad overview of computational intelligence and informatics through lecture, readings from textbooks, readings from the research literature, and programming projects. The topics covered in the course include a review of nature-inspired methods in computational intelligence, such as neurocomputing, evolutionary computing, fuzzy and rough logic, as well as hybrid systems. Various branches of informatics, such as bioinformatics, neuroinformatics, health/medical informatics, security informatics, business informatics, and legal informatics, with a special emphasis on applications of computational intelligence in those areas, are also reviewed.

### **CSCI-540, MACHINE LEARNING**

This class will provide a graduate introductory survey of machine learning, through lecture, readings from textbooks, readings from the research literature, and programming projects. Topics include, what is machine learning, information theoretic methods, probabilistic methods, discrete and continuous distributions, max-likelihood estimation, regularization, the inference problem, feature spaces, considerations for model validation, generative models, discriminative models, model validation, considerations for building practical systems.

### **CSCI-562, COMPUTER SIMULATION**

With the advent of powerful computers, scientists and engineers have been able to replace real world situations with various models whose dynamics can be evaluated on computers and consequently simulate these real world situations. Examples are numerous, from aeronautical engineering to weather forecasting. Availability of modern computational tools makes feasible simulation that was just a decade ago impossible. As a result, use of computer simulation is rapidly growing and future researchers and engineers have to be familiar with these methods. This course is designed to expose students in Computer Science and natural sciences to computer-based simulation and its applications to sciences, engineering, and management. Students in this course will be trained to design useful models of real world situations, and to implement them on computers.

### **CSCI-563, SCIENTIFIC COMPUTING**

This course is designed to expose students in Computer Science and natural sciences to various aspects of scientific computing. Such topics have become of importance in today's highly technical scientific research environments and in contemporary engineering. In addition to a need to understand fundamental concepts of computing, a researcher or an engineer is hard pressed to acquire the highest possible proficiency in using available computational resources, which in addition to powerful computers include software packages capable of automatizing not only numerical work but also symbolic algebraic manipulations. This course is supposed to address these practical needs.

### **CSCI-564, GRAPH THEORY**

Graphs are of particular importance in Computer Science. Many important data structures in Computer Science are described naturally via graphs (trees, for instance). Graphs are essential for describing networks, and on a more abstract level, for describing automata and some features of formal languages. As a consequence of this pervasiveness, numerous algorithms have been developed on graphs, and it is safe to say that a computer science student cannot study algorithms in depth without at least some understanding of Graph Theory. This course is a graduate level introduction to Graph Theory, along with some of its most interesting algorithms. In addition to discussing the theory, it covers miscellaneous applications from operations research, science and several engineering fields.

### **CSCI-565, COMPUTATIONAL LEARNING THEORY**

This course is a graduate level introduction to advanced concepts of computational learning theory. It covers study of PAC and weak learners, boosting, concepts of algorithms complexity for learning discrete and continuous functions from examples, as well as study of algorithms including perceptron, winnow, support vector machines and on-line learning algorithms.

### **CSCI-511, DISTRIBUTED SYSTEMS AND PARALLEL COMPUTING / CSCI-511**

This course explores the collaboration of algorithm design, programming language structure, and computer architecture to achieve high performance. The nature of concurrent computations, idealized models of parallel systems, Interconnection networks, building-block parallel operations, optimality and efficiency, and mapping and scheduling of computations will be covered.

### **CSCI-5EDUC, COMPUTER AND NETWORK SECURITY / CSCI-5EDUC**

This course will provide a graduate level introduction to aspects of computer and network security such as Operating System security issues, trusted computing base, access control, biometric security, network security issues, cryptographic systems, defense mechanisms, and use of secure communication and storage methodologies.

### **CSCI-521, MOBILE NETWORKING AND COMPUTING / CSCI-521**

This course will prepare the student to understand the issues in mobile computing and help in design and deployment of wireless infrastructure.

### **CSCI-531, SOFTWARE ENGINEERING**

This course provides a graduate introduction to the principles and paradigms of software engineering with a special focus on the pragmatic aspects, such as requirements analysis, cost estimation, design, team organization, quality control, configuration management, verification, testing and documentation. Students coming out of this course should be familiar with the core concepts and jargon in each area, have gone into a little more depth on some areas, and have experienced an attempt at applying software engineering methods to an actual project, as a member of a team.

### **CSCI-541, HUMAN-COMPUTER INTERACTION**

Human-computer interaction (HCI) is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Interaction between users and computers occurs at the user interface (or simply interface), which includes both software and hardware. Students will learn material at the intersection of computer science, behavioral sciences, design and several other fields of study. The course will focus on important facets of design consideration for systems that offer a satisfying user experience. Topics will include human-computer interaction, HCI paradigms, requirements analysis, design, and validation of HCI systems.

### **CSCI-542, VIRTUAL WORLDS**

Virtual worlds are interactive, simulated environments created by humans online. They have become an important and rapidly changing new mode of social and professional interaction. Virtual worlds have many practical applications such as: tele-collaboration, computer-aided design and manufacturing, virtual tours, scientific modeling and visualization, and entertainment. Virtual worlds provide a very attractive area of research and development for computer scientists due to the plethora of computational issues related to an adequate design and implementation of such systems. Virtual worlds are also extensively studied by scientists in other disciplines, due to their significant impact on the relationship between technology, society, and economy, thus creating potential inter-disciplinary research opportunities. The course includes an overview of virtual worlds, with their history, technology, methodologies, and applications, as well as a discussion of the socio-economic impact of virtual worlds in everyday life.

### **CSCI-543, ADVANCED COMPUTER GRAPHICS**

In this course we will survey classic papers and current research in computer graphics. Students will become acquainted with advanced topics in computer graphics; these include graphics pipelines, shading, texturing, illumination, anti-aliasing, perception, image accuracy, image-based rendering, non-photorealistic rendering, procedural modeling, simulation, texture synthesis, interaction, visualization, and virtual reality. Course activities include programming assignments, oral presentations and a term project.

### **CSCI-544, GAME PROGRAMMING**

The Video Game industry is a fast growing, multi-billion dollar industry. Video gaming is now one of the most popular forms of entertainment and a pervasive component of global culture. Academics have begun to recognize the ubiquity, cultural importance and growth of video gaming; as enriching tools for research and studies. In this course, students will gain experience in the engineering aspects, computer graphics methods and artificial intelligence techniques concerning the development of an interactive computer game. This provides students with an opportunity to bring together the theory of algorithms and data structures taught in early classes in an engaging and meaningful application.

### **CSCI-550, ADVANCED DATABASE MANAGEMENT SYSTEMS**

Database management systems are important field of computer science with applications in business, science, homeland security, web design, etc. Proper use of the database technology can significantly improve productivity and lead to better use of resources. Databases are an irreplaceable tool of contemporary computer scientist who wants to be involved in cutting-edge research, development and implementations in one of aforementioned multidisciplinary fields. Main purpose of the course is to provide students with rigorous theoretical basis of databases and solid experience in applications so that they can actively join the work force in development and research in database management systems.

### **CSCI-551, DATA WAREHOUSING**

Data warehousing is a discipline concerned with efficient storing and pre-processing (*i.e.*, cleaning, transforming, and cataloging) of corporate data to support managers and other business professionals in data mining, online analytical processing, market research, and decision-making. As the volumes of data stored by companies continue increasing dramatically, there is a perpetual need for skilled professionals capable of planning, implementing, and maintaining a data warehouse. This course provides students with the technical skills required to plan, implement, and maintain a data warehouse. Topics include data modeling for warehouses, data warehousing infrastructure and tool selection, data exploration, data synthesis and reduction, Online Analytical Processing (OLAP), organizational metadata, and data warehouse administration.

### **CSCI-552, DATA MINING AND VISUALIZATION**

Data mining is active research area of computer science with substantial applications in sciences and commerce. Students in computer sciences need this course to become familiar with techniques that can be subsequently used for identifying interesting phenomena in observed data and/or for design and implementation of stand-alone real-time applications including applications in military and homeland security. This course provides the study of techniques for analysis and visualization of massive amounts of data. Includes hands-on experience in developing and using data mining software.

### **CSCI-554, PATTERN RECOGNITION**

Pattern recognition is concerned with the design, development, and realization of algorithms that arrange data objects (images, records, sensor data) into groups. Students in this course will learn a number of algorithms and considerations for the design and development of pattern recognition systems. Topics include pattern recognition paradigms, supervised learning, feature extraction, feature selection, unsupervised learning, semi-supervised learning, feature spaces and transformations, kernels, support-vector machines, system design, model validation, and

multivariate analysis. Students will gain experience from readings from texts, research literature, and a major semester project.

### **CSCI-555, ARTIFICIAL NEURAL NETWORKS**

Artificial neural networks are important and emerging field of technology with applications in numerous fields such as classification, statistics, data processing, system identification and control, game-playing and decision making (backgammon, chess, racing), pattern recognition (radar systems, face identification, object recognition and more), sequence recognition (gesture, speech, handwritten text recognition), medical diagnosis, financial applications, etc. This course provides an overview of analysis and design principles for artificial neural networks. Topics include unsupervised and supervised learning, recurrent networks, as well as applications in various fields.

### **CSCI-556, EMERGENT ALGORITHMS**

An emergent behavior (process) or emergent property can appear when a number of simple entities operate in an environment, forming more complex behaviors as a collective. In other words, high-level behavior resulting from low-level interaction of simpler building blocks. Emergent phenomenon can be seen in many places, such as snowflakes, sand dunes, flocking of birds, ant colony, traffic patterns, stock market, and evolution. Many of these phenomena can be studied with the model consisting of many autonomous agents, each with simple local rules (algorithm) controlling agent behavior relative to closest neighboring agents. An emergent algorithm is an algorithm that has the following characteristics: 1) it achieves predictable global effects, 2) it does not require global visibility, 3) it does not assume any kind of centralized control, and 4) it is self-stabilizing. Such algorithms typically are stochastic, involve parallel processing and iterative progress. The course includes a discussion of examples of emergence and self-organization in nature and human society, as well as an examination and implementation of selected emergent algorithms and models.

### **CSCI-557, EXPERT SYSTEMS**

Expert systems have been applied to virtually every field of knowledge (e.g., chemistry, electronics, medicine, engineering, geology, computers, military) to perform various task including diagnostics, instruction, interpretation, monitoring, planning, prognosis, treatment and control. This course is designed to provide necessary theoretical foundation and hands-on experience for graduate students so that they can actively join the work force in further development and launching of the expert systems for commercial, scientific and military applications.

### **CSCI-558, EVOLUTIONARY COMPUTATION**

Main purpose of the course is to provide students with systematic overview of techniques for analysis and design of algorithms of evolutionary computation (genetic algorithms, evolution strategies, evolutionary programming, and genetic programming) and to familiarize the students with notions related to their foundations and applications. This way, the students will become more capable of designing efficient genetic algorithm solutions for specific tasks in computer sciences and their applications, including but not data mining, engineering and optimization techniques.

### **CSCI-570, COMPUTER VISION**

Computer vision is the study of systems that derive information from visual data (pictures, video, sensors). This course is a graduate introduction to computer visual algorithms, models, and techniques. Topics include image formation, projective geometry, color spaces and representations, kernels and visual features, segmentation, motion estimation, video feature, considerations for practical systems, models, and case studies.

### **CSCI-571, ROBOTICS**

Robotics is unique among computer science sub-disciplines in that it draws from all three areas of computer science (Systems, Theory, Computational Intelligence/Informatics). Robotics has been identified as one of the next big growth industries in the United States. In order to prepare our students to become innovators and leaders in this field, they will need to have a rigorous grounding in the underlying concepts, tools, and techniques across robotics. This class will expose graduate students/advanced senior undergraduate students to fundamental issues related to the research and applications of robotic systems. This course will cover both manipulators and mobile robots. Students will learn the mathematical tools for modeling, analysis, and control of a robotic system.

### **CSCI-580, BIOINFORMATICS**

The emerging field of bioinformatics has been consistently growing in importance over the past few decades. As an inherently interdisciplinary field situated at the intersection of biology, information technology, computer science, mathematics, and statistics, bioinformatics provides a vast range of career opportunities. In the face of ever-growing amounts of biological and biomedical data, there is a tremendous need for skilled computer scientists capable of fostering the advancement of computational techniques to solve various problems arising from the management and analysis of those data. This course provides an introduction of the most important and basic concepts, methods, and tools used in bioinformatics such as bioinformatics databases, sequence and structure alignment, protein structure

prediction, protein folding, protein-protein interaction.

#### **CSCI-585, MEDICAL INFORMATICS / CSCI-585**

Medical Informatics (or Health Informatics) is an emerging, inter-disciplinary field concerned with the collection, storage, retrieval, communication, and optimal use of health-related data, information, and knowledge. It utilizes methods from various spheres of science and technology, such as computer science, information technology, bioinformatics, biomedicine, and social sciences. In the climate of a strong push towards a health-care reform and digitization of medical records in the United States, there is an ever-growing need for skilled computer scientists experienced in medical information systems design and engineering, as well as medical decision support methods. This course provides an interdisciplinary introduction to the technological advances in the field of medical informatics and their applications at the intersection of computer science and biomedical research.

#### **CSCI-590, INFORMATICS FOR HOMELAND SECURITY**

In the post-9/11 world, Homeland Security is one of the top priorities of the U.S. government. Within the scope of the War on Terror, various government agencies place an increasing emphasis on the efficient use of informatics for the purpose of prevention or management of threats of terrorist attacks. Therefore, there is an ever-growing need for professionals skilled in utilizing informatics methodologies for the purpose of intelligent data mining and analysis (*e.g.*, threat detection), audio/video surveillance, or security-centered information system design and development.

The course provides an introduction to issues and policies related to Homeland Security (HS) in the United States, as well as an overview of applications of informatics to HS-related problems such as detection of threats of terrorist attacks, audio/video surveillance, and design of reliable security-centered information systems.

#### **CSCI-691, GRADUATE SEMINAR: SURVEY / CSCI-691**

In this seminar we survey across a number of research areas in Computer Science in order to give student knowledge and breadth in understanding the discipline. This will help students in selecting a research topic for their graduate degree program.

#### **CSCI-692, GRADUATE SEMINAR: CRITICAL ANALYSIS**

In this seminar we cover research problem formulation, experimental design, and empirical methods Computer Science in order to train students in the scientific method as it pertains to computer science. At the end of this seminar, students will have begun identifying and formulating a research topic for their M.S. degree program.

This seminar will train students in research problem formulation, experimental design, and empirical methods in Computer Science.

#### **CSCI-695, THESIS/PROJECT SUSTAINING / CSCI-695**

This course is used to maintain registration until graduation upon completion of all courses and research.

# DOCTOR OF PHILOSOPHY IN INTERDISCIPLINARY APPLIED MATHEMATICS AND MATHEMATICAL PHYSICS

## OBJECTIVES

This program is designed for students interested in research careers in mathematics in the military, industry or government. It also prepares individuals to teach and/or do research at college. The Ph.D. program in Interdisciplinary Applied Mathematics and Mathematical Physics is flexible enough to accommodate students with diversified backgrounds. Each student develops a course of study in **Applied Mathematics** concentration or **Mathematical Physics** concentration, whichever is most relevant to his/her professional and career objectives.

### Graduate Assistantships and Fellowships

Graduate research or teaching assistantships and fellowships are available. Detailed information and application forms may be obtained from the Applied Mathematics Research Center, or the Department of Mathematical Sciences.

## ADMISSION AND DEGREE REQUIREMENTS

### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Applicants must have earned a minimum GPA of 3.0 on a 4-point scale overall and in the courses related to the field of the Ph.D
  - b. If a student has a GPA less than 3.0, the student may be conditionally recommended for acceptance into the program with the recommendation of the Chemistry Department Ph.D. program committee.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit a resume. (Optional)
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation from professionals in the area of interest.
7. International applicants must meet all requirements.

Students who desire to enter the Applied Mathematics concentration with Master's degree must have successfully completed the following courses, by examination or by successfully completing the graduate courses with a grade of "B" or above: Abstract Algebra, Real Analysis, and Complex Analysis. Depending upon the student's educational background, some students may also be required to take some master level graduate mathematics courses.

Students who desire to enter the Imaging Applied Mathematics concentration from baccalaureate degree must have successfully completed the following courses, by examination or by successfully completing the undergraduate courses: Advanced Calculus I, Linear Algebra, Statistics, Probability, and Algebraic Structures I. The plan of study for this scenario will be agreed upon by the student, his/her advisor, and the Graduate Committee, Department of Mathematical Sciences. Depending upon the student's educational background, some students may also be required to take some undergraduate mathematics courses.

## **DEGREE REQUIREMENTS**

A student who enters the program with a baccalaureate degree must complete his/her Master's degree in the related area. Students who have Master's degrees with no prior Ph.D. graduate coursework must complete thirty (30) credit hours of graduate level courses listed below. In addition at least nine (9) credit hours of research on dissertation are required. A GPA of 3.0 on a 4.0 scale or above must be maintained. The program requires the Ph.D. candidate to have reading knowledge of at least one foreign language approved by the Director of Graduate Programs.

## **QUALIFYING EXAMINATIONS**

Upon completing the course requirement, each student must successfully pass two (2) written examinations. One (1) examination is based on two (2) courses selected by the student from Functional Analysis, Real Analysis, and Complex Analysis. The other examination is based on two (2) courses selected by the student from Image Processing, Mathematical Methods, Advanced Electromagnetic Theory, Computational Geometry, Wavelet Analysis, Numerical Analysis and Scientific Computation I, and courses approved by the Graduate Committee. A student must pass an oral examination on a subject area directly related to his/her dissertation.

**DOCTOR OF PHILOSOPHY IN INTERDISCIPLINARY APPLIED  
MATHEMATICS AND MATHEMATICAL PHYSICS  
APPLIED MATHEMATICS CONCENTRATION**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
MTSC-863	3	Functional Analysis
MTSC-861	3	Real Analysis
MTSC-871	3	Complex Analysis
MTSC-887	3	Image Processing <b>OR</b>
MTSC-821	3	Scientific Computation I
MTSC-890	9	Dissertation
<b>ELECTIVES (Select 18 credit hours)</b>		
MTSC-821	3	Scientific Computation I
MTSC-822	3	Scientific Computation II
MTSC-833	3	Stochastic Processes
MTSC-853	3	Partial Differential Equations
MTSC-867	3	Numerical Analysis
MTSC-851	3	Ordinary Differential Equations
MTSC-885	3	Computational Geometry*
MTSC-857	3	Integral Equations
MTSC-875	3	Inverse Problems
MTSC-887	3	Image Processing
MTSC-811	3	Abstract Algebra
PHYS-655	3	Computational Methods
PHYS-665	3	Statistical Mechanics
PHYS-671	3	Advanced Electromagnetic Theory I*
PHYS-672	3	Advanced Electromagnetic Theory II
PHYS-652	3	Classical Mechanics
PHYS-667	3	Mathematical Methods IV*
PHYS-661	3	Solid State Physics
PHYS-675	3	Quantum Mechanics I
MTSC-883	3	Wavelet Analysis*
MTSC-845	3	Theory of Solitons
MTSC-852	3	Pattern Recognition
MTSC-787	3	Digital Signal Processing
MTSC-850	3	Mathematical Theory of Algorithms
MTSC-854	3	Numerical Methods for Partial Differential Equations
MTSC-843	3	Advanced Statistics
MTSC-835	3	Advanced Perturbation Theory
MTSC-889	3	Topics in Applied Mathematics
<b>TOTAL CREDIT HOURS: 39</b>		
*Students must take any two of these courses.		

## **MATHEMATICAL PHYSICS CONCENTRATION**

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Applicants must have earned a minimum GPA of 3.0 on a 4-point scale overall and in the courses related to the field of the Ph.D
  - b. If a student has a GPA less than 3.0, the student may be conditionally recommended for acceptance into the program with the recommendation of the Chemistry Department Ph.D. program committee.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit a resume. (Optional)
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation from professionals in the area of interest.
7. International applicants must meet all requirements.

Students who desire to enter the Mathematical Physics concentration with Master's degree in physics or a related area must have successfully completed the following courses, by examination or by successfully completing the graduate courses with a grade of "B" or above: Thermodynamics and Kinetic Theory, Classical Mechanics, Advanced Electromagnetic Theory, and Quantum Mechanics. Depending upon the student's educational background, some students may also be required to take some masters level graduate mathematics and physics courses.

Students with baccalaureate degrees may enter the mathematical physics concentration with the approval of the Graduate Committee. Depending upon the student's educational background, some students may also be required to take some undergraduate mathematics and physics courses.

#### **DEGREE REQUIREMENTS**

The program requires the Ph.D. candidate to have reading knowledge of at least one (1) foreign language approved by the Director of Graduate Programs.

A sequence of core courses required by all Ph.D. candidates includes the following: PHYS-665 Statistical Mechanics, PHYS-672 Advanced Electromagnetic Theory, PHYS-676 Quantum Mechanics II, PHYS-655 Computational Methods, MTSC-863 Functional Analysis or MTSC-857 Integral Equations, and MTSC-871 Complex Analysis. Any student found deficient in any of these areas may be required to take appropriate courses to remove that deficiency.

#### **QUALIFYING EXAMINATIONS**

Each student must successfully pass the written general examination in physics which encompasses the area of Thermodynamics and Kinetic Theory, Classical Mechanics, Advanced Electromagnetic Theory, and Quantum Mechanics. In addition, a student must pass an oral examination on a subject area chosen by his/her advisor.

**DOCTOR OF PHILOSOPHY IN INTERDISCIPLINARY APPLIED  
MATHEMATICS AND MATHEMATICAL PHYSICS  
MATHEMATICAL PHYSICS CONCENTRATION**

<b>REQUIRED COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
PHYS-665	3	Statistical Mechanics
PHYS-672	3	Advanced Electromagnetic Theory
PHYS-676	3	Quantum Mechanics II
PHYS-655	3	Computational Methods
MTSC-871	3	Complex Analysis
MTSC-863	3	Functional Analysis <b>OR</b>
MTSC-857	3	Integral Equations
MTSC-890	9	Dissertation
<b>ELECTIVES (Select EDUC credit hours)</b>		
MTSC-821	3	Scientific Computation I
MTSC-822	3	Scientific Computation II
MTSC-833	3	Stochastic Processes
MTSC-853	3	Partial Differential Equations
MTSC-867	3	Numerical Analysis
MTSC-851	3	Ordinary Differential Equations
MTSC-885	3	Computational Geometry
MTSC-857	3	Integral Equations
MTSC-875	3	Inverse Problems
MTSC-887	3	Image Processing
MTSC-811	3	Abstract Algebra
PHYS-655	3	Computational Methods
PHYS-665	3	Statistical Mechanics
PHYS-671	3	Advanced Electromagnetic Theory I
PHYS-672	3	Advanced Electromagnetic Theory II
PHYS-652	3	Classical Mechanics
PHYS-667	3	Mathematical Methods IV
PHYS-661	3	Solid State Physics
PHYS-675	3	Quantum Mechanics I
MTSC-883	3	Wavelet Analysis
MTSC-845	3	Theory of Solitons
MTSC-852	3	Pattern Recognition
MTSC-787	3	Digital Signal Processing
MTSC-850	3	Mathematical Theory of Algorithms
MTSC-854	3	Numerical Methods for Partial Differential Equations
MTSC-843	3	Advanced Statistics
MTSC-835	3	Advanced Perturbation Theory
MTSC-889	3	Topics in Applied Mathematics
<b>TOTAL CREDIT HOURS: 39</b>		

## COURSE DESCRIPTIONS

### PHYSICS (PHYS) (PHYS)

#### PHYS-652. CLASSICAL MECHANICS

3:3:0

Lagrangian formulation, the Kepler problem, Rutherford scattering, rotating coordinate systems, rigid body motion, small oscillations, stability problems, and Hamiltonian formulation.

Credit, three hours.

#### PHYS-655. COMPUTATIONAL METHODS

3:3:0

Designed to familiarize students with the use of computers in pursuing theoretical research. Numerical analysis techniques and computational methods employed in the study of physical models will be studied.

Credit, three hours.

#### PHYS-661. SOLID STATE PHYSICS

3:3:0

An introductory study of the structure and physical properties of crystalline solids. Included are topics in crystal structure, lattice vibrations, thermal properties of solids, x-ray diffraction, free electron theory and energy based theory.

Credit, three hours.

#### PHYS-665. STATISTICAL MECHANICS

3:3:0

Laws of thermodynamics, Boltzmann and quantum statistical distributions, with applications to properties of gases, specific heats of solids, paramagnetism, black body radiation and Bose-Einstein condensation.

Credit, three hours.

#### PHYS-667. MATHEMATICAL METHODS OF PHYSICS IV

3:3:0

An advanced treatment of mathematical topics including operators, matrix mathematics, complex variables and eigenvalue problems.

Credit, three hours.

#### PHYS-671. ADVANCED ELECTROMAGNETIC THEORY I

3:3:0

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

#### PHYS-672. ADVANCED ELECTROMAGNETIC THEORY II

3:3:0

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

#### PHYS-675. QUANTUM MECHANICS I

3:3:0

A study of the Schroedinger wave equation, operators and matrices, perturbation theory, collision and scattering problems classification of atomic states, and introduction to field quantization.

Credit, three hours.

#### PHYS-676. QUANTUM MECHANICS II

3:3:0

Quantum Mechanics of molecules and solid state. Relativistic quantum mechanics. Field quantization. Quantum theory of light. Basics of quantum electrodynamics.

Credit, three hours.

#### PHYS-691. RESEARCH I

3:3:3

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

#### PHYS-692. RESEARCH II

3:3:3

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-695. MASTER'S THESIS****6:6:6**

A research problem in a selected physics topic resulting in a written thesis.  
Credit, one to six hours.

**PHYS-800. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

Basics of laser spectroscopic techniques and instrumentation. Topics include: ultra violet and visible (uv-vi) absorption spectroscopy; Fourier transform infrared spectroscopy; Raman, fluorescence, and saturation spectroscopy; polarization, correlation, and ultra-fast spectroscopy.  
Prerequisites: PHYS-600, PHYS-601, PHYS-605.  
Credit, three hours.

**PHYS-801. QUANTUM THEORY OF LIGHT****3:3:0**

Quantum mechanical description of light matter interaction. Presentation of basic quantum mechanics and quantum mechanical treatment of light and atoms.  
Prerequisites: Consent of the Instructor.  
Credit, three hours.

**PHYS-802. THEORY OF LIGHT SCATTERING****3:3:0**

An advanced electricity and magnetism course focused on light interactions with small particles. Topics include Raleigh and Mie scattering, optical properties of nanoparticles and surface plasmon resonance.  
Credit, three hours.

**PHYS-803. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

The laser revolution in spectroscopy. Absorption within the Doppler line, Doppler-free broadening spectroscopy, saturation spectroscopy, multiphoton spectroscopy, laser fluorescence, laser Raman, coherent stokes and antistokes Raman spectroscopy, photon echo and coherent spectroscopy. Ultrafast spectroscopy. Modern trends in spectroscopy.  
Credit, three hour.

**PHYS-804. PRINCIPLES OF PHOTOCHEMISTRY AND PHOTOBIOLOGY****3:3:0**

Review of the main phenomena related to the interaction of light with matter that results in chemical or biological activity. The study of inorganic and organic photochemistry, environmental aspects of photochemistry, atmospheric photochemistry, photosynthesis, visual processing, bio-luminescence, interaction of light with bio-organisms, photo-medicine, and phototherapy.  
Credit, three hours.

**PHYS-805. PHOTOACOUSTIC AND THERMAL SPECTROSCOPY****3:3:0**

Fundamentals of photo-acoustic and photo-thermal interaction of light with optical samples. Examination of basic instrumentations and their applications for characterization of complex samples including biological samples.  
Credit, three hours.

**PHYS-806. MOLECULAR BIOPHYSICS****3:3:0**

An overview of the physics of bio-molecular interactions. Topics will include physical models for DNA and protein systems.  
Credit, three hours.

**PHYS-807. OPTICAL SOLITONS****3:3:0**

Basic concepts of the mathematical aspects of optical solitons. Presentation of optical waveguides, the nonlinear Schrodinger's equation, laws of nonlinearity, soliton perturbation, soliton-soliton interactions, Stochastic perturbation of optical solitons, optical couplers, optical switching, magneto-optic waveguides and optical bullets.  
Prerequisites: PHYS-601, MTSC-853, MTSC-845.  
Credit, three hours.

**PHYS-808. FIBER OPTICS AND FIBER OPTICS COMMUNICATION****3:3:0**

Light propagation in fiber, its dispersion and nonlinear characteristics that play an important role in light communication. Types of fiber-optic devices and their applications to communication. Wavelength division multiplexing.  
Credit, three hours.

<b>PHYS-809. PHOTONICS AND INFORMATION PROCESSING</b>	<b>3:3:0</b>
Wave propagation in linear optical systems and optical information processing. Topics include: fundamentals of optical propagation, diffraction, optical imaging, Fourier transform, wave-front modulation, signal processing, and basics of optical processing devices.	
Credit, three hours.	
<b>PHYS-810. CURRENT TOPICS IN OPTICS I</b>	<b>3:3:0</b>
Current topics in optics and spectroscopy.	
Credit, three hours.	
<b>PHYS-811. CURRENT TOPICS IN OPTICS II</b>	<b>3:3:0</b>
Current topics in optics and spectroscopy.	
Credit, three hours.	
<b>PHYS-820. DISSERTATION RESEARCH</b>	<b>9:9:9</b>
The course is for Ph.D. students in the optics program working on their dissertation research project.	
Credit, two to eight hours.	
<b>PHYS-890. DISSERTATION</b>	<b>9:9:0</b>
Written work that describes the main research results obtained during the completion of the graduate program. The format must comply with the requirements of the College for thesis and dissertations.	
Credit, three to nine hours.	
<b>PHYS-999. DOCTORAL SUSTAINING</b>	<b>0:0:0</b>
Public oral defense of the thesis that includes presentation of the main research results obtained during the completion of the graduate program. It takes place after evaluation of the written dissertation by the members of the corresponding academic committee.	
Credit, none.	
<b>MATHEMATICAL SCIENCES (MTSC) (25)</b>	
<b>MTSC-787. DIGITAL SIGNAL PROCESSING</b>	<b>3:3:0</b>
The goal of the course is to provide the student with the mathematical tools and techniques for analyzing, modeling, and implementing digital signal processing systems. The course also provides the relevant background knowledge to students of applied mathematics and theoretical physics who need the signal processing tools for the analysis of data obtained during research in their fields.	
Credit, three hours.	
<b>MTSC-811. ABSTRACT ALGEBRA</b>	<b>3:3:0</b>
The student should understand the theory of groups, rings and fields.	
Credit, three hours.	
<b>MTSC-821. SCIENTIFIC COMPUTATION I</b>	<b>3:3:0</b>
The student should become familiar with matrix analysis and matrix computation.	
Credit, three hours.	
<b>MTSC-822. SCIENTIFIC COMPUTATION II</b>	<b>3:3:0</b>
The student should become familiar with numerical approximations such as finite element methods in computational electromagnetism.	
Credit, three hours.	
<b>MTSC-833. STOCHASTIC PROCESSES</b>	<b>3:3:0</b>
The student should become familiar with the theory and applications of Stochastic processes.	
Credit, three hours.	

**MTSC-843. ADVANCED STATISTICS****3:3:0**

Main purpose of the course is to provide students with systematic overview of advanced statistical techniques that can be useful in their research and future careers. The statistical techniques are applicable in various fields including video surveillance analysis, data mining, natural resources, finance, etc.

Credit, three hours.

**MTSC-845. THEORY OF SOLITONS****3:3:0**

The aim of the course is to introduce the basic concepts of the mathematical aspects of Soliton Theory. This will include the derivation and the introduction to the Korteweg-de Vries equation; the travelling wave solution, Inverse Scattering Transform; N-soliton solution; Lax pair; Integrals of Motion; Hirota's bilinear method; Backlund Transform; AKNS (Ablowitz, Kaup, Newell and Segur) scheme; Zakharov-Shabat scheme; Painleve transcendents; Painleve conjecture; perturbation of solitons; adiabatic parameter dynamics; Topological solitons, kinks and anti-kinks, breathers, phonons, skyrimions; Chiral solitons.

Credit, three hours.

**MTSC-850. MATHEMATICAL THEORY OF ALGORITHMS****3:3:0**

Main purpose of the course is to provide students with systematic overview about techniques for analysis and design of algorithms and to familiarize the students with notions related to computational complexity, intractability and approximation algorithms. This way, the students will become more capable of designing efficient algorithms for specific tasks in applied mathematics, included but not limited to computational geometry, image processing, video surveillance analysis, data mining, etc.

Credit, three hours.

**MTSC-851. ORDINARY DIFFERENTIAL EQUATIONS****3:3:0**

The purpose of the course is to present techniques of solving ordinary differential equations. The students should become familiar with Boundary Value Problems, Systems of Ordinary Differential Equations, and Phase Diagrams and Stability.

Credit, three hours.

**MTSC-852. PATTERN RECOGNITION****3:3:0**

Pattern recognition is integral part of image processing, video surveillance and data mining, which are research areas at Delaware State University. Potential junior researchers in applied mathematics and/or applied optics field need this course to become familiar with techniques that can be subsequently used for identifying interesting phenomena in observed data and/or for design and implementation of stand-alone real-time applications for military and homeland security.

Credit, three hours.

**MTSC-853. PARTIAL DIFFERENTIAL EQUATIONS****3:3:0**

The course is designed to acquaint students to Classifications of Partial Differential Equations, Methods of Solution for the Wave Equation, Laplace's Equation, and the Heat Equation.

Credit, three hours.

**MTSC-854. NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS 3:3:0**

Numerical methods for Partial Differential Equations (PDEs) are a part of the problem solving skills that are expected to be mastered by most of the university graduates working in a quantitative field. The same fundamental concepts of convection, diffusion, dispersion and nonlinearity are used to simulate applications in physics, economics, biology, engineering and social sciences. Quantitative answers for the real world can generally be obtained only from computations. The goal of this course is to provide a basic foundation in numerical methods for PDEs include finite difference method and finite element method.

Credit, three hours.

**MTSC-857. INTEGRAL EQUATIONS****3:3:0**

The student should become familiar with the theory and applications of Integral Equations.

Credit, three hours.

**MTSC-860. ADVANCED PERTURBATION THEORY****3:3:0**

The aim of the course is to lay an introduction to the perturbation theory to solve ordinary differential equations, partial differential equations as well as integral equations. Topics that will be covered in this course are Regular perturbations; Error Estimates; Periodic solutions and Lindstedt Series, Harmonic Resonance, Duffing's equation, Multiple Scales, Struble's Method, Averaging, Krylov-Bogoliubov Method of Averaging, Krylov-Bogoliubov-Mitropolski generalized method of Averaging; Forced Duffing and Van der Pol's equations, Wentzel-Kramer-Brillouin-Jeffreys (WKBJ) Approximation, Fredholm's Alternative, Latta's method of composite expansion; Matched Asymptotic Expansion. The emphasis in this course is on the adaptation of these mathematical methods and techniques to their swift and effective application in solving advanced problems in applied mathematics and theoretical physics.

Credit, three hours.

**MTSC-861. REAL ANALYSIS****3:3:0**

The course is to provide the students with the background in those parts of modern mathematics which have their roots in the classical theory of functions of a real variable. These include the classical theory of functions of a real variable itself, measure and integration, point-set topology, and the theory of normed linear space.

Credit, three hours.

**MTSC-863. FUNCTIONAL ANALYSIS****3:3:0**

To provide students theories of Metric Spaces, Hilbert Spaces and Banach Spaces.

Credit, three hours.

**MTSC-867. NUMERICAL ANALYSIS****3:3:0**

The student should become familiar with advanced techniques for solving numerically large problems in Linear Algebra. In particular, students should become familiar with the effects of ill conditioning, and of ways in which special information about matrices, such as sparsity can be used. An important part of all of this is the consideration of error from various sources and ways of controlling its accumulation.

Credit, three hours.

**MTSC-871. COMPLEX ANALYSIS****3:3:0**

Upon successful completion of this course, the student will be familiar with Complex Analysis and various applications of Complex Analysis physical and engineering disciplines.

Credit, three hours.

**MTSC-875. INVERSE PROBLEMS****3:3:0**

The student should become familiar with ill-posed problems, regularization methods, Tikhonov regularization, the discrepancy principle, and the regularization by discretization.

Credit, three hours.

**MTSC-883. WAVELET ANALYSIS****3:3:0**

The student should become familiar with Wavelets and their applications in signal and image processing.

Credit, three hours.

**MTSC-885. COMPUTATIONAL GEOMETRY****3:3:0**

The student should become familiar with communication complexity, pseudo-randomness, rapidly mixing Markov chains, points on a sphere, derandomization, convex hulls and Voronoi diagrams, linear programming, geometric sampling and VC-dimension theory, minimum spanning trees, circuit complexity, and multidimensional searching.

Credit, three hours.

**MTSC-887. IMAGE PROCESSING****3:3:0**

The student should become familiar with Image Enhancement, Image Restoration, Wavelets and Multiresolution Processing, Image Compression, Morphological Image Processing, Image Segmentation, Representation and Description, and Object Recognition.

Credit, three hours.

**MTSC-889. TOPICS IN APPLIED MATHEMATICS**

**3:3:0**

The topics of this course will be determined and the course will be offered whenever needed.  
Credit, three hours.

**MTSC-890. DISSERTATION**

**3:3:0**

A student may register 3-9 hours dissertation with approval of his/her dissertation advisor each semester.  
Credit, three to nine hours.

# MASTER OF SCIENCE IN APPLIED MATHEMATICS

## OBJECTIVES

The Master's programs in the Mathematical sciences are flexible enough to accommodate students with diversified background training. In consultation with the Graduate Committee, each student develops a course of study in mathematics areas most relevant to his or her professional and career objectives.

## ADMISSION AND DEGREE REQUIREMENTS

### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Must possess the ability to carry out graduate work of high quality.
  - b. Applicants for degree status should have a minimum cumulative undergraduate grade point average of 2.50 (on a 4-point scale) and a scholastic average of 3.00 in their undergraduate major. They should have successfully completed specific courses at the undergraduate level in the field in which they plan to pursue a graduate degree and a minimum number of courses in a designated area approved by the specific department.
  - c. Applicants who have not taken the required test(s) can be admitted provisionally, but must satisfy this requirement during the first semester of graduate study in order to continue.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation from professionals in the area of interest.
6. International applicants must meet all requirements.

### International Students

Non-English speaking international students applying for admission to graduate study must demonstrate a satisfactory level of proficiency in the English language. The proficiency requirement may be satisfied by meeting the criteria in any one of the following categories:

1. Foreign applicants who hold the baccalaureate degree from a regionally accredited college or university within the United States are presumed to be proficient in the English language.
2. Foreign applicants who hold the baccalaureate degree or its equivalent from a foreign institution in which English is the language of instruction are presumed to be proficient in English.
3. Foreign applicants who do not meet the requirements outlined in 1 and 2 above must take the Test of English as a Foreign Language (TOEFL). Applicants should attain a score of at least 550 on the TOEFL.
4. All applicants must show evidence of medical insurance prior to admission.

Prior to acceptance, international students must place an Affidavit of Support Form on file with the Director of the Office of International Studies.

## **DEGREE REQUIREMENTS**

Each student must take fifteen (15) credit hours of required courses, and complete an additional eighteen (18) hours either in the Thesis Option or the Non-Thesis Option. The students who select thesis option must defend their thesis before the Department Graduate Committee. A student must complete a six (6) hour research thesis.

The student who selects either one (1) of the following non-thesis options must pass a written examination within two (2) attempts. The written examination is administered in February. A student must pass the written exam by the beginning of his/her 6th semester of study. A second and final attempt is permitted in the following August. In the examination a student must choose two (2) topics from Algebra, Analysis, and Applied Mathematics. The exam is based on both MTSC-561 for Analysis, MTSC-511 for Algebra, and (or) MTSC-651 and MTSC-643 for Applied Mathematics. Another topic, such as Ordinary Differential Equations, Partial Differential Equations, or Statistics, may be substituted for one (1) of the above by petition to the graduate committee based on two (2) graduate level courses and supported by a faculty member.

**MASTER OF SCIENCE IN APPLIED MATHEMATICS  
THESIS OPTION**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE NAME</b>
MTSC-500	3	Foundations of Mathematics*
MTSC-511	3	Introduction to Abstract Algebra*
MTSC-561	3	Real Analysis I*
MTSC-562	3	Real Analysis II*
MTSC-571	3	Complex Analysis*
MTSC-699	6	Thesis or Directed Project 6
MTSC-541	3	Advanced Probability Theory <sup>o</sup>
MTSC-521	3	General Topology <sup>o</sup>
MTSC-xxx	6	Applied Mathematics Electives
xx-xxx	3	Pure or Applied Mathematics Electives (or other Graduate level courses with advisor approval).
<b>TOTAL CREDIT HOURS: 33</b>		
<sup>o</sup> Select one of these courses. *Each of these courses is required.		

**MASTER OF SCIENCE IN APPLIED MATHEMATICS  
NON-THESIS OPTION**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE NAME</b>
MTSC-500	3	Foundations of Mathematics*
MTSC-511	3	Introduction to Abstract Algebra*
MTSC-561	3	Real Analysis I*
MTSC-562	3	Real Analysis II*
MTSC-571	3	Complex Analysis*
MTSC-xxx	9	Pure Mathematics Electives
xx-xxx	6	Pure or Applied Mathematics Electives (or other Graduate level courses with advisor approval).
MTSC-541	3	Advanced Probability Theory <sup>o</sup>
MTSC-521	3	General Topology <sup>o</sup>
<b>TOTAL CREDIT HOURS: 33</b>		
<sup>o</sup> Select one of these courses. *Each of these courses is required.		

## COURSE DESCRIPTIONS

### MATHEMATICAL SCIENCES (MTSC) (25)

#### **MTSC-500. FOUNDATIONS OF MATHEMATICS**

**3:3:0**

This course is specifically designed to bridge undergraduate and graduate study in mathematics. It is an introduction to abstract ideas, proofs, set theory, relations, and number systems and their connections.

Prerequisites: MTSC-252.

Credit, three hours.

#### **MTSC-503. MATHEMATICS TEACHING METHODS I**

**3:3:0**

This course is the first of a two (2) part sequence designed to provide weighty consideration of some of the major topics in middle and secondary school mathematics education. Emphasis will be on epistemological, pedagogical, social, psychological, effective teaching, classroom management, and cultural concerns as well as the teaching profession. This course is also a study of methods and materials used in teaching mathematics and will expose students to current educational theory and reform organizations. Through research, practice, and presentations, students will take an active role in the instruction and development of materials for this course.

Prerequisites: MTSC-252, MTSC-313, MTSC-341, MTSC-241 and MTSC-203.

Credit, three hours.

#### **MTSC-504. MODERN GEOMETRY**

**3:3:0**

The course covers Menelaus and Ceva's Theorem, Cross Ratio, Elementary Transformations, Euclidean Constructions, and Non-Euclidean Geometry. The course illustrates to the students the strength of deductive reasoning in proofs involving Euclidean axioms and transformation theory. The student will also be familiar with Non-Euclidean Geometry.

Prerequisites: MTSC-303 with minimum grade of "C".

Credit, three hours.

#### **MTSC-505. MATHEMATICAL LOGIC**

**3:3:0**

The course is designed to examine the logical foundations of mathematics. Formal systems are shown to model real life relationships, and these formal systems are studied and analyzed using mathematical methods and rigor. The results of the study show both the inherent limitation of reasoning and at the same time the richness of what can be expressed and proven.

Prerequisites: MTSC-251, MTSC-313.

Credit, three hours.

#### **MTSC-511. INTRODUCTION TO ABSTRACT ALGEBRA**

**3:3:0**

The course is concerned with the basic theory of some of the important algebraic systems such as groups, rings and fields with emphasis on homomorphism, isomorphism, integral domain, extension fields, and Galois groups.

Credit, three hours.

#### **MTSC-521. GENERAL TOPOLOGY**

**3:3:0**

The purpose of the course is to give the students the basic concepts of topology and lead them to algebraic topology. The course also presents as a related discipline to the proper understanding of various branches of analysis and geometry. The students should become familiar with topological spaces, point-set topology and homotopy theory.

Prerequisites: MTSC-451, MTSC-452.

Credit, three hours.

#### **MTSC-531. NUMBER THEORY**

**3:3:0**

The course, Number Theory, is an introduction to the study of basic properties of integers which allows one to demonstrate how various areas of mathematics play a role in the study of properties of natural numbers. The course is flexible and fundamental enough to be taken by Math and Math Ed Majors.

Credit, three hours.

#### **MTSC-541. ADVANCED PROBABILITY THEORY**

**3:3:0**

The course covers the mathematical structure of probability theory with applications of the theory from a wide variety of experimental situations.

Prerequisites: MTSC-253 with a minimum grade of "C".

Credit, three hours.

**MTSC-551. ORDINARY DIFFERENTIAL EQUATIONS****3:3:0**

The purpose of the course is to present techniques of solving ordinary differential equations. The students should become familiar with Boundary Value Problems, Systems of Ordinary Differential Equations, Phase Diagrams, and Stability.

Prerequisites: MTSC-351.

Credit, three hours.

**MTSC-561. REAL ANALYSIS I****3:3:0**

The purpose of the course is to cover the basic material that every graduate should know in the classical theory of functions of a real variable and in measure and integration theory. To provide the students with the background in those parts of modern mathematics which have their roots in the classical theory of functions of a real variable. These include the classical theory of functions of a real variable itself, measure and integration, point-set topology, and the theory of normed linear space.

Prerequisites: MTSC-402 with a minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-562. REAL ANALYSIS II****3:3:0**

This course is the extension of real analysis I. The purpose of the course is to further provide students the background of modern mathematics. The course is to cover the theories of (improper) Riemann integrals and a brief introduction of Lebesgue integrals, the theories of pointwise and uniform convergence of sequences of functions, and the theories of infinite series of functions.

Prerequisites: MTSC-561 with minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-571. COMPLEX ANALYSIS****3:3:0**

This is a first-semester course at the graduate level, in the field of Functions of one (1) Complex Variable. The rigorous approach adopted herein will set a firm foundation for leading the students to the next level of Complex Analysis. To prepare the student for further studies in the field of Complex Analysis. To provide the students with sufficient background for various applications of Complex Analysis physical and engineering disciplines.

Prerequisites: MTSC-471.

Credit, three hours.

**MTSC-621. FUNCTIONAL ANALYSIS****3:3:0**

The course gives students an introduction to Metric Spaces, Hilbert Spaces, and Banach Spaces with emphasis on Hilbert Spaces.

Prerequisites: MTSC-561.

Credit, three hours.

**MTSC-631. OPERATIONS RESEARCH****3:3:0**

The course is designed to expose students in computer science to linear, nonlinear, and integer programming, simplex method, duality theorem, transport and other application problems, and different optimization methods and techniques. The topics to be covered include: Optimization problems; the subject of Operations Research; Linear programming; Simplex method and duality theorem; Integer programming; Nonlinear programming; Optimization techniques; Applications; and MATLAB Optimization Toolbox.

Credit, three hours.

**MTSC-641. COMBINATORICS****3:3:0**

The student will be introduced to the theory involved in combinatorial reasoning. The two (2) combinatorial theories of enumeration and graph theory will be developed. Students will apply combinatorial reasoning to problems in the analysis of computer systems, in discrete operations research and in finite probability.

Credit, three hours.

**MTSC-643. STATISTICS****3:3:0**

The course provides students with the fundamental theory of statistics. The students will be familiar with descriptive and inferential statistical methods, theory, and applications.

Prerequisites: MTSC-541 with minimum grade of "C".

Credit, three hours.

**MTSC-651. PARTIAL DIFFERENTIAL EQUATIONS****3:3:0**

The course is designed to acquaint students to Classifications of Partial Differential Equations, Methods of Solution for the Wave Equation, Laplace's Equation, and the Heat Equation.

Prerequisites: A second course in Ordinary Differential Equations.

Credit, three hours.

**MTSC-661. NUMERICAL ANALYSIS****3:3:0**

The student should become familiar with advanced techniques for solving numerically large problems in Linear Algebra. In particular, students should become familiar with the effects of ill conditioning, and of ways in which special information about matrices, such as sparsity can be used. An important part of all of this is the consideration of error from various sources and ways of controlling its accumulation.

Prerequisites: MTSC-313.

Credit, three hours.

**MTSC-699. THESIS OR DIRECTED PROJECT 6****3:3:0**

A student may register three (3) or six (6) hours thesis with the approval of his/her thesis advisor.

Credit, three to six hours.

# **MASTER OF SCIENCE IN PURE MATHEMATICS**

## **OBJECTIVES**

The Master's programs in Mathematical sciences are flexible enough to accommodate students with diversified background training. In consultation with the Graduate Committee, each student develops a course of study in mathematics areas most relevant to his or her professional and career objectives. Each student must take fifteen (15) credit hours of required courses, and complete an additional eighteen (18) hours either in the Thesis Option or the Non-Thesis Option.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. Must possess the ability to carry out graduate work of high quality.
  - b. Applicants for degree status should have a minimum cumulative undergraduate grade point average of 2.50 (on a 4-point scale) and a scholastic average of 3.00 in their undergraduate major. They should have successfully completed specific courses at the undergraduate level in the field in which they plan to pursue a graduate degree and a minimum number of courses in a designated area approved by the specific department.
  - c. Applicants who have not taken the required test(s) can be admitted provisionally, but must satisfy this requirement during the first semester of graduate study in order to continue.
2. Official scores on the Graduate Record Examination (GRE) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation from professionals in the area of interest.
6. International applicants must meet all requirements.

### **International Students**

Non-English speaking international students applying for admission to graduate study must demonstrate a satisfactory level of proficiency in the English language. The proficiency requirement may be satisfied by meeting the criteria in any one of the following categories:

1. Foreign applicants who hold the baccalaureate degree from a regionally accredited college or university within the United States are presumed to be proficient in the English language.
2. Foreign applicants who hold the baccalaureate degree or its equivalent from a foreign institution in which English is the language of instruction are presumed to be proficient in English.
3. Foreign applicants who do not meet the requirements outlined in 1 and 2 above must take the Test of English as a Foreign Language (TOEFL). Applicants should attain a score of at least 550 on the TOEFL.
4. All applicants must show evidence of medical insurance prior to admission.

Prior to acceptance, international students must place an Affidavit of Support Form on file with the Director of the Office of International Studies.

## **DEGREE REQUIREMENTS**

Each student must take fifteen (15) credit hours of required courses, and complete an additional eighteen (18) hours either in the Thesis Option or the Non-Thesis Option. The students who select thesis option must defend their thesis before the Department Graduate Committee. A student must complete a six (6) hour research thesis.

The student who selects either one (1) of the following non-thesis options must pass a written examination within two (2) attempts. The written examination is administered in February. A student must pass the written exam by the beginning of his/her 6<sup>th</sup> semester of study. A second and final attempt is permitted in the following August. In the examination a student must choose two (2) topics from *Algebra*, *Analysis*, and *Applied Mathematics*. The exam is based on both MTSC-561 for Analysis, MTSC-511 for Algebra, and (or) MTSC-651 and MTSC-643 for Applied Mathematics. Another topic, such as Ordinary Differential Equations, Partial Differential Equations, or Statistics, may be substituted for one (1) of the above by petition to the graduate committee based on two (2) graduate level courses and supported by a faculty member.

**MASTER OF SCIENCE IN PURE MATHEMATICS  
THESIS OPTION**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
MTSC-500	3	Foundations of Mathematics*
MTSC-511	3	Introduction to Abstract Algebra*
MTSC-561	3	Real Analysis I*
MTSC-562	3	Real Analysis II*
MTSC-571	3	Complex Analysis*
MTSC-541	3	Advanced Probability Theory <sup>o</sup>
MTSC-521	3	General Topology <sup>o</sup>
MTSC-699	6	Thesis or Directed Project 6
xx-xxx	3	Pure or Applied Mathematics Electives (or other Graduate level courses with advisor approval).
<b>Electives (Select 6 credit hours)</b>		
MTSC-5MTSC	3	Logic
MTSC-531	3	Number Theory
MTSC-621	3	Introduction to Functional Analysis
MTSC-504	3	Modern Geometry
MTSC-611	3	Topics in Pure Mathematics

**MASTER OF SCIENCE IN PURE MATHEMATICS  
NON-THESIS OPTION**

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
MTSC-500	3	Foundations of Mathematics*
MTSC-511	3	Introduction to Abstract Algebra*
MTSC-561	3	Real Analysis I*
MTSC-562	3	Real Analysis II*
MTSC-571	3	Complex Analysis*
MTSC-541	3	Advanced Probability Theory <sup>o</sup>
MTSC-521	3	General Topology <sup>o</sup>
MTSC-xxx	9	Pure Mathematics Electives
xx-xxx	6	Pure or Applied Mathematics Electives (or other Graduate level courses with advisor approval).
<b>Electives (Select 6 credit hours)</b>		
MTSC-5MTSC	3	Logic
MTSC-531	3	Number Theory
MTSC-621	3	Introduction to Functional Analysis
MTSC-504	3	Modern Geometry
MTSC-611	3	Topics in Pure Mathematics

## COURSE DESCRIPTIONS

### MATHEMATICAL SCIENCES (MTSC) (25)

#### **MTSC-500. FOUNDATIONS OF MATHEMATICS**

**3:3:0**

This course is specifically designed to bridge undergraduate and graduate study in mathematics. It is an introduction to abstract ideas, proofs, set theory, relations, and number systems and their connections.

Prerequisites: MTSC-252.

Credit, three hours.

#### **MTSC-503. MATHEMATICS TEACHING METHODS I**

**3:3:0**

This course is the first of a two (2) part sequence designed to provide weighty consideration of some of the major topics in middle and secondary school mathematics education. Emphasis will be on epistemological, pedagogical, social, psychological, effective teaching, classroom management, and cultural concerns as well as the teaching profession. This course is also a study of methods and materials used in teaching mathematics and will expose students to current educational theory and reform organizations. Through research, practice, and presentations, students will take an active role in the instruction and development of materials for this course.

Prerequisites: MTSC-MTSC2, MTSC-313, MTSC-341, MTSC-241 and MTSC-203.

Credit, three hours.

#### **MTSC-504. MODERN GEOMETRY**

**3:3:0**

The course covers Menelaus and Ceva's Theorem, Cross Ratio, Elementary Transformations, Euclidean Constructions, and Non-Euclidean Geometry. The course illustrates to the students the strength of deductive reasoning in proofs involving Euclidean axioms and transformation theory. The student will also be familiar with Non-Euclidean Geometry.

Prerequisites: MTSC-303 with minimum grade of "C".

Credit, three hours.

#### **MTSC-505. MATHEMATICAL LOGIC**

**3:3:0**

The course is designed to examine the logical foundations of mathematics. Formal systems are shown to model real life relationships, and these formal systems are studied and analyzed using mathematical methods and rigor. The results of the study show both the inherent limitation of reasoning and at the same time the richness of what can be expressed and proven.

Prerequisites: MTSC-251, MTSC-313.

Credit, three hours.

#### **MTSC-511. INTRODUCTION TO ABSTRACT ALGEBRA**

**3:3:0**

The course is concerned with the basic theory of some of the important algebraic systems such as groups, rings and fields with emphasis on homomorphism, isomorphism, integral domain, extension fields, and Galois groups.

Credit, three hours.

#### **MTSC-521. GENERAL TOPOLOGY**

**3:3:0**

The purpose of the course is to give the students the basic concepts of topology and lead them to algebraic topology. The course also presents as a related discipline to the proper understanding of various branches of analysis and geometry. The students should become familiar with topological spaces, point-set topology and homotopy theory.

Prerequisites: MTSC-451, MTSC-452.

Credit, three hours.

#### **MTSC-531. NUMBER THEORY**

**3:3:0**

The course, Number Theory, is an introduction to the study of basic properties of integers which allows one to demonstrate how various areas of mathematics play a role in the study of properties of natural numbers. The course is flexible and fundamental enough to be taken by Math and Math Ed Majors.

Credit, three hours.

#### **MTSC-541. ADVANCED PROBABILITY THEORY**

**3:3:0**

The course covers the mathematical structure of probability theory with applications of the theory from a wide variety of experimental situations.

Prerequisites: MTSC-253 with a minimum grade of "C".

Credit, three hours.

**MTSC-551. ORDINARY DIFFERENTIAL EQUATIONS****3:3:0**

The purpose of the course is to present techniques of solving ordinary differential equations. The students should become familiar with Boundary Value Problems, Systems of Ordinary Differential Equations, Phase Diagrams, and Stability.

Prerequisites: MTSC-351.

Credit, three hours.

**MTSC-561. REAL ANALYSIS I****3:3:0**

The purpose of the course is to cover the basic material that every graduate should know in the classical theory of functions of a real variable and in measure and integration theory. To provide the students with the background in those parts of modern mathematics which have their roots in the classical theory of functions of a real variable. These include the classical theory of functions of a real variable itself, measure and integration, point-set topology, and the theory of normed linear space.

Prerequisites: MTSC-402 with a minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-562. REAL ANALYSIS II****3:3:0**

This course is the extension of real analysis I. The purpose of the course is to further provide students the background of modern mathematics. The course is to cover the theories of (improper) Riemann integrals and a brief introduction of Lebesgue integrals, the theories of pointwise and uniform convergence of sequences of functions, and the theories of infinite series of functions.

Prerequisites: MTSC-561 with minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-571. COMPLEX ANALYSIS****3:3:0**

This is a first-semester course at the graduate level, in the field of Functions of one (1) Complex Variable. The rigorous approach adopted herein will set a firm foundation for leading the students to the next level of Complex Analysis. To prepare the student for further studies in the field of Complex Analysis. To provide the students with sufficient background for various applications of Complex Analysis physical and engineering disciplines.

Prerequisites: MTSC-471.

Credit, three hours.

**MTSC-621. FUNCTIONAL ANALYSIS****3:3:0**

The course gives students an introduction to Metric Spaces, Hilbert Spaces, and Banach Spaces with emphasis on Hilbert Spaces.

Prerequisites: MTSC-561.

Credit, three hours.

**MTSC-631. OPERATIONS RESEARCH****3:3:0**

The course is designed to expose students in computer science to linear, nonlinear, and integer programming, simplex method, duality theorem, transport and other application problems, and different optimization methods and techniques. The topics to be covered include: Optimization problems; the subject of Operations Research; Linear programming; Simplex method and duality theorem; Integer programming; Nonlinear programming; Optimization techniques; Applications; and MATLAB Optimization Toolbox.

Credit, three hours.

**MTSC-641. COMBINATORICS****3:3:0**

The student will be introduced to the theory involved in combinatorial reasoning. The two (2) combinatorial theories of enumeration and graph theory will be developed. Students will apply combinatorial reasoning to problems in the analysis of computer systems, in discrete operations research and in finite probability.

Credit, three hours.

**MTSC-643. STATISTICS****3:3:0**

The course provides students with the fundamental theory of statistics. The students will be familiar with descriptive and inferential statistical methods, theory, and applications.

Prerequisites: MTSC-541 with minimum grade of "C".

Credit, three hours.

**MTSC-651. PARTIAL DIFFERENTIAL EQUATIONS****3:3:0**

The course is designed to acquaint students to Classifications of Partial Differential Equations, Methods of Solution for the Wave Equation, Laplace's Equation, and the Heat Equation.

Prerequisites: A second course in Ordinary Differential Equations.

Credit, three hours.

**MTSC-661. NUMERICAL ANALYSIS****3:3:0**

The student should become familiar with advanced techniques for solving numerically large problems in Linear Algebra. In particular, students should become familiar with the effects of ill conditioning, and of ways in which special information about matrices, such as sparsity can be used. An important part of all of this is the consideration of error from various sources and ways of controlling its accumulation.

Prerequisites: MTSC-313.

Credit, three hours.

**MTSC-699. THESIS OR DIRECTED PROJECT 6****3:3:0**

A student may register three (3) or six (6) hours thesis with the approval of his/her thesis advisor.

Credit, three to six hours.

# **MASTER OF SCIENCE IN MATHEMATICS EDUCATION**

## **OBJECTIVES**

The Master's programs in Mathematical sciences are flexible enough to accommodate students with diversified background training. In consultation with the Graduate Committee, each student develops a course of study in mathematics areas most relevant to his or her professional and career objectives.

## **ADMISSION AND DEGREE REQUIREMENTS**

### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree.
  - a. A student may opt to begin the program provisionally, prior to applying to enter the program. In which case, the student could take no more than six (6) graduate credits prior to being fully accepted into the program. Taking graduate courses provisionally does not guarantee future admission into the graduate program.
2. Official scores on either the Graduate Record Examination (GRE) or Miller Analogies Test (MAT) are required. Testing must be within five (5) years of application.
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation from professionals in the area of interest.
6. Submit a resume/vita.
7. Submit an essay.
8. International applicants must meet all requirements.

Upon receipt of these materials, the Department of Mathematical Sciences Committee will evaluate the candidate and decide if he/she is to be admitted into the program. If the student is accepted, he/she will immediately be assigned an advisor. The advisor and candidate will collaborate to determine a schedule and plan of study. The plan will then be submitted to the Graduate Committee for approval. Once approved, the student will be allowed to begin his/her coursework.

### **DEGREE REQUIREMENTS**

Each student must take thirty-six (36) credit hours of coursework including mathematics education and mathematics content courses, technology and computer courses, education courses, and research. In addition to the required coursework, students will be required to select one (1) of three (3) options.

## MASTER OF SCIENCE IN MATHEMATICS EDUCATION

<b>REQUIRED MATHEMATICS EDUCATION COURSES</b>		
<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
MTSC-503	3	Mathematics Teaching Methods I
MTSC-603	3	Mathematics Teaching Methods II
MTSC-691	3	History & Philosophy of Math/Math Educ.
MTSC-500	3	Foundations of Mathematics
MTSC-504	3	Modern Geometry
MTSC-511	3	Introduction to Abstract Algebra
MTSC-513	3	Discrete Mathematics*
MTSC-531	3	Number Theory*
*Choose one of these courses		
MTSC-507	3	Computers and Technology in Mathematics
<b>REQUIRED EDUCATION COURSES – 6 Credits</b>		
EDUC-604	3	Theories and Methods of Instruction
EDUC-605	3	Curriculum Organization and Design
EDUC-610	3	Development of Instructional Materials
EDUC-614	3	Human Growth and Developments
EDUC-607/633	3	Classroom Management/Classroom and Behavior Management Techniques for Special Education Teachers
<b>OPTION I (6 credit hours)</b>		
MTSC-697	3	Research Methods in Mathematics Education
MTSC-699	6	Thesis or Directed Project 6
<b>OPTION II (Select one of the following courses)</b>		
MTSC-521	3	General Topology
MTSC-525	3	Logic
MTSC-531	3	Number Theory
MTSC-541	3	Advanced Probability Theory
MTSC-551	3	Ordinary Differential Equations
MTSC-561	3	Real Analysis I
MTSC-562	3	Real Analysis II
MTSC-571	3	Complex Analysis
MTSC-581	3	Operations Research
MTSC-611	3	Topics in Pure Mathematics
MTSC-621	3	Introduction to Functional Analysis
MTSC-641	3	Combinatorics
MTSC-643	3	Statistics
MTSC-651	3	Partial Differential Equations
MTSC-661	3	Numerical Analysis
MTSC-663	3	Topics in Applied Mathematics
MTSC-5xx/6xx	3	Select a graduate education course as agreed upon by student, advisor, and graduate committee.
<b>OPTION III – 9 credits (For students considering a Ph.D. in Mathematics Education)</b>		
MTSC-697	3	Research Methods in Mathematics Education
MTSC-699	6	Thesis or Directed Project 6
<b>TOTAL CREDIT HOURS: 36</b>		

Note: If Option III is selected, the student will be required to take only 3 credits, rather than 6 credits, from the education courses listed above.

## COURSE DESCRIPTIONS

### MATHEMATICAL SCIENCES (MTSC) (25)

#### **MTSC-500. FOUNDATIONS OF MATHEMATICS**

**3:3:0**

This course is specifically designed to bridge undergraduate and graduate study in mathematics. It is an introduction to abstract ideas, proofs, set theory, relations, and number systems and their connections.

Prerequisites: MTSC-252.

Credit, three hours.

#### **MTSC-503. MATHEMATICS TEACHING METHODS I**

**3:3:0**

This course is the first of a two (2) part sequence designed to provide weighty consideration of some of the major topics in middle and secondary school mathematics education. Emphasis will be on epistemological, pedagogical, social, psychological, effective teaching, classroom management, and cultural concerns as well as the teaching profession. This course is also a study of methods and materials used in teaching mathematics and will expose students to current educational theory and reform organizations. Through research, practice, and presentations, students will take an active role in the instruction and development of materials for this course.

Prerequisites: MTSC-252, MTSC-313, MTSC-341, MTSC-241 and MTSC-203.

Credit, three hours.

#### **MTSC-504. MODERN GEOMETRY**

**3:3:0**

The course covers Menelaus and Ceva's Theorem, Cross Ratio, Elementary Transformations, Euclidean Constructions, and Non-Euclidean Geometry. The course illustrates to the students the strength of deductive reasoning in proofs involving Euclidean axioms and transformation theory. The student will also be familiar with Non-Euclidean Geometry.

Prerequisites: MTSC-303 with minimum grade of "C".

Credit, three hours.

#### **MTSC-505. MATHEMATICAL LOGIC**

**3:3:0**

The course is designed to examine the logical foundations of mathematics. Formal systems are shown to model real life relationships, and these formal systems are studied and analyzed using mathematical methods and rigor. The results of the study show both the inherent limitation of reasoning and at the same time the richness of what can be expressed and proven.

Prerequisites: MTSC-251, MTSC-313.

Credit, three hours.

#### **MTSC-511. INTRODUCTION TO ABSTRACT ALGEBRA**

**3:3:0**

The course is concerned with the basic theory of some of the important algebraic systems such as groups, rings and fields with emphasis on homomorphism, isomorphism, integral domain, extension fields, and Galois groups.

Credit, three hours.

#### **MTSC-521. GENERAL TOPOLOGY**

**3:3:0**

The purpose of the course is to give the students the basic concepts of topology and lead them to algebraic topology. The course also presents as a related discipline to the proper understanding of various branches of analysis and geometry. The students should become familiar with topological spaces, point-set topology and homotopy theory.

Prerequisites: MTSC-451, MTSC-452.

Credit, three hours.

#### **MTSC-531. NUMBER THEORY**

**3:3:0**

The course, Number Theory, is an introduction to the study of basic properties of integers which allows one to demonstrate how various areas of mathematics play a role in the study of properties of natural numbers. The course is flexible and fundamental enough to be taken by Math and Math Ed Majors.

Credit, three hours.

#### **MTSC-541. ADVANCED PROBABILITY THEORY**

**3:3:0**

The course covers the mathematical structure of probability theory with applications of the theory from a wide variety of experimental situations.

Prerequisites: MTSC-253 with a minimum grade of "C".

Credit, three hours.

**MTSC-551. ORDINARY DIFFERENTIAL EQUATIONS****3:3:0**

The purpose of the course is to present techniques of solving ordinary differential equations. The students should become familiar with Boundary Value Problems, Systems of Ordinary Differential Equations, Phase Diagrams, and Stability.

Prerequisites: MTSC-351.

Credit, three hours.

**MTSC-561. REAL ANALYSIS I****3:3:0**

The purpose of the course is to cover the basic material that every graduate should know in the classical theory of functions of a real variable and in measure and integration theory. To provide the students with the background in those parts of modern mathematics which have their roots in the classical theory of functions of a real variable. These include the classical theory of functions of a real variable itself, measure and integration, point-set topology, and the theory of normed linear space.

Prerequisites: MTSC-402 with a minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-562. REAL ANALYSIS II****3:3:0**

This course is the extension of real analysis I. The purpose of the course is to further provide students the background of modern mathematics. The course is to cover the theories of (improper) Riemann integrals and a brief introduction of Lebesgue integrals, the theories of pointwise and uniform convergence of sequences of functions, and the theories of infinite series of functions.

Prerequisites: MTSC-561 with minimum grade of "C", or its equivalent.

Credit, three hours.

**MTSC-571. COMPLEX ANALYSIS****3:3:0**

This is a first-semester course at the graduate level, in the field of Functions of one (1) Complex Variable. The rigorous approach adopted herein will set a firm foundation for leading the students to the next level of Complex Analysis. To prepare the student for further studies in the field of Complex Analysis. To provide the students with sufficient background for various applications of Complex Analysis physical and engineering disciplines.

Prerequisites: MTSC-471.

Credit, three hours.

**MTSC-621. FUNCTIONAL ANALYSIS****3:3:0**

The course gives students an introduction to Metric Spaces, Hilbert Spaces, and Banach Spaces with emphasis on Hilbert Spaces.

Prerequisites: MTSC-561.

Credit, three hours.

**MTSC-631. OPERATIONS RESEARCH****3:3:0**

The course is designed to expose students in computer science to linear, nonlinear, and integer programming, simplex method, duality theorem, transport and other application problems, and different optimization methods and techniques. The topics to be covered include: Optimization problems; the subject of Operations Research; Linear programming; Simplex method and duality theorem; Integer programming; Nonlinear programming; Optimization techniques; Applications; and MATLAB Optimization Toolbox.

Credit, three hours.

**MTSC-641. COMBINATORICS****3:3:0**

The student will be introduced to the theory involved in combinatorial reasoning. The two (2) combinatorial theories of enumeration and graph theory will be developed. Students will apply combinatorial reasoning to problems in the analysis of computer systems, in discrete operations research and in finite probability.

Credit, three hours.

**MTSC-643. STATISTICS****3:3:0**

The course provides students with the fundamental theory of statistics. The students will be familiar with descriptive and inferential statistical methods, theory, and applications.

Prerequisites: MTSC-541 with minimum grade of "C".

Credit, three hours.

**MTSC-651. PARTIAL DIFFERENTIAL EQUATIONS****3:3:0**

The course is designed to acquaint students to Classifications of Partial Differential Equations, Methods of Solution for the Wave Equation, Laplace's Equation, and the Heat Equation.

Prerequisites: A second course in Ordinary Differential Equations.

Credit, three hours.

**MTSC-661. NUMERICAL ANALYSIS****3:3:0**

The student should become familiar with advanced techniques for solving numerically large problems in Linear Algebra. In particular, students should become familiar with the effects of ill conditioning, and of ways in which special information about matrices, such as sparsity can be used. An important part of all of this is the consideration of error from various sources and ways of controlling its accumulation.

Prerequisites: MTSC-313.

Credit, three hours.

**MTSC-699. THESIS OR DIRECTED PROJECT 6****3:3:0**

A student may register three (3) or six (6) hours thesis with the approval of his/her thesis advisor.

Credit, three to six hours.

## **MASTER OF SCIENCE IN APPLIED OPTICS**

### **OBJECTIVES**

The department of Physics and Pre-Engineering provides educational and research trainings leading to the Master of Science (M.S.) in Applied Optics. The primary goals of the graduate programs are to train creative and productive scientists and/or science teachers using state-of-the-art research and educational facilities and under the tutelage of a dedicated and culturally diverse faculty with unprecedented passion for teaching and for conducting research in many expanding fields.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Physics or a related field.
  - a. Graduate students are expected to have a sound background in intermediate level mechanics, electricity and magnetism, thermal physics, and mathematical methods of physics. Any student found deficient in any of these areas may be required to take appropriate courses to remove that deficiency. Recommendation will be made for the student to enter the M.S. program in Optics, after evaluation of the candidate's documents.
2. Official scores on the Graduate Record Examination (GRE).
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation completed by persons acquainted with their ability for graduate study.
6. Submit a cover letter.
7. Submit a Statement of Intent.
8. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

**M.S. Thesis and Non-Thesis Options** - The student has an option of earning the Master of Science degree in physics on either a thesis or non-thesis track. If the non-thesis track is selected, the student must complete thirty (30) credits of graduate coursework, of which twenty-four (24) must be above the 600-level. In the thesis option, the student must complete a minimum of twenty-four (24) credit of graduate coursework (all above the 600-level), at least six (6) credits of thesis research, and submit and defend a written thesis. For both the thesis and non-thesis options, only a maximum of six (6) credit hours of graduate credit may be granted for physics courses in the 500 level, or other graduate level courses in the sciences with the approval of the Physics Department Chair. A grade of "B" or better must be attained in each of the physics core courses taken, and a student must achieve a 3.0 overall GPA on a scale of 4.0 to receive a degree.

Students in the Master of Science in Applied Optics are required to complete twenty-one (21) credits of core coursework from the 600-level. For electives, the student may take other 600 level courses offered by the Department of Physics & Pre-Engineering, or similar level courses offered by other departments in the College of Mathematics, Natural Sciences & Technology with the consent of the department. A master's student may also take 800 level Optics courses with approval of the instructor and student's advisor.

## **FACILITIES**

A unique feature of the department is the harmonious cooperation of its members, faculty and staff towards one (1) goal: the best education for the students. The performance of the majors has been tested by their success in prestigious graduate schools nationwide. This is complemented with a large inventory of laboratory and research grade equipment. In addition, the department has a network of PC's with modern hardware and software including word processors. These are used for computer-assisted instruction, data collection and analysis, and graphics.

## MASTER OF SCIENCE IN APPLIED OPTICS

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
PHYS-600	4	Modern Optics
PHYS-671	3	Advanced Electromagnetic Theory I
PHYS-675	3	Quantum Mechanics I
PHYS-601	4	Nonlinear Optics
PHYS-803	3	Modern Laser Spectroscopic Methods
PHYS-6xx/8xx	3	Optics Technical Elective
PHYS-605	4	Principles of Lasers & Optical Devices
PHYS-695	6	Thesis Research
<b>TOTAL CREDIT HOURS: 30</b>		

## COURSE DESCRIPTIONS

### PHYSICS (PHYS) (26)

#### PHYS-501. ELECTRICITY AND MAGNETISM I

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields and magnetic materials. Credit, three hours.

#### PHYS-502. ELECTRICITY AND MAGNETISM II

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields, and magnetic materials. Credit, three hours.

#### PHYS-505. MATHEMATICAL METHODS OF PHYSICS I

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-506. MATHEMATICAL METHODS OF PHYSICS II

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-511. MECHANICS I

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-5EDUC. MECHANICS II

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-516. LASER OPTICS

3:3:0

A study of geometric and physical optics with particular application to optical instruments and an introduction to lasers and holography. Credit, three hours.

#### PHYS-523. MODERN PHYSICS

3:3:0

Important contributions to atomic and nuclear physics since 1900, including electrical discharges in gases, atomic spectra, Bohr's atom, Schroedinger's equation, natural radioactivity, and elementary relativity. Credit, three hours.

#### PHYS-525. THERMAL AND KINETIC THEORY

3:3:0

Study of first and second laws of thermodynamics, general thermodynamic formulas with application to matter, kinetic theory of gases and Maxwell-Boltzmann statistics. Credit, three hours.

#### PHYS-531. ENERGY SYSTEMS

3:3:0

Physical and chemical principles of energy conversion and their application to potential sources of power, fossil fuels, fission and fusion, fuel cells, photovoltaics, and photothermal systems. Credit, three hours.

#### PHYS-535. METHODS OF EXPERIMENTAL PHYSICS I

3:3:0

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-536. METHODS OF EXPERIMENTAL PHYSICS II** **3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-563. MATHEMATICAL METHODS OF PHYSICS III** **3:3:0**

An intermediate course in applied mathematics. Topics covered include the solution of differential equations, vector calculus, Fourier series and Laplace transforms.

Credit, three hours.

**PHYS-565. THERMAL PHYSICS** **3:3:0**

Statistical inference is used to deduce the fundamental principles of thermodynamics and kinetic theory. These principles are applied to ideal and real gases, solids, closed and open systems, and black body radiation.

Credit, three hours.

**PHYS-567. INTERMEDIATE ELECTRICITY AND MAGNETISM I** **3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-568. INTERMEDIATE ELECTRICITY AND MAGNETISM II** **3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-574. SELECTED TOPICS FOR MIDDLE SCHOOL TEACHERS** **3:3:0**

A course that allows middle school teachers to pursue physics concepts as they relate to middle school science.

Credit, three hours.

**PHYS-577. SELECTED TOPICS I** **3:3:0**

A course allowing practicing teachers to pursue independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-578. SELECTED TOPICS II** **3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-579. SELECTED TOPICS III** **3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-600. MODERN OPTICS** **4:4:0**

Electromagnetic description of light and its interaction with matter. Topics include interference, coherence, diffraction, holography, dispersion, polarization, scattering, and confinement.

Credit, four hours.

- PHYS-601. NONLINEAR OPTICS** **4:4:0**  
Principles of nonlinear interaction of light and matter based on the semi-classical approximation. Definition of nonlinear induced polarization and nonlinear susceptibility. Basic model of the coherent interaction of light with a two-level system is included. Main nonlinear optical effects are studied: harmonic generation, optical parametric amplification, saturation effects, Kerr effect, coherent effects, stimulated light scattering including stimulated Raman scattering, self-focusing and self-defocusing effects, multi-photon ionization, multi-photon ionization, and other nonlinear optical effects. The course also discusses practical applications of the nonlinear optical phenomena and related technology.  
Prerequisites: PHYS-600.  
Credit, four hours.
- PHYS-602. BIOPHOTONICS I: PRINCIPLES OF LUMINESCENCE** **4:4:0**  
A study of the physics behind light emitting molecules and their applications in biology.  
Credit, four hours.
- PHYS-603. BIOPHOTONICS II: INSTRUMENTATION** **3:3:0**  
An overview of microscopes and other optical instruments used in the biomedical field.  
Credit, three hours.
- PHYS-604. APPLIED OPTICS IN BIOMEDICINE** **3:3:0**  
A treatment of concepts of physics and optics applied to the medical field. Topics include DNA sequencing, in situ fluorescence, enzyme-based assays, glucose monitoring, HIV detection, and cancer diagnostics.  
Credit, three hours.
- PHYS-605. PRINCIPLES OF LASERS AND OPTICAL DEVICES** **4:4:0**  
Treatment of basic principles of lasers and their applications. Topics to be covered include, fundamentals of quantum electronics, oscillator model, rate equations, stimulated transitions, population inversion, laser amplification, design of laser resonators, principles of q-switching, mode locking, injection locking and modern applications of lasers.  
Credit, four hours.
- PHYS-606. LABORATORY TECHNIQUES IN OPTICS AND SPECTROSCOPY** **3:3:0**  
Modern spectroscopic methods. Human chromosomes, human leukocyte antigen (hla) haplotyping, enzyme-linked immune-assays (Elisa), diabetes testing and glucose monitoring, pregnancy testing, drug testing, HIV detection, and cancer diagnostics.  
Prerequisites: PHYS-602, PHYS-603.  
Credit, three hours.
- PHYS-607. INTRODUCTION TO LABVIEW** **3:3:0**  
A hands-on approach to the national instruments labview programming language.  
Credit, three hours.
- PHYS-608. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY I** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-609. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY II** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-633. SELECTED TOPICS IN SCIENCE EDUCATION** **3:3:0**  
Current developments in physics education.  
Credit, three hours.
- PHYS-652. CLASSICAL MECHANICS** **3:3:0**  
Lagrangian formulation, the Kepler problem, Rutherford scattering, rotating coordinate systems, rigid body motion, small oscillations, stability problems, and Hamiltonian formulation.  
Credit, three hours.

**PHYS-655. COMPUTATIONAL METHODS****3:3:0**

Designed to familiarize students with the use of computers in pursuing theoretical research. Numerical analysis techniques and computational methods employed in the study of physical models will be studied.

Credit, three hours.

**PHYS-661. SOLID STATE PHYSICS****3:3:0**

An introductory study of the structure and physical properties of crystalline solids. Included are topics in crystal structure, lattice vibrations, thermal properties of solids, x-ray diffraction, free electron theory and energy based theory.

Credit, three hours.

**PHYS-665. STATISTICAL MECHANICS****3:3:0**

Laws of thermodynamics, Boltzmann and quantum statistical distributions, with applications to properties of gases, specific heats of solids, paramagnetism, black body radiation and Bose-Einstein condensation.

Credit, three hours.

**PHYS-667. MATHEMATICAL METHODS OF PHYSICS IV****3:3:0**

An advanced treatment of mathematical topics including operators, matrix mathematics, complex variables and eigenvalue problems.

Credit, three hours.

**PHYS-671. ADVANCED ELECTROMAGNETIC THEORY I****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-672. ADVANCED ELECTROMAGNETIC THEORY II****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-675. QUANTUM MECHANICS I****3:3:0**

A study of the Schroedinger wave equation, operators and matrices, perturbation theory, collision and scattering problems classification of atomic states, and introduction to field quantization.

Credit, three hours.

**PHYS-676. QUANTUM MECHANICS II****3:3:0**

Quantum Mechanics of molecules and solid state. Relativistic quantum mechanics. Field quantization. Quantum theory of light. Basics of quantum electrodynamics.

Credit, three hours.

**PHYS-691. RESEARCH I****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-692. RESEARCH II****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-695. MASTER'S THESIS****6:6:6**

A research problem in a selected physics topic resulting in a written thesis.

Credit, one to six hours.

**PHYS-800. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

Basics of laser spectroscopic techniques and instrumentation. Topics include: ultra violet and visible (uv-vi) absorption spectroscopy; Fourier transform infrared spectroscopy; Raman, fluorescence, and saturation spectroscopy; polarization, correlation, and ultra-fast spectroscopy.

Prerequisites: PHYS-600, PHYS-601, PHYS-605.

Credit, three hours.

**PHYS-801. QUANTUM THEORY OF LIGHT****3:3:0**

Quantum mechanical description of light matter interaction. Presentation of basic quantum mechanics and quantum mechanical treatment of light and atoms.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**PHYS-802. THEORY OF LIGHT SCATTERING****3:3:0**

An advanced electricity and magnetism course focused on light interactions with small particles. Topics include Raleigh and Mie scattering, optical properties of nanoparticles and surface plasmon resonance.

Credit, three hours.

**PHYS-803. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

The laser revolution in spectroscopy. Absorption within the Doppler line, Doppler-free broadening spectroscopy, saturation spectroscopy, multiphoton spectroscopy, laser fluorescence, laser Raman, coherent stokes and anti-stokes Raman spectroscopy, photon echo and coherent spectroscopy. Ultrafast spectroscopy. Modern trends in spectroscopy.

Credit, three hours.

**PHYS-804. PRINCIPLES OF PHOTOCHEMISTRY AND PHOTOBIOLOGY****3:3:0**

Review of the main phenomena related to the interaction of light with matter that results in chemical or biological activity. The study of inorganic and organic photochemistry, environmental aspects of photochemistry, atmospheric photochemistry, photosynthesis, visual processing, bio-luminescence, interaction of light with bio-organisms, photo-medicine, and phototherapy.

Credit, three hours.

**PHYS-805. PHOTOACOUSTIC AND THERMAL SPECTROSCOPY****3:3:0**

Fundamentals of photo-acoustic and photo-thermal interaction of light with optical samples. Examination of basic instrumentations and their applications for characterization of complex samples including biological samples.

Credit, three hours.

**PHYS-806. MOLECULAR BIOPHYSICS****3:3:0**

An overview of the physics of bio-molecular interactions. Topics will include physical models for DNA and protein systems.

Credit, three hours.

**PHYS-807. OPTICAL SOLITONS****3:3:0**

Basic concepts of the mathematical aspects of optical solitons. Presentation of optical waveguides, the nonlinear Schrodinger's equation, laws of nonlinearity, soliton perturbation, soliton-soliton interactions, Stochastic perturbation of optical solitons, optical couplers, optical switching, magneto-optic waveguides and optical bullets.

Prerequisites: PHYS-601, MTSC-853, MTSC-845.

Credit, three hours.

**PHYS-808. FIBER OPTICS AND FIBER OPTICS COMMUNICATION****3:3:0**

Light propagation in fiber, its dispersion and nonlinear characteristics that play an important role in light communication. Types of fiber-optic devices and their applications to communication. Wavelength division multiplexing.

Credit, three hours.

**PHYS-809. PHOTONICS AND INFORMATION PROCESSING****3:3:0**

Wave propagation in linear optical systems and optical information processing. Topics include: fundamentals of optical propagation, diffraction, optical imaging, Fourier transform, wave-front modulation, signal processing, and basics of optical processing devices.

Credit, three hours.

**PHYS-810. CURRENT TOPICS IN OPTICS I****3:3:0**

Current topics in optics and spectroscopy.

Credit, three hours.

**PHYS-811. CURRENT TOPICS IN OPTICS II**

**3:3:0**

Current topics in optics and spectroscopy.  
Credit, three hours.

**PHYS-820. DISSERTATION RESEARCH**

**9:9:9**

The course is for Ph.D. students in the optics program working on their dissertation research project.  
Credit, two to eight hours.

**PHYS-890. DISSERTATION**

**9:9:0**

Written work that describes the main research results obtained during the completion of the graduate program. The format must comply with the requirements of the College for thesis and dissertations.  
Credit, three to nine hours.

**PHYS-999. DOCTORAL SUSTAINING**

**0:0:0**

Public oral defense of the thesis that includes presentation of the main research results obtained during the completion of the graduate program. It takes place after evaluation of the written dissertation by the members of the corresponding academic committee.  
Credit, none.

## **DOCTOR OF PHILOSOPHY IN OPTICS**

### **OBJECTIVES**

The department of Physics and Pre-Engineering provides educational and research trainings leading to the Doctor of Philosophy (Ph.D.) in Optics. The primary goals of the graduate programs are to train creative and productive scientists and/or science teachers using state-of-the-art research and educational facilities and under the tutelage of a dedicated and culturally diverse faculty with unprecedented passion for teaching and for conducting research in many expanding fields.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Physics or a related field.
  - a. Graduate students are expected to have a sound background in intermediate level mechanics, electricity and magnetism, thermal physics, and mathematical methods of physics. Any student found deficient in any of these areas may be required to take appropriate courses to remove that deficiency. Admission into the Ph.D. Optics program requires special approval by the Department of Physics and Pre-Engineering. Recommendation will be made for the student to enter the Ph.D. program after evaluation of the candidate's documents.
2. Earned a Master's degree.
3. Official scores on the Graduate Record Examination (GRE).
4. Complete an application for admission.
5. Submit official transcript(s).
6. Submit three (3) letters of recommendation completed by persons acquainted with their ability for graduate study.
7. Submit a cover letter.
8. Submit a Statement of Intent.
9. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

The degree of Doctor of Philosophy is generally granted to a candidate who has demonstrated a high level of scholarly competence, and the ability to independently and effectively conduct and report significant research. The Optics Ph.D. program requires a minimum of forty-two (42) credit hours beyond the B.S. level. A student is required to first complete the twenty-three (23) credits of core coursework described for the M.S. Applied Optics program, followed by a Preliminary Examination or qualifying examination. Upon passing the written qualifier, the student must take the following three (3) courses: Advanced Electricity and Magnetism II, Biophotonics I, and Modern Laser Spectroscopic Methods. For elective coursework, the student may take 600 and 800 level Optics courses offered by the Department of Physics & Pre-Engineering, or similar-level courses offered by other departments in the College of Mathematics, Natural Sciences & Technology with the consent of the department. A dissertation is required for the Ph.D. degree

## **FACILITIES**

A unique feature of the department is the harmonious cooperation of its members, faculty and staff towards one (1) goal: the best education for the students. The performance of the majors has been tested by their success in prestigious graduate schools nationwide. This is complemented with a large inventory of laboratory and research grade equipment. In addition, the department has a network of PC's with modern hardware and software including word processors. These are used for computer-assisted instruction, data collection and analysis, and graphics.

## DOCTOR OF PHILOSOPHY IN OPTICS

COURSE NO.	CREDITS	COURSE TITLE
PHYS-600	4	Modern Optics*
PHYS-671	3	Advanced Electromagnetic Theory I*
PHYS-675	3	Quantum Mechanics I*
PHYS-601	4	Nonlinear Optics*
PHYS-676	3	Quantum Mechanics II*
PHYS-803	4	Modern Laser Spectroscopic Methods
PHYS-667	3	Mathematical Methods IV*
PHYS-605	4	Principles of Lasers & Optical Devices*
PHYS-602	4	Biophotonics I
PHYS-695	6	Thesis Research
EXAM	Y/N	Qualifying Exam
PHYS-6xx/8xx	4	Optics Technical Elective
PHYS-6xx/8xx	3	Optics Technical Elective
PHYS-820	2-8	Dissertation Research
<b>TOTAL CREDIT HOURS: 60</b>		

**\*Students must take and pass these courses with at least a “C” before the completion of the Qualifier Examination.**

## COURSE DESCRIPTIONS

### PHYSICS (PHYS) (26)

#### PHYS-501. ELECTRICITY AND MAGNETISM I

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields and magnetic materials. Credit, three hours.

#### PHYS-502. ELECTRICITY AND MAGNETISM II

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields, and magnetic materials. Credit, three hours.

#### PHYS-505. MATHEMATICAL METHODS OF PHYSICS I

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-506. MATHEMATICAL METHODS OF PHYSICS II

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-511. MECHANICS I

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-5EDUC. MECHANICS II

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-516. LASER OPTICS

3:3:0

A study of geometric and physical optics with particular application to optical instruments and an introduction to lasers and holography. Credit, three hours.

#### PHYS-523. MODERN PHYSICS

3:3:0

Important contributions to atomic and nuclear physics since 1900, including electrical discharges in gases, atomic spectra, Bohr's atom, Schroedinger's equation, natural radioactivity, and elementary relativity. Credit, three hours.

#### PHYS-525. THERMAL AND KINETIC THEORY

3:3:0

Study of first and second laws of thermodynamics, general thermodynamic formulas with application to matter, kinetic theory of gases and Maxwell-Boltzmann statistics. Credit, three hours.

#### PHYS-531. ENERGY SYSTEMS

3:3:0

Physical and chemical principles of energy conversion and their application to potential sources of power, fossil fuels, fission and fusion, fuel cells, photovoltaics, and photothermal systems. Credit, three hours.

**PHYS-535. METHODS OF EXPERIMENTAL PHYSICS I****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-536. METHODS OF EXPERIMENTAL PHYSICS II****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-563. MATHEMATICAL METHODS OF PHYSICS III****3:3:0**

An intermediate course in applied mathematics. Topics covered include the solution of differential equations, vector calculus, Fourier series and Laplace transforms.

Credit, three hours.

**PHYS-565. THERMAL PHYSICS****3:3:0**

Statistical inference is used to deduce the fundamental principles of thermodynamics and kinetic theory. These principles are applied to ideal and real gases, solids, closed and open systems, and black body radiation.

Credit, three hours.

**PHYS-567. INTERMEDIATE ELECTRICITY AND MAGNETISM I****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-568. INTERMEDIATE ELECTRICITY AND MAGNETISM II****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-574. SELECTED TOPICS FOR MIDDLE SCHOOL TEACHERS****3:3:0**

A course that allows middle school teachers to pursue physics concepts as they relate to middle school science.

Credit, three hours.

**PHYS-577. SELECTED TOPICS I****3:3:0**

A course allowing practicing teachers to pursue independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-578. SELECTED TOPICS II****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-579. SELECTED TOPICS III****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-600. MODERN OPTICS****4:4:0**

Electromagnetic description of light and its interaction with matter. Topics include interference, coherence, diffraction, holography, dispersion, polarization, scattering, and confinement.

Credit, four hours.

- PHYS-601. NONLINEAR OPTICS** **4:4:0**  
Principles of nonlinear interaction of light and matter based on the semi-classical approximation. Definition of nonlinear induced polarization and nonlinear susceptibility. Basic model of the coherent interaction of light with a two-level system is included. Main nonlinear optical effects are studied: harmonic generation, optical parametric amplification, saturation effects, Kerr effect, coherent effects, stimulated light scattering including stimulated Raman scattering, self-focusing and self-defocusing effects, multi-photon ionization, multi-photon ionization, and other nonlinear optical effects. The course also discusses practical applications of the nonlinear optical phenomena and related technology.  
Prerequisites: PHYS-600.  
Credit, four hours.
- PHYS-602. BIOPHOTONICS I: PRINCIPLES OF LUMINESCENCE** **4:4:0**  
A study of the physics behind light emitting molecules and their applications in biology.  
Credit, four hours.
- PHYS-603. BIOPHOTONICS II: INSTRUMENTATION** **3:3:0**  
An overview of microscopes and other optical instruments used in the biomedical field.  
Credit, three hours.
- PHYS-604. APPLIED OPTICS IN BIOMEDICINE** **3:3:0**  
A treatment of concepts of physics and optics applied to the medical field. Topics include DNA sequencing, in situ fluorescence, enzyme-based assays, glucose monitoring, HIV detection, and cancer diagnostics.  
Credit, three hours.
- PHYS-605. PRINCIPLES OF LASERS AND OPTICAL DEVICES** **4:4:0**  
Treatment of basic principles of lasers and their applications. Topics to be covered include, fundamentals of quantum electronics, oscillator model, rate equations, stimulated transitions, population inversion, laser amplification, design of laser resonators, principles of q-switching, mode locking, injection locking and modern applications of lasers.  
Credit, four hours.
- PHYS-606. LABORATORY TECHNIQUES IN OPTICS AND SPECTROSCOPY** **3:3:0**  
Modern spectroscopic methods. Human chromosomes, human leukocyte antigen (hla) haplotyping, enzyme-linked immune-assays (Elisa), diabetes testing and glucose monitoring, pregnancy testing, drug testing, HIV detection, and cancer diagnostics.  
Prerequisites: PHYS-602, PHYS-603.  
Credit, three hours.
- PHYS-607. INTRODUCTION TO LABVIEW** **3:3:0**  
A hands-on approach to the national instruments labview programming language.  
Credit, three hours.
- PHYS-608. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY I** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-609. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY II** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-633. SELECTED TOPICS IN SCIENCE EDUCATION** **3:3:0**  
Current developments in physics education.  
Credit, three hours.
- PHYS-652. CLASSICAL MECHANICS** **3:3:0**  
Lagrangian formulation, the Kepler problem, Rutherford scattering, rotating coordinate systems, rigid body motion, small oscillations, stability problems, and Hamiltonian formulation.  
Credit, three hours.

**PHYS-655. COMPUTATIONAL METHODS****3:3:0**

Designed to familiarize students with the use of computers in pursuing theoretical research. Numerical analysis techniques and computational methods employed in the study of physical models will be studied.

Credit, three hours.

**PHYS-661. SOLID STATE PHYSICS****3:3:0**

An introductory study of the structure and physical properties of crystalline solids. Included are topics in crystal structure, lattice vibrations, thermal properties of solids, x-ray diffraction, free electron theory and energy based theory.

Credit, three hours.

**PHYS-665. STATISTICAL MECHANICS****3:3:0**

Laws of thermodynamics, Boltzmann and quantum statistical distributions, with applications to properties of gases, specific heats of solids, paramagnetism, black body radiation and Bose-Einstein condensation.

Credit, three hours.

**PHYS-667. MATHEMATICAL METHODS OF PHYSICS IV****3:3:0**

An advanced treatment of mathematical topics including operators, matrix mathematics, complex variables and eigenvalue problems.

Credit, three hours.

**PHYS-671. ADVANCED ELECTROMAGNETIC THEORY I****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-672. ADVANCED ELECTROMAGNETIC THEORY II****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-675. QUANTUM MECHANICS I****3:3:0**

A study of the Schroedinger wave equation, operators and matrices, perturbation theory, collision and scattering problems classification of atomic states, and introduction to field quantization.

Credit, three hours.

**PHYS-676. QUANTUM MECHANICS II****3:3:0**

Quantum Mechanics of molecules and solid state. Relativistic quantum mechanics. Field quantization. Quantum theory of light. Basics of quantum electrodynamics.

Credit, three hours.

**PHYS-691. RESEARCH I****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-692. RESEARCH II****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-695. MASTER'S THESIS****6:6:6**

A research problem in a selected physics topic resulting in a written thesis.

Credit, one to six hours.

**PHYS-800. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

Basics of laser spectroscopic techniques and instrumentation. Topics include: ultra violet and visible (uv-vi) absorption spectroscopy; Fourier transform infrared spectroscopy; Raman, fluorescence, and saturation spectroscopy; polarization, correlation, and ultra-fast spectroscopy.

Prerequisites: PHYS-600, PHYS-601, PHYS-605.

Credit, three hours.

**PHYS-801. QUANTUM THEORY OF LIGHT****3:3:0**

Quantum mechanical description of light matter interaction. Presentation of basic quantum mechanics and quantum mechanical treatment of light and atoms.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**PHYS-802. THEORY OF LIGHT SCATTERING****3:3:0**

An advanced electricity and magnetism course focused on light interactions with small particles. Topics include Raleigh and Mie scattering, optical properties of nanoparticles and surface plasmon resonance.

Credit, three hours.

**PHYS-803. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

The laser revolution in spectroscopy. Absorption within the Doppler line, Doppler-free broadening spectroscopy, saturation spectroscopy, multiphoton spectroscopy, laser fluorescence, laser Raman, coherent stokes and antistokes Raman spectroscopy, photon echo and coherent spectroscopy. Ultrafast spectroscopy. Modern trends in spectroscopy.

Credit, three hour.

**PHYS-804. PRINCIPLES OF PHOTOCHEMISTRY AND PHOTOBIOLOGY****3:3:0**

Review of the main phenomena related to the interaction of light with matter that results in chemical or biological activity. The study of inorganic and organic photochemistry, environmental aspects of photochemistry, atmospheric photochemistry, photosynthesis, visual processing, bio-luminescence, interaction of light with bio-organisms, photo-medicine, and phototherapy.

Credit, three hours.

**PHYS-8PHYS. PHOTOACOUSTIC AND THERMAL SPECTROSCOPY****3:3:0**

Fundamentals of photo-acoustic and photo-thermal interaction of light with optical samples. Examination of basic instrumentations and their applications for characterization of complex samples including biological samples.

Credit, three hours.

**PHYS-806. MOLECULAR BIOPHYSICS****3:3:0**

An overview of the physics of bio-molecular interactions. Topics will include physical models for DNA and protein systems.

Credit, three hours.

**PHYS-807. OPTICAL SOLITONS****3:3:0**

Basic concepts of the mathematical aspects of optical solitons. Presentation of optical waveguides, the nonlinear Schrodinger's equation, laws of nonlinearity, soliton perturbation, soliton-soliton interactions, Stochastic perturbation of optical solitons, optical couplers, optical switching, magneto-optic waveguides and optical bullets.

Prerequisites: PHYS-601, MTSC-853, MTSC-845.

Credit, three hours.

**PHYS-808. FIBER OPTICS AND FIBER OPTICS COMMUNICATION****3:3:0**

Light propagation in fiber, its dispersion and nonlinear characteristics that play an important role in light communication. Types of fiber-optic devices and their applications to communication. Wavelength division multiplexing.

Credit, three hours.

**PHYS-809. PHOTONICS AND INFORMATION PROCESSING****3:3:0**

Wave propagation in linear optical systems and optical information processing. Topics include: fundamentals of optical propagation, diffraction, optical imaging, Fourier transform, wave-front modulation, signal processing, and basics of optical processing devices.

Credit, three hours.

**PHYS-810. CURRENT TOPICS IN OPTICS I****3:3:0**

Current topics in optics and spectroscopy.

Credit, three hours.

**PHYS-811. CURRENT TOPICS IN OPTICS II**

**3:3:0**

Current topics in optics and spectroscopy.  
Credit, three hours.

**PHYS-820. DISSERTATION RESEARCH**

**9:9:9**

The course is for Ph.D. students in the optics program working on their dissertation research project.  
Credit, two to eight hours.

**PHYS-890. DISSERTATION**

**9:9:0**

Written work that describes the main research results obtained during the completion of the graduate program. The format must comply with the requirements of the College for thesis and dissertations.  
Credit, three to nine hours.

**PHYS-999. DOCTORAL SUSTAINING**

**0:0:0**

Public oral defense of the thesis that includes presentation of the main research results obtained during the completion of the graduate program. It takes place after evaluation of the written dissertation by the members of the corresponding academic committee.  
Credit, none.

# MASTER OF SCIENCE IN PHYSICS

## OBJECTIVES

The department of Physics and Pre-Engineering provides educational and research trainings leading to the Master of Sciences (M.S.) in Physics. The primary goals of the graduate programs are to train creative and productive scientists and/or science teachers using state-of-the-art research and educational facilities and under the tutelage of a dedicated and culturally diverse faculty with unprecedented passion for teaching and for conducting research in many expanding fields.

## ADMISSION AND DEGREE REQUIREMENTS

### ADMISSION REQUIREMENTS

All applicants are required to:

1. Earned Baccalaureate degree in Physics or a related field.
  - a. Graduate students are expected to have a sound background in intermediate level mechanics, electricity and magnetism, thermal physics, and mathematical methods of physics. Any student found deficient in any of these areas may be required to take appropriate courses to remove that deficiency. Recommendation will be made for the student to enter the M.S. program after evaluation of the candidate's documents.
2. Official scores on the Graduate Record Examination (GRE).
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation completed by persons acquainted with their ability for graduate study.
6. Submit a cover letter.
7. Submit a Statement of Intent.
8. International applicants must meet all requirements.

### DEGREE REQUIREMENTS

**M.S. Thesis and Non-Thesis Options** - The student has an option of earning the Master of Science degree in physics on either a thesis or non-thesis track. If the non-thesis track is selected, the student must complete thirty (30) credits of graduate coursework, of which twenty-four (24) must be above the 600-level. In the thesis option, the student must complete a minimum of twenty-four (24) credit of graduate coursework (all above the 600-level), at least six (6) credits of thesis research, and submit and defend a written thesis. A sequence of courses required by all candidates includes the following: PHYS-652, PHYS-665, PHYS- 667, PHYS-671, PHYS-672, and PHYS-675. For both the thesis and non-thesis options, only a maximum of six (6) credit hours of graduate credit may be granted for physics courses in the 500 level, or other graduate level courses in the sciences with the approval of the Physics Department Chair. A grade of "B" or better must be attained in each of the physics core courses taken, and a student must achieve a 3.0 overall GPA on a scale of 4.0 to receive a degree.

### FACILITIES

A unique feature of the department is the harmonious cooperation of its members, faculty and staff towards one (1) goal: the best education for the students. The performance of the majors has been tested by their success in prestigious graduate schools nationwide. This is complemented with a large inventory of laboratory and research grade equipment. In addition, the department has a network of PC's with modern hardware and software including word processors. These are used for computer-assisted instruction, data collection and analysis, and graphics.

## MASTER OF SCIENCE IN PHYSICS

### NON-THESIS OPTION

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
PHYS-652	3	Classical Mechanics
PHYS-665	3	Statistical Mechanics
PHYS-667	3	Mathematical Methods IV
PHYS-671	3	Advanced Electromagnetic Theory I
PHYS-672	3	Advanced Electromagnetic Theory II
PHYS-675	3	Quantum Mechanics I
PHYS-6xx	6	Select two additional 600 level courses.
PHYS-5xx	6	Select a maximum of 6 credit hours with the approval of
<b>TOTAL CREDIT HOURS: 30</b>		

### THESIS OPTION

<b>COURSE NO.</b>	<b>CREDITS</b>	<b>COURSE TITLE</b>
PHYS-652	3	Classical Mechanics
PHYS-665	3	Statistical Mechanics
PHYS-667	3	Mathematical Methods IV
PHYS-671	3	Advanced Electromagnetic Theory I
PHYS-672	3	Advanced Electromagnetic Theory II
PHYS-675	3	Quantum Mechanics I
PHYS-695	6	Thesis Research
<b>TOTAL CREDIT HOURS: 24</b>		

## COURSE DESCRIPTIONS

### PHYSICS (PHYS) (26)

#### PHYS-501. ELECTRICITY AND MAGNETISM I

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields and magnetic materials. Credit, three hours.

#### PHYS-502. ELECTRICITY AND MAGNETISM II

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields, and magnetic materials. Credit, three hours.

#### PHYS-505. MATHEMATICAL METHODS OF PHYSICS I

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-506. MATHEMATICAL METHODS OF PHYSICS II

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-511. MECHANICS I

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-5EDUC. MECHANICS II

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-516. LASER OPTICS

3:3:0

A study of geometric and physical optics with particular application to optical instruments and an introduction to lasers and holography. Credit, three hours.

#### PHYS-523. MODERN PHYSICS

3:3:0

Important contributions to atomic and nuclear physics since 1900, including electrical discharges in gases, atomic spectra, Bohr's atom, Schroedinger's equation, natural radioactivity, and elementary relativity. Credit, three hours.

#### PHYS-525. THERMAL AND KINETIC THEORY

3:3:0

Study of first and second laws of thermodynamics, general thermodynamic formulas with application to matter, kinetic theory of gases and Maxwell-Boltzmann statistics. Credit, three hours.

#### PHYS-531. ENERGY SYSTEMS

3:3:0

Physical and chemical principles of energy conversion and their application to potential sources of power, fossil fuels, fission and fusion, fuel cells, photovoltaics, and photothermal systems. Credit, three hours.

**PHYS-535. METHODS OF EXPERIMENTAL PHYSICS I****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-536. METHODS OF EXPERIMENTAL PHYSICS II****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-563. MATHEMATICAL METHODS OF PHYSICS III****3:3:0**

An intermediate course in applied mathematics. Topics covered include the solution of differential equations, vector calculus, Fourier series and Laplace transforms.

Credit, three hours.

**PHYS-565. THERMAL PHYSICS****3:3:0**

Statistical inference is used to deduce the fundamental principles of thermodynamics and kinetic theory. These principles are applied to ideal and real gases, solids, closed and open systems, and black body radiation.

Credit, three hours.

**PHYS-567. INTERMEDIATE ELECTRICITY AND MAGNETISM I****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-568. INTERMEDIATE ELECTRICITY AND MAGNETISM II****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-574. SELECTED TOPICS FOR MIDDLE SCHOOL TEACHERS****3:3:0**

A course that allows middle school teachers to pursue physics concepts as they relate to middle school science.

Credit, three hours.

**PHYS-577. SELECTED TOPICS I****3:3:0**

A course allowing practicing teachers to pursue independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-578. SELECTED TOPICS II****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-579. SELECTED TOPICS III****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-600. MODERN OPTICS****4:4:0**

Electromagnetic description of light and its interaction with matter. Topics include interference, coherence, diffraction, holography, dispersion, polarization, scattering, and confinement.

Credit, four hours.

- PHYS-601. NONLINEAR OPTICS** **4:4:0**  
Principles of nonlinear interaction of light and matter based on the semi-classical approximation. Definition of nonlinear induced polarization and nonlinear susceptibility. Basic model of the coherent interaction of light with a two-level system is included. Main nonlinear optical effects are studied: harmonic generation, optical parametric amplification, saturation effects, Kerr effect, coherent effects, stimulated light scattering including stimulated Raman scattering, self-focusing and self-defocusing effects, multi-photon ionization, multi-photon ionization, and other nonlinear optical effects. The course also discusses practical applications of the nonlinear optical phenomena and related technology.  
Prerequisites: PHYS-600.  
Credit, four hours.
- PHYS-602. BIOPHOTONICS I: PRINCIPLES OF LUMINESCENCE** **4:4:0**  
A study of the physics behind light emitting molecules and their applications in biology.  
Credit, four hours.
- PHYS-603. BIOPHOTONICS II: INSTRUMENTATION** **3:3:0**  
An overview of microscopes and other optical instruments used in the biomedical field.  
Credit, three hours.
- PHYS-604. APPLIED OPTICS IN BIOMEDICINE** **3:3:0**  
A treatment of concepts of physics and optics applied to the medical field. Topics include DNA sequencing, in situ fluorescence, enzyme-based assays, glucose monitoring, HIV detection, and cancer diagnostics.  
Credit, three hours.
- PHYS-605. PRINCIPLES OF LASERS AND OPTICAL DEVICES** **4:4:0**  
Treatment of basic principles of lasers and their applications. Topics to be covered include, fundamentals of quantum electronics, oscillator model, rate equations, stimulated transitions, population inversion, laser amplification, design of laser resonators, principles of q-switching, mode locking, injection locking and modern applications of lasers.  
Credit, four hours.
- PHYS-606. LABORATORY TECHNIQUES IN OPTICS AND SPECTROSCOPY** **3:3:0**  
Modern spectroscopic methods. Human chromosomes, human leukocyte antigen (hla) haplotyping, enzyme-linked immune-assays (Elisa), diabetes testing and glucose monitoring, pregnancy testing, drug testing, HIV detection, and cancer diagnostics.  
Prerequisites: PHYS-602, PHYS-603.  
Credit, three hours.
- PHYS-607. INTRODUCTION TO LABVIEW** **3:3:0**  
A hands-on approach to the national instruments labview programming language.  
Credit, three hours.
- PHYS-608. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY I** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-609. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY II** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-633. SELECTED TOPICS IN SCIENCE EDUCATION** **3:3:0**  
Current developments in physics education.  
Credit, three hours.
- PHYS-652. CLASSICAL MECHANICS** **3:3:0**  
Lagrangian formulation, the Kepler problem, Rutherford scattering, rotating coordinate systems, rigid body motion, small oscillations, stability problems, and Hamiltonian formulation.  
Credit, three hours.

**PHYS-655. COMPUTATIONAL METHODS****3:3:0**

Designed to familiarize students with the use of computers in pursuing theoretical research. Numerical analysis techniques and computational methods employed in the study of physical models will be studied.

Credit, three hours.

**PHYS-661. SOLID STATE PHYSICS****3:3:0**

An introductory study of the structure and physical properties of crystalline solids. Included are topics in crystal structure, lattice vibrations, thermal properties of solids, x-ray diffraction, free electron theory and energy based theory.

Credit, three hours.

**PHYS-665. STATISTICAL MECHANICS****3:3:0**

Laws of thermodynamics, Boltzmann and quantum statistical distributions, with applications to properties of gases, specific heats of solids, paramagnetism, black body radiation and Bose-Einstein condensation.

Credit, three hours.

**PHYS-667. MATHEMATICAL METHODS OF PHYSICS IV****3:3:0**

An advanced treatment of mathematical topics including operators, matrix mathematics, complex variables and eigenvalue problems.

Credit, three hours.

**PHYS-671. ADVANCED ELECTROMAGNETIC THEORY I****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-672. ADVANCED ELECTROMAGNETIC THEORY II****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-675. QUANTUM MECHANICS I****3:3:0**

A study of the Schroedinger wave equation, operators and matrices, perturbation theory, collision and scattering problems classification of atomic states, and introduction to field quantization.

Credit, three hours.

**PHYS-676. QUANTUM MECHANICS II****3:3:0**

Quantum Mechanics of molecules and solid state. Relativistic quantum mechanics. Field quantization. Quantum theory of light. Basics of quantum electrodynamics.

Credit, three hours.

**PHYS-691. RESEARCH I****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-692. RESEARCH II****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-695. MASTER'S THESIS****6:6:6**

A research problem in a selected physics topic resulting in a written thesis.

Credit, one to six hours.

**PHYS-800. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

Basics of laser spectroscopic techniques and instrumentation. Topics include: ultra violet and visible (uv-vi) absorption spectroscopy; Fourier transform infrared spectroscopy; Raman, fluorescence, and saturation spectroscopy; polarization, correlation, and ultra-fast spectroscopy.

Prerequisites: PHYS-600, PHYS-601, PHYS-605.

Credit, three hours.

**PHYS-801. QUANTUM THEORY OF LIGHT****3:3:0**

Quantum mechanical description of light matter interaction. Presentation of basic quantum mechanics and quantum mechanical treatment of light and atoms.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**PHYS-802. THEORY OF LIGHT SCATTERING****3:3:0**

An advanced electricity and magnetism course focused on light interactions with small particles. Topics include Raleigh and Mie scattering, optical properties of nanoparticles and surface plasmon resonance.

Credit, three hours.

**PHYS-803. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

The laser revolution in spectroscopy. Absorption within the Doppler line, Doppler-free broadening spectroscopy, saturation spectroscopy, multiphoton spectroscopy, laser fluorescence, laser Raman, coherent stokes and antistokes Raman spectroscopy, photon echo and coherent spectroscopy. Ultrafast spectroscopy. Modern trends in spectroscopy.

Credit, three hour.

**PHYS-804. PRINCIPLES OF PHOTOCHEMISTRY AND PHOTOBIOLOGY****3:3:0**

Review of the main phenomena related to the interaction of light with matter that results in chemical or biological activity. The study of inorganic and organic photochemistry, environmental aspects of photochemistry, atmospheric photochemistry, photosynthesis, visual processing, bio-luminescence, interaction of light with bio-organisms, photo-medicine, and phototherapy.

Credit, three hours.

**PHYS-805. PHOTOACOUSTIC AND THERMAL SPECTROSCOPY****3:3:0**

Fundamentals of photo-acoustic and photo-thermal interaction of light with optical samples. Examination of basic instrumentations and their applications for characterization of complex samples including biological samples.

Credit, three hours.

**PHYS-806. MOLECULAR BIOPHYSICS****3:3:0**

An overview of the physics of bio-molecular interactions. Topics will include physical models for DNA and protein systems.

Credit, three hours.

**PHYS-807. OPTICAL SOLITONS****3:3:0**

Basic concepts of the mathematical aspects of optical solitons. Presentation of optical waveguides, the nonlinear Schrodinger's equation, laws of nonlinearity, soliton perturbation, soliton-soliton interactions, Stochastic perturbation of optical solitons, optical couplers, optical switching, magneto-optic waveguides and optical bullets.

Prerequisites: PHYS-601, MTSC-853, MTSC-845.

Credit, three hours.

**PHYS-808. FIBER OPTICS AND FIBER OPTICS COMMUNICATION****3:3:0**

Light propagation in fiber, its dispersion and nonlinear characteristics that play an important role in light communication. Types of fiber-optic devices and their applications to communication. Wavelength division multiplexing.

Credit, three hours.

**PHYS-809. PHOTONICS AND INFORMATION PROCESSING****3:3:0**

Wave propagation in linear optical systems and optical information processing. Topics include: fundamentals of optical propagation, diffraction, optical imaging, Fourier transform, wave-front modulation, signal processing, and basics of optical processing devices.

Credit, three hours.

**PHYS-810. CURRENT TOPICS IN OPTICS I****3:3:0**

Current topics in optics and spectroscopy.

Credit, three hours.

**PHYS-811. CURRENT TOPICS IN OPTICS II**

**3:3:0**

Current topics in optics and spectroscopy.  
Credit, three hours.

**PHYS-820. DISSERTATION RESEARCH**

**9:9:9**

The course is for Ph.D. students in the optics program working on their dissertation research project.  
Credit, two to eight hours.

**PHYS-890. DISSERTATION**

**9:9:0**

Written work that describes the main research results obtained during the completion of the graduate program. The format must comply with the requirements of the College for thesis and dissertations.  
Credit, three to nine hours.

**PHYS-999. DOCTORAL SUSTAINING**

**0:0:0**

Public oral defense of the thesis that includes presentation of the main research results obtained during the completion of the graduate program. It takes place after evaluation of the written dissertation by the members of the corresponding academic committee.  
Credit, none.

## **MASTER OF SCIENCE IN PHYSICS TEACHING**

### **OBJECTIVES**

The department of Physics and Pre-Engineering provides educational and research trainings leading to the Physics Teaching. The primary goals of the graduate programs are to train creative and productive scientists and/or science teachers using state-of-the-art research and educational facilities and under the tutelage of a dedicated and culturally diverse faculty with unprecedented passion for teaching and for conducting research in many expanding fields.

### **ADMISSION AND DEGREE REQUIREMENTS**

#### **ADMISSION REQUIREMENTS**

All applicants are required to:

1. Earned Baccalaureate degree in Physics, Physics Education, or a related field, or through experience obtained by teaching physics or related courses at the secondary level.
2. Official scores on the Graduate Record Examination (GRE).
3. Complete an application for admission.
4. Submit official transcript(s).
5. Submit three (3) letters of recommendation completed by persons acquainted with their ability for graduate study.
6. Submit a cover letter.
7. Submit a Statement of Intent.
8. International applicants must meet all requirements.

#### **DEGREE REQUIREMENTS**

Admission to the Master of Science in Physics Teaching Program requires a baccalaureate degree from an accredited institution and a working knowledge of topics classically addressed by the discipline of physics. The level of proficiency is typically achieved through successful completion of a baccalaureate program in physics, physics education, or a related field, or through experience obtained by teaching physics or related courses at the secondary level.

The Master of Science in Physics Teaching requires successful completion of thirty-six (36) credit hours of courses as listed below, with a minimum average grade of "B". No more than nine (9) credit hours may be transferred from other institutions.

- A maximum of six (6) credit hours of graduate level education courses.
- A minimum of twenty-four (24) credit hours of graduate level physics courses.
- A maximum of six (6) graduate level credits in other sciences with departmental approval.

Typically, most, if not all, of the physics courses will be taken from the PHYS--501 through PHYS--579 offerings.

## **FACILITIES**

A unique feature of the department is the harmonious cooperation of its members, faculty and staff towards one (1) goal: the best education for the students. The performance of the majors has been tested by their success in prestigious graduate schools nationwide. This is complemented with a large inventory of laboratory and research grade equipment. In addition, the department has a network of PC's with modern hardware and software including word processors. These are used for computer-assisted instruction, data collection analysis, and graphics.

## MASTER OF SCIENCE PROGRAM IN PHYSICS TEACHING

COURSE NO.	CREDITS	COURSE TITLE
EDUC-6xx	6	A maximum of 6 hours from graduate level education courses.
	6	A maximum of 6 hours from other sciences with department approval.
PHYS-501	3	Electricity and Magnetism I*
PHYS-502	3	Electricity and Magnetism II*
PHYS-505	3	Mathematical Methods of Physics I*
PHYS-506	3	Mathematical Methods of Physics II*
PHYS-511	3	Mechanics I*
PHYS-5EDUC	3	Mechanics II*
PHYS-516	3	Laser Optics*
PHYS-523	3	Modern Physics*
PHYS-525	3	Therm. and Kinetic Theory*
PHYS-531	3	Energy Systems*
PHYS-535	3	Methods of Experimental Physics I*
PHYS-536	3	Methods of Experimental Physics II*
PHYS-563	3	Mathematical Methods of Physics III*
PHYS-565	3	Thermal Physics*
PHYS-567	3	Intermediate Elec. & Magnetism I*
PHYS-568	3	Intermediate Elec. & Magnetism II*
PHYS-574	3	Selected Topics for Middle School Teachers*
PHYS-577	3	Selected Topics I*
PHYS-578	3	Selected Topics II*
PHYS-579	3	Selected Topics III*
*Select a minimum of 24 credit hours from these courses.		
<b>TOTAL CREDIT HOURS: 36</b>		

## COURSE DESCRIPTIONS

### PHYSICS (PHYS) (26)

#### PHYS-501. ELECTRICITY AND MAGNETISM I

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields and magnetic materials. Credit, three hours.

#### PHYS-502. ELECTRICITY AND MAGNETISM II

3:3:0

An introductory course in the theory and applications of electricity and magnetism. Basic integral calculus is used throughout. Topics covered include electric fields and potentials, dc circuits, magnetic fields, and magnetic materials. Credit, three hours.

#### PHYS-505. MATHEMATICAL METHODS OF PHYSICS I

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-506. MATHEMATICAL METHODS OF PHYSICS II

3:3:0

An introductory course in the applications of mathematics to the description of physical systems. Specific physical situations from the areas of mechanics, electricity and magnetism, optics, and thermodynamics are analyzed using the techniques of differential and integral calculus and vector analysis. Credit, three hours.

#### PHYS-511. MECHANICS I

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-5EDUC. MECHANICS II

3:3:0

Problems in statics, kinematics and dynamics; the study of equilibrium of forces, rectilinear and curvilinear motion, central forces, constrained motion, energy and momentum methods and rotational motion. Credit, three hours.

#### PHYS-516. LASER OPTICS

3:3:0

A study of geometric and physical optics with particular application to optical instruments and an introduction to lasers and holography. Credit, three hours.

#### PHYS-523. MODERN PHYSICS

3:3:0

Important contributions to atomic and nuclear physics since 1900, including electrical discharges in gases, atomic spectra, Bohr's atom, Schroedinger's equation, natural radioactivity, and elementary relativity. Credit, three hours.

#### PHYS-525. THERMAL AND KINETIC THEORY

3:3:0

Study of first and second laws of thermodynamics, general thermodynamic formulas with application to matter, kinetic theory of gases and Maxwell-Boltzmann statistics. Credit, three hours.

#### PHYS-531. ENERGY SYSTEMS

3:3:0

Physical and chemical principles of energy conversion and their application to potential sources of power, fossil fuels, fission and fusion, fuel cells, photovoltaics, and photothermal systems. Credit, three hours.

**PHYS-535. METHODS OF EXPERIMENTAL PHYSICS I****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-536. METHODS OF EXPERIMENTAL PHYSICS II****3:3:0**

Designed to acquaint students with the principles of basic experiments in all major branches of physics, stressing design of apparatus, procedures and analysis of projects involving mechanical, optical, electronic and thermal techniques, with microcomputers employed to collect and analyze experimental data.

Credit, three hours.

**PHYS-563. MATHEMATICAL METHODS OF PHYSICS III****3:3:0**

An intermediate course in applied mathematics. Topics covered include the solution of differential equations, vector calculus, Fourier series and Laplace transforms.

Credit, three hours.

**PHYS-565. THERMAL PHYSICS****3:3:0**

Statistical inference is used to deduce the fundamental principles of thermodynamics and kinetic theory. These principles are applied to ideal and real gases, solids, closed and open systems, and black body radiation.

Credit, three hours.

**PHYS-567. INTERMEDIATE ELECTRICITY AND MAGNETISM I****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-568. INTERMEDIATE ELECTRICITY AND MAGNETISM II****3:3:0**

A treatment of electrostatics, Dielectric Theory, magnetic phenomena, magnetic media, ac circuits and Maxwell's equations. Vector calculus is used throughout.

Credit, three hours.

**PHYS-574. SELECTED TOPICS FOR MIDDLE SCHOOL TEACHERS****3:3:0**

A course that allows middle school teachers to pursue physics concepts as they relate to middle school science.

Credit, three hours.

**PHYS-577. SELECTED TOPICS I****3:3:0**

A course allowing practicing teachers to pursue independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-578. SELECTED TOPICS II****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-579. SELECTED TOPICS III****3:3:0**

A course allowing practicing teachers to pursue additional independent study of a topic in physics and physical science at the graduate level.

Credit, three hours.

**PHYS-600. MODERN OPTICS****4:4:0**

Electromagnetic description of light and its interaction with matter. Topics include interference, coherence, diffraction, holography, dispersion, polarization, scattering, and confinement.

Credit, four hours.

- PHYS-601. NONLINEAR OPTICS** **4:4:0**  
Principles of nonlinear interaction of light and matter based on the semi-classical approximation. Definition of nonlinear induced polarization and nonlinear susceptibility. Basic model of the coherent interaction of light with a two-level system is included. Main nonlinear optical effects are studied: harmonic generation, optical parametric amplification, saturation effects, Kerr effect, coherent effects, stimulated light scattering including stimulated Raman scattering, self-focusing and self-defocusing effects, multi-photon ionization, multi-photon ionization, and other nonlinear optical effects. The course also discusses practical applications of the nonlinear optical phenomena and related technology.  
Prerequisites: PHYS-600.  
Credit, four hours.
- PHYS-602. BIOPHOTONICS I: PRINCIPLES OF LUMINESCENCE** **4:4:0**  
A study of the physics behind light emitting molecules and their applications in biology.  
Credit, four hours.
- PHYS-603. BIOPHOTONICS II: INSTRUMENTATION** **3:3:0**  
An overview of microscopes and other optical instruments used in the biomedical field.  
Credit, three hours.
- PHYS-604. APPLIED OPTICS IN BIOMEDICINE** **3:3:0**  
A treatment of concepts of physics and optics applied to the medical field. Topics include DNA sequencing, in situ fluorescence, enzyme-based assays, glucose monitoring, HIV detection, and cancer diagnostics.  
Credit, three hours.
- PHYS-605. PRINCIPLES OF LASERS AND OPTICAL DEVICES** **4:4:0**  
Treatment of basic principles of lasers and their applications. Topics to be covered include, fundamentals of quantum electronics, oscillator model, rate equations, stimulated transitions, population inversion, laser amplification, design of laser resonators, principles of q-switching, mode locking, injection locking and modern applications of lasers.  
Credit, four hours.
- PHYS-606. LABORATORY TECHNIQUES IN OPTICS AND SPECTROSCOPY** **3:3:0**  
Modern spectroscopic methods. Human chromosomes, human leukocyte antigen (hla) haplotyping, enzyme-linked immune-assays (Elisa), diabetes testing and glucose monitoring, pregnancy testing, drug testing, HIV detection, and cancer diagnostics.  
Prerequisites: PHYS-602, PHYS-603.  
Credit, three hours.
- PHYS-607. INTRODUCTION TO LABVIEW** **3:3:0**  
A hands-on approach to the national instruments labview programming language.  
Credit, three hours.
- PHYS-608. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY I** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-609. SELECTED TOPICS IN OPTICS AND SPECTROSCOPY II** **3:3:0**  
Current research topics in optics and spectroscopy.  
Credit, three hours.
- PHYS-633. SELECTED TOPICS IN SCIENCE EDUCATION** **3:3:0**  
Current developments in physics education.  
Credit, three hours.
- PHYS-652. CLASSICAL MECHANICS** **3:3:0**  
Lagrangian formulation, the Kepler problem, Rutherford scattering, rotating coordinate systems, rigid body motion, small oscillations, stability problems, and Hamiltonian formulation.  
Credit, three hours.

**PHYS-655. COMPUTATIONAL METHODS****3:3:0**

Designed to familiarize students with the use of computers in pursuing theoretical research. Numerical analysis techniques and computational methods employed in the study of physical models will be studied.

Credit, three hours.

**PHYS-661. SOLID STATE PHYSICS****3:3:0**

An introductory study of the structure and physical properties of crystalline solids. Included are topics in crystal structure, lattice vibrations, thermal properties of solids, x-ray diffraction, free electron theory and energy based theory.

Credit, three hours.

**PHYS-665. STATISTICAL MECHANICS****3:3:0**

Laws of thermodynamics, Boltzmann and quantum statistical distributions, with applications to properties of gases, specific heats of solids, paramagnetism, black body radiation and Bose-Einstein condensation.

Credit, three hours.

**PHYS-667. MATHEMATICAL METHODS OF PHYSICS IV****3:3:0**

An advanced treatment of mathematical topics including operators, matrix mathematics, complex variables and eigenvalue problems.

Credit, three hours.

**PHYS-671. ADVANCED ELECTROMAGNETIC THEORY I****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-672. ADVANCED ELECTROMAGNETIC THEORY II****3:3:0**

Treatment of boundary value problems of electrostatics and magnetostatics, electromagnetic radiation, radiating systems, wave guides, resonating systems and multipole fields.

Credit, three hours.

**PHYS-675. QUANTUM MECHANICS I****3:3:0**

A study of the Schroedinger wave equation, operators and matrices, perturbation theory, collision and scattering problems classification of atomic states, and introduction to field quantization.

Credit, three hours.

**PHYS-676. QUANTUM MECHANICS II****3:3:0**

Quantum Mechanics of molecules and solid state. Relativistic quantum mechanics. Field quantization. Quantum theory of light. Basics of quantum electrodynamics.

Credit, three hours.

**PHYS-691. RESEARCH I****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-692. RESEARCH II****3:3:3**

Independent student research or laboratory work in a specialized field of interest.

Credit, three hours.

**PHYS-695. MASTER'S THESIS****6:6:6**

A research problem in a selected physics topic resulting in a written thesis.

Credit, one to six hours.

**PHYS-800. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

Basics of laser spectroscopic techniques and instrumentation. Topics include: ultra violet and visible (uv-vi) absorption spectroscopy; Fourier transform infrared spectroscopy; Raman, fluorescence, and saturation spectroscopy; polarization, correlation, and ultra-fast spectroscopy.

Prerequisites: PHYS-600, PHYS-601, PHYS-605.

Credit, three hours.

**PHYS-801. QUANTUM THEORY OF LIGHT****3:3:0**

Quantum mechanical description of light matter interaction. Presentation of basic quantum mechanics and quantum mechanical treatment of light and atoms.

Prerequisites: Consent of the Instructor.

Credit, three hours.

**PHYS-802. THEORY OF LIGHT SCATTERING****3:3:0**

An advanced electricity and magnetism course focused on light interactions with small particles. Topics include Raleigh and Mie scattering, optical properties of nanoparticles and surface plasmon resonance.

Credit, three hours.

**PHYS-803. MODERN LASER SPECTROSCOPIC METHODS****3:3:0**

The laser revolution in spectroscopy. Absorption within the Doppler line, Doppler-free broadening spectroscopy, saturation spectroscopy, multiphoton spectroscopy, laser fluorescence, laser Raman, coherent stokes and antistokes Raman spectroscopy, photon echo and coherent spectroscopy. Ultrafast spectroscopy. Modern trends in spectroscopy.

Credit, three hour.

**PHYS-804. PRINCIPLES OF PHOTOCHEMISTRY AND PHOTOBIOLOGY****3:3:0**

Review of the main phenomena related to the interaction of light with matter that results in chemical or biological activity. The study of inorganic and organic photochemistry, environmental aspects of photochemistry, atmospheric photochemistry, photosynthesis, visual processing, bio-luminescence, interaction of light with bio-organisms, photo-medicine, and phototherapy.

Credit, three hours.

**PHYS-805. PHOTOACOUSTIC AND THERMAL SPECTROSCOPY****3:3:0**

Fundamentals of photo-acoustic and photo-thermal interaction of light with optical samples. Examination of basic instrumentations and their applications for characterization of complex samples including biological samples.

Credit, three hours.

**PHYS-806. MOLECULAR BIOPHYSICS****3:3:0**

An overview of the physics of bio-molecular interactions. Topics will include physical models for DNA and protein systems.

Credit, three hours.

**PHYS-807. OPTICAL SOLITONS****3:3:0**

Basic concepts of the mathematical aspects of optical solitons. Presentation of optical waveguides, the nonlinear Schrodinger's equation, laws of nonlinearity, soliton perturbation, soliton-soliton interactions, Stochastic perturbation of optical solitons, optical couplers, optical switching, magneto-optic waveguides and optical bullets.

Prerequisites: PHYS-601, MTSC-853, MTSC-845.

Credit, three hours.

**PHYS-808. FIBER OPTICS AND FIBER OPTICS COMMUNICATION****3:3:0**

Light propagation in fiber, its dispersion and nonlinear characteristics that play an important role in light communication. Types of fiber-optic devices and their applications to communication. Wavelength division multiplexing.

Credit, three hours.

**PHYS-809. PHOTONICS AND INFORMATION PROCESSING****3:3:0**

Wave propagation in linear optical systems and optical information processing. Topics include: fundamentals of optical propagation, diffraction, optical imaging, Fourier transform, wave-front modulation, signal processing, and basics of optical processing devices.

Credit, three hours.

**PHYS-810. CURRENT TOPICS IN OPTICS I****3:3:0**

Current topics in optics and spectroscopy.

Credit, three hours.

**PHYS-811. CURRENT TOPICS IN OPTICS II**

**3:3:0**

Current topics in optics and spectroscopy.  
Credit, three hours.

**PHYS-820. DISSERTATION RESEARCH**

**9:9:9**

The course is for Ph.D. students in the optics program working on their dissertation research project.  
Credit, two to eight hours.

**PHYS-890. DISSERTATION**

**9:9:0**

Written work that describes the main research results obtained during the completion of the graduate program. The format must comply with the requirements of the College for thesis and dissertations.  
Credit, three to nine hours.

**PHYS-999. DOCTORAL SUSTAINING**

**0:0:0**

Public oral defense of the thesis that includes presentation of the main research results obtained during the completion of the graduate program. It takes place after evaluation of the written dissertation by the members of the corresponding academic committee.  
Credit, none.

## **ACCREDITATIONS AND INSTITUTIONAL MEMBERSHIPS**

Delaware State University, chartered by the State of Delaware, is accredited by the Middle States Commission on Higher Education (MSCHE) to award degrees at the baccalaureate and master's levels.

Credits earned at Delaware State University are accepted by other accredited institutions of higher education throughout the country for transfer credit, graduate study, and professional placement and employment opportunities. The University also holds full membership in and/or accreditation from the following state, regional, and national educational or professional organizations:

### **ACCREDITATIONS**

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Commission on Accreditation for Dietetics Education (CADE)  
Commission on Collegiate Nursing Education (CCNE)  
Council on Social Work Education (CSWE)  
National League for Nursing Accreditation Commission (NLNAC)  
National Council for Accreditation of Teacher Education (NCATE)

### **CERTIFICATIONS AND AFFILIATIONS**

American Association of Colleges of Teacher Education (AACTE)  
Association of American Colleges and Universities (AAC&U)  
American Council of Education (ACE), member  
Association of Governing Boards (ACG), member  
Association of Public and Land Grant Universities (APLU), member  
American Chemical Society  
College Board, member  
Council of 1890 Presidents/Chancellors, member  
Delaware State Department of Education (Teacher Education Program)  
Federal Aviation Administration (FAA)  
National Collegiate Athletics Association (NCAA)  
National Association for Equal Opportunity in Higher Education, member

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Vice President for Business and Finance	6200
Vice President for Enrollment Management and Student Affairs	6300
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