

# MATHEMATICS

**Chairperson:** Dr. Barbara A. Bracken

The courses of study are intended for:

1. Those with an undergraduate degree from a traditional mathematics program. For the degree in mathematics, a student who has met admission requirements can take up to half of the required 30 credits in computer science.
2. Current or prospective teachers of mathematics who wish to enhance their training in either educational methodology or in mathematics/computer science itself.
3. Those who plan to continue their studies beyond the master's level in e mathematics.

## Admission

To be considered for admission, the applicant must submit the following:

1. A completed graduate application for admission with payment of appropriate application fee
2. Two letters of recommendation from previous academic faculty and/or from current or previous supervisors, if employed.
3. A complete set of official undergraduate transcripts from all academic institutions previously attended.

## Master of Science in Mathematics

Applicants are expected to have had undergraduate courses in each of the following three areas: linear algebra/matrix theory, advanced calculus or real variables, and abstract algebra. Students deficient in one or more of these areas may still be admitted into the program, but are required to make up all deficiencies early in their graduate studies.

## Master of Science in Education

Admission requirements for the Department of Education are described under the header "Secondary Education" earlier in this bulletin.

# **MASTER OF SCIENCE IN EDUCATION**

## **Requirements**

Candidates for the degree of Master of Science in Education with a concentration in Secondary Education/Mathematics must complete thirty (30) credits of approved courses offered by the Department of Mathematics/Computer Science and the Department of Education. Of these thirty credits, eighteen (18) credits shall be in approved 400-level courses offered by the Department of Mathematics and Computer Science. Requirements for the Education component of the Master of Science degree in Education with a concentration in Secondary Education/Mathematics are listed under the Education section earlier in this bulletin.

Mathematics.....	18
Computer Science.....	4
Education.....	5

# **MASTER OF SCIENCE IN MATHEMATICS**

Candidates for the degree of Master of Science in Mathematics must complete thirty (30) credits of approved 400-level courses offered by the Department of Mathematics and Computer Science numbered 400 or above, with a minimum of six (6) credits completed in 500-level courses.

A thesis option is available whereby a candidate can write and defend a written thesis under the direction of a faculty advisor. At most, six of the required thirty credits may be earned through thesis work. Students electing a thesis option should consult the department chairperson for details regarding thesis-preparation guidelines.

Computer Science.....	4
Mathematics.....	18

# CS. COMPUTER SCIENCE

## CS-419. PRINCIPLES OF PROGRAMMING LANGUAGES

**Credits:** 3

A study of the principles that govern the design and implementation of programming languages. Topics include language structure, data types, and control structures. Programming projects will familiarize students with the features of programming languages through their implementation in interpreters.

### Pre-Requisites

CS-226 or equivalent

## CS-421. SIMULATION AND DATA ANALYSIS

**Credits:** 3

Methods of handling large databases including statistical analysis and computer simulations. The emphasis will be upon discrete simulation models with a discussion of relevant computer languages, SLAM, GPSS, and/or SIMSCRIPT.

### Pre-Requisites

CS-125 (or the equivalent programming experience) and one semester of calculus.

## CS-423. THEORY OF COMPUTATION

**Credits:** 3

This course formalizes many topics encountered in previous computing courses. Topics include: languages, grammars, finite automata, regular expressions and grammars, context-free languages, push-down automata, Turing machines and computability.

### Pre-Requisites

MTH-232 (Discrete Mathematics II) and CS-126 (or the equivalent programming experience).

## CS-424. SYSTEMS ANALYSIS

**Credits:** 3

A study of the design and implementation of large computer projects. Special emphasis is placed on applications to business systems. Students will use a CASE tool for automated systems analysis and design.

### Pre-Requisites

CS-226 or equivalent

## CS-425. DATABASE MANAGEMENT

**Credits:** 3

Practical experience in solving a large-scale computer problem including determination of data requirements, appropriate data organization, data manipulation procedures, implementation, testing and documentation.

### Pre-Requisites

CS-126 or permission of the instructor.

## CS-426. OPERATING SYSTEM PRINCIPLES

**Credits:** 3

Analysis of the computer operating systems including Batch, Timesharing, and Realtime systems. Topics include sequential and concurrent processes, processor and storage management, resource protection, processor multiplexing, and handling of interrupts from peripheral devices.

### Pre-Requisites

CS-226 or equivalent

## CS-427. COMPILER DESIGN

**Credits:** 3

A study of compiler design including language definition, syntactic analysis, lexical analysis, storage allocation, error detection and recovery, code generation and optimization problems.

### Pre-Requisites

CS-226 or equivalent

## CS-428. ALGORITHMS

**Credits:** 3

Theoretical analysis of various algorithms. Topics are chosen from sorting, searching, selection, matrix multiplication and multiplication of real numbers, and various combinational algorithms.

### Pre-Requisites

CS-226 or equivalent and MTH-232 (Discrete Mathematics II).

## CS-430. COMPUTER ARCHITECTURE

**Credits:** 3

A study of the design, organization, and structure of computers, ranging from the microprocessors to the latest 'supercomputers.'

### Pre-Requisites

CS-226 or equivalent

## CS-434. SOFTWARE ENGINEERING

**Credits:** 3

A course in 'programming in the large.' Topics include software design, implementation, validation, maintenance and documentation. There will be one or more team projects. Prerequisite CS-226 or equivalent

## CS-435. ADVANCED DATABASE CONCEPTS

**Credits:** 3

Practical experience involving unstructured data collections. Topics cover big data, data mining, predictive modeling, decision analysis, and indexing and retrieval including probabilistic, clustering, thesauri, and passage based retrieval strategies.

### Pre-Requisites

CS-325 (Database Management) or CS340 Artificial Intelligence

## CS-440. ARTIFICIAL INTELLIGENCE

**Credits:** 3

This course will provide an overview of artificial intelligence (AI) application areas and hands-on experience with some common AI computational tools. Topics include search, natural language processing, theorem proving, planning, machine learning, robotics, vision, knowledge-based systems (expert systems), and neural networks.

### Pre-Requisites

CS-126 (Unix) and equivalent programming experience in a high-level language.

## CS-450. OBJECT-ORIENTED PROGRAMMING

**Credits:** 3

Object-oriented concepts and their application to human-computer interaction. Concepts to be covered include objects, classes, inheritance, polymorphism, design patterns, GUI interface guidelines and design of interfaces. There will be programming projects in object-oriented languages.

### Pre-Requisites

CS-226 or equivalent

**CS-455. COMPUTER NETWORKS****Credits:** 3

This course introduces basic concepts, architecture, and widely used protocols of computer networks. Topics include the Open System Interconnection (OSI) model consisting of physical link layer, data layer, network layer, transport layer, session layer, presentation layer, and application layer, medium access sublayer and LAN; various routing protocols; Transmission Control Protocol (TCP) and Internet Protocol (IP) for internetworking.

**Pre-Requisites**Either [CS-225](#) and [CS-246](#)**CS-463. OPERATIONS RESEARCH****Credits:** 3

A survey of operations research topics such as decision analysis, inventory models, queueing models, dynamic programming, network models, and linear programming. (Cross-listed with [MTH-463](#))

**Pre-Requisites**

Programming experience in a high-level language and completion of one semester of calculus.

**CS-464. NUMERICAL ANALYSIS****Credits:** 3

An introduction to numerical algorithms as tools to providing solutions to common problems formulated in mathematics, science, and engineering. Focus is given to developing the basic understanding of the construction of numerical algorithms, their applicability, and their limitations. (Cross-listed with [MTH-464](#))

**Pre-Requisites**

Programming experience in a high-level language and completion of a one-year calculus sequence.

**CS-467. COMPUTER GRAPHICS****Credits:** 3

Introduction to equipment and techniques used to generate graphical representations by computer. Discussion of the mathematical techniques necessary to draw objects in two and three-dimensional space. Emphasis on application programming and the use of a high-resolution color raster display.

**Pre-Requisites**[CS-226](#) or equivalent**CS-483. WEB DEVELOPMENT****Credits:** 3

An introduction to the development of dynamic, database-driven sites, including active server pages, PHP, authentication, session tracking and security, and the development of shopping cart and portal systems.

**Pre-Requisites**[CS-283](#) (Web Development I) and [CS-325](#) (Database Management).**CS-498. TOPICS IN COMPUTER SCIENCE****Credits:** variable

Variable credit Study of one or more special topics in computer science. May be repeated for credit provided a different topic is selected.

**ED. EDUCATION****ED-508. INTERCULTURAL COMMUNICATION****Credits:** 3

This course examines the ways cultural differences, ethical perspectives, and characteristics of the communication process influence interaction in intercultural settings. The course focuses upon critical issues in intercultural communication. Special emphasis is given to intercultural competence in educational settings.

**ED-510. PSYCHOLOGICAL FOUNDATIONS OF EDUCATION****Credits:** 3

A study of human development and learning, application of psychological principles in the practice of education.

**ED-511. PHILOSOPHICAL FOUNDATIONS OF EDUCATION****Credits:** 3

An examination of philosophical issues which bear upon American education. The problem of relating theory to practice is considered.

**ED-512. SOCIAL FOUNDATIONS OF EDUCATION****Credits:** 3

An introduction to the history, scope, materials and methods of the sociological analysis of education. Instruction includes the concepts of culture, socialization, stratification, social control and change as they relate to formal education.

**ED-513. COMPARATIVE FOUNDATIONS OF EDUCATION****Credits:** 3

An analytic study of educational patterns in contemporary societies. Educational policies and institutions are studied in their cultural context. Educational patterns of developed and developing nations are described, analyzed and compared; examples from each pattern are examined.

**ED-515. COGNITION****Credits:** 3

This course provides in depth study of the processes required for students to process information, including perception, attention, memory, encoding, retrieval, problem solving, and the information processing requirements of reading and writing. Consideration of problem solving in specific subject areas is also covered.

**ED-517. PRINCIPAL AS AN EDUCATIONAL LEADER****Credits:** 3

This course will focus on the leadership roles and responsibilities of the principal. Leadership theories, ethics, organizational models, data-driven decision making, managing change and conflict, effective communication, diversity, and community relations are critical areas that will be analyzed, assessed and practiced. This course requires a minimum of 30 hours of field experience. Students are conditionally admitted to the EDLS program until successful completion of this course. Required for K-12 principal certification.

**EDUCATION-518. SCHOOL LAW****Credits:** 3

An examination of school law at the federal, state and local levels; review, discussion and analysis of court decisions which affect schools.

## Course Descriptions

### **ED-519. ISSUES, LAWS AND TRENDS IN EDUCATION**

**Credits:** 3

(Students who have previously taken either [ED-514](#) or [ED-518](#) may not register for [ED-519](#).) This course will focus on an examination of school law at the federal, state and local levels through review, discussion and analysis of court decisions that affect educational institutions. The study of school law and American education will be centered on contemporary issues with consideration given to historical perspectives, accountability issues and future trends. Topics will include legal and ethical issues in instructional delivery systems and the functions of education. Required for the Classroom Technology, Educational Development & Strategies, and Special Education Programs for students beginning courses in Fall 2007.

### **ED-520. USING ASSESSMENT TO GUIDE INSTRUCTION**

**Credits:** 3

An examination of various assessment strategies and current methods of assessment, through the study of theory and effective practices in assessment translated into design. The analysis of disaggregated student data to implement effective change in teaching and assessment practices will be explored. Research based strategies for the assessment and instruction of diverse learners will be examined. (Cross listed with [EDAM-5032](#)).

### **ED-521. USING TECHNOLOGY FOR ASSESSMENT**

**Credits:** 3

This course will explore the use of various technological tools in assessment that helps improve teaching and learning in both face-to-face and online environments. Students will examine practices and strategies for developing effective assessments and utilizing assessment data.

### **ED-522. CURRICULUM AND INSTRUCTION**

**Credits:** 3

The course will engage students in the study of school curricula in elementary and secondary education. Models and trends in curriculum development will be explored by examining past and present influences on curriculum. The needs of diverse learners will be addressed through a survey of the latest research addressing differentiated instruction and societal factors influencing achievement gaps. Participants will relate this knowledge to their delivery of curriculum to students.

### **ED-523. ADMINISTRATIVE LEADERSHIP IN CURRICULUM AND INSTRUCTION**

**Credits:** 3

This course familiarizes future principals with the nature of curriculum and the impact of national and state standards on the instructional program. The importance of the role of the principal in developing an organizational structure for curricular change to provide the most appropriate instructional environment for all students will be embedded throughout the course. This course requires a 30 hour field experience focusing on school curriculum leadership. Pre-requisite: [ED-517](#) Principal as Educational Leader Required for K-12 principal certification.

### **ED-524. ACTION RESEARCH FOR EDUCATIONAL CHANGE**

**Credits:** 3

Action research is applied research educators can do within the school to improve practice, from instruction to learning. Knowledge and skill will be in designing action research, using both quantitative and qualitative data collection methods, to inform and improve practice. (Cross-listed with [EDAM-5031](#))

### **ED-525. INTRODUCTION TO EDUCATIONAL RESEARCH / MASTER'S LEVEL**

**Credits:** 3

This course is designed to facilitate learning methods and techniques of educational research, critiquing published research and conducting a thorough and professional search for research literature on a selected topic.

### **ED-527. MULTIMEDIA DESIGN FOR DIGITAL LEARNING**

**Credits:** 3

(Previously titled Authoring Systems/Instructional Design - do not repeat for additional credit)

This course explores how multimedia is used for teaching and learning. Research-based principles of multimedia design will be explored to enhance competency and skills in multimedia development.

### **ED-530. UTILIZING EMERGING TECHNOLOGIES TO IMPROVE LEARNING**

**Credits:** 3

This course is designed to help students understand different key learning theories and their effective use in the design of accessible learning activities. Students will apply learning theory principles to develop model lessons using emerging technologies. Students will also identify appropriate strategies and technologies to support equitable access and diverse learning styles. Using technology to accomplish data-driven decision-making will be explored.

### **ED-531. CHILDREN'S LITERATURE**

**Credits:** 3

A study of methods and materials appropriate for elementary school instruction in literature.

### **ED-539. ADVANCED STUDIES IN TEACHING AND LEARNING**

**Credits:** 3

This capstone course offers a culminating experience to demonstrate the attainment and integration of program outcomes. Students will be provided an in-depth opportunity to synthesize learning, think critically about their role as life-long learners, and apply new knowledge in creative ways.

#### **Pre-Requisites**

Completion of required International Teaching and Learning program coursework. Department permission required.

### **ED-541. DESIGNING MOTIVATION FOR ALL LEARNERS**

**Credits:** 3

Students will design learning experiences and develop effective leadership strategies that promote motivation for all learners. Additionally, they will learn verbal encouragement techniques that motivate by reinforcing student effort and reducing risk and discover how purposeful work and goal achievement can support all types of learners.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-542. MEANINGFUL ACTIVITIES TO GENERATE INTERESTING CLASSROOMS (MAGIC)**

**Credits:** 3

A hands-on course which offers students the opportunity to learn a variety of engaging activities to go beyond textbook and workbook instruction. Participation in over 60 activities provides practice in creating, evaluating, and adapting ideas to each participant's specific curriculum.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-543. ACHIEVING STUDENT OUTCOMES THROUGH COOPERATIVE LEARNING**

**Credits:** 3

Designed to encourage teachers to use cooperative strategies appropriately in classrooms. Activities include simulations, use of cooperative learning models, and creation of lesson plans.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-548. PURPOSEFUL LEARNING THROUGH MULTIPLE INTELLIGENCES**

**Credits:** 3

Based on the research of Howard Gardner, this course focuses on understanding each of the intelligences and identifying them. Discovery centers are used to experience each intelligence and teaching strategies and classroom activities that enhance the intelligences are designed by participants.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-552. TEACHING THROUGH LEARNING CHANNELS**

**Credits:** 3

This course utilizes recent brain research, examines individual differences in learning styles, and develops adaptive teaching procedures to accommodate varying cognitive processes.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-553. BRAIN-BASED WAYS WE THINK AND LEARN**

**Credits:** 3

This course will explore the four basic thinking skills of induction, deduction, analysis, and synthesis. Students will experience, model, and internalize specific techniques of brain-based teaching and learning and will integrate thinking processes into real-life applications.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-554. SUCCESSFUL TEACHING FOR ACCEPTANCE OF RESPONSIBILITY**

**Credits:** 3

This course is designed to help experienced and beginning K-12 educators create a classroom environment in which responsible behavior is modeled, taught, and supported. Participants will explore the underlying causes of irresponsible behavior and learn specific strategies associated with four instructional approaches that empower students to be self-directed, responsible learners. As participants learn to mentor, model, coach, and facilitate responsible actions in their students, they likewise develop increasing responsibility and personal power in their own professional practice.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

## Course Descriptions

### **ED-555. CLASSROOM MANAGEMENT: ORCHESTRATING A COMMUNITY OF LEARNERS**

**Credits:** 3

This course equips experienced and beginning K-12 educators with current, research-validated concepts and strategies for orchestrating classroom life and learning so that instruction flows smoothly, student misbehavior is minimized, and learning potential is maximized. Participants will learn strategies associated with seven key areas of expertise that collectively contribute to a teacher's classroom management effectiveness.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-557. DIFFERENTIATED INSTRUCTION FOR TODAY'S CLASSROOM**

**Credits:** 3

This course equips experienced and beginner educators with the essential knowledge and skills to implement differentiated instruction (DI) successfully in their own classrooms. In a highly interactive learning environment that models the DI principles and processes, class members will gain expertise in understanding and implementing a broad range of strategies associated with the essential, distinguishing components of DI.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-558. TOPICS COURSES**

**Credits:** 3

Advanced study of topics of special interest not extensively treated in regular courses.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-559. BEHAVIORAL, ACADEMIC, AND SOCIAL INTERVENTIONS FOR THE CLASSROOM**

**Credits:** 3

This course provides educators with research-based interventions in the behavioral, academic, and social areas of student performance. Through a multitiered response to intervention model, educators implement a solution-seeking cycle for gathering information, identifying issues, and planning and assessing early and effective interventions.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-560. BUILDING COMMUNICATION AND TEAMWORK IN THE CLASSROOM**

**Credits:** 3

This course equips experienced and beginner educators with the essential knowledge and skills necessary to foster an emotionally engaging classroom. The selected strategies participants will learn and practice are designed to improve teacher expertise in five specific areas: leadership, communication and listening, positive thinking, student support, and team building.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.



**ED-561. READING ACROSS THE CURRICULUM**

**Credits:** 3

This course provides research-based active reading comprehension strategies that participants can apply to their grade level or content area. By learning how to implement these metacognitive reading strategies, participants will be able to plan lessons more effectively. Emphasis is on learning styles, types of text, notation systems, content-area reading, assessments, fluency, motivation, and grade-level vocabulary.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-569. TEACHING DIVERSE LEARNERS USING INCLUSIVE CLASSROOM PRACTICES**

**Credits:** 3

Research-based strategies for the instruction of diverse learners in inclusive settings will be examined in this course. Participants will examine effective teaching practices including the research and theories to support such practices. Students will apply the practices to an educational setting. Instructional strategies such as Differentiated Instruction, Universal Design for Learning, co-teaching, differentiated instruction, Understanding by Design/ (UbD), formative assessments, and other effective inclusive classroom practices will be explored.

**ED-571. SPECIAL EDUCATION PROGRAMMING AND ADMINISTRATION**

**Credits:** 3

This course will familiarize future principals with methods and strategies to design and implement programs for students with disabilities that are compliant with legal requirements and current research in improving student achievement. The importance of the role of the principal in developing an organizational structure that facilitates the most appropriate teaching and learning environment for students with disabilities will be embedded throughout the course. This course requires a 30 hour field experience focusing on special education administration from the principal's perspective. Pre-requisite: [ED-517](#) Principal as Educational Leader Required for K-12 principal certification.

**ED-573. EVALUATION OF EDUCATIONAL PROGRAMS**

**Credits:** 3

Students will undertake advanced study in educational assessment strategies and program evaluation with a focus on student learning within the operation of these programs. It will encompass various types of assessment strategies and methods, as well as the analysis of assessment data to guide instruction and curriculum design. Instruction will focus on the principal's role in guiding teachers in the design of effective assessments and alternative assessment strategies, and the use of assessment in program evaluation. Working in collaboration with faculty, colleagues, and a practicing administrator, students will design a leadership plan of study for a topic in this area. The plan of study must directly relate to the role and responsibilities of the principal in this capacity. Sample topics can be drawn from such areas as: student assessment methods, evaluation of special and regular education programs, academic standards and the PA Assessment System or other related topics. Pre-requisite: [ED-517](#) Principal as Educational Leader. Required for K-12 principal certification.

**ED-575. SCHOOL LAW FOR PRINCIPALS**

**Credits:** 3

This course focuses on current school law at the state and federal levels and its influence on the role and responsibilities of the principal in a K – 12 school system. Law, legislation, and court decisions that affect the principals' dealings with students and employees will be studied and analyzed in light of the historical context and current issues. Emphasis will be given to laws governing the management of special education services and programs and the mandates related to student achievement of state standards. Pre-requisite: [ED-517](#) Principal as Educational Leader. Required for K-12 principal certification.

**ED-576. SCHOOL MANAGEMENT AND COMMUNICATIONS**

**Credits:** 3

This course focuses on the study of administrative functions in educational institutions. Topics include: school budget planning, facilities management, resource allocation, establishing and maintaining positive school and community relations, and effective communication strategies for principals. Pre-requisite: [ED-517](#) Principal as Educational Leader Required for K-12 principal certification.

**ED-577. PRINCIPLES OF INFORMATION SECURITY**

**Credits:** 3

With focus on the educational environment, this course will discuss the principles of information security, building a clear understanding of the foundations of information security, the principles on which managerial strategy can be formulated and the technical solutions available to technology coordinators.

**Pre-Requisites**

[ED-588](#).

**ED-578. STAFF DEVELOPMENT AND SUPERVISION**

**Credits:** 3

This course focuses on staff development and teacher supervision. Models of supervision, such as clinical supervision and differentiated supervision, are examined. Case studies will be utilized to gain understanding of the teacher evaluation process. Mentoring and new teacher induction programs will be investigated. An overview of the laws and policies, which influence and govern these programs will be included. Pre-requisite: [ED-517](#) Principal as Educational Leader Required for K-12 principal certification.

## Course Descriptions

### **ED-579. MEDIA DESIGN**

**Credits:** 3

This course is designed to give specific and realistic examples of how different types of media and instructional technology can complement each other in the computer age classroom. Emphasis will be given to the design and production of instructional materials using text, video, audio, and computer based and photographic formats for use in both distance learning and traditional classrooms.

### **ED-583. COURSEWARE DESIGN AND CONSTRUCTION**

**Credits:** 3

Using state-of-the-art technology to design and construct appropriate courseware support and curricula. Topics include the use of authoring software, optical technologies, ISD (Instructional Systems Design) models and strategies geared towards proper courseware design.

### **ED-585. INTEGRATING TECHNOLOGY INTO THE CURRICULUM**

**Credits:** 3

The course will present models of instructional design to provide a theoretical framework in the application and integration of microcomputer technology into the K-12 curriculum. Participants will develop a portfolio of computer-generated materials for their classroom. Required for the Classroom Technology, Special Education, and Educational Development and Strategies Programs.

### **ED-587. TECHNOLOGY LEADERSHIP**

**Credits:** 3

This course is designed to develop educational technology leaders who are knowledgeable and skilled in technology leadership practices that improve student learning and school operations in K-12 schools. It addresses skills and competencies necessary for the support and assessment of technology standards and will include issues and trends relevant to the field of educational technology. **Required for Instructional Technology degree and & the master's degree in Educational Leadership.**

### **ED-588. OPERATING SYSTEMS & NETWORKING**

**Credits:** 3

An exploration into the design of present-day microcomputer systems. Topics include microcomputer architecture and hardware, telecommunications, networking and general operating systems.

### **ED-589. INSTRUCTIONAL TECHNOLOGY: MODELS AND METHODS**

**Credits:** 3

A 'wide area' look into technology integration. An investigation into what the responsibilities of a technology coordinator will be - relating technology and thinking processes, the cognitive effects of technology integration, materials acquisition and placement and general administrative strategies.

### **ED-591. INTERNSHIP (INSTRUCTIONAL TECH)**

**Credits:** 3

Participation in field experience to observe the use of technology to support instruction, the management of technology resources in educational settings, and the evaluation of effectiveness of technology resources for teaching and learning; application of technology resources to support instruction in classroom settings. **Required for PA Instructional Technology Specialist Certification.**

#### **Pre-Requisites**

[ED-587](#), [ED-588](#), [ED-589](#) (or equivalent) and permission of Director.

### **ED-592. K-12 PRINCIPAL INTERNSHIP**

**Credits:** Parts A & B - two semesters at 3 credits each

Students will complete work as an administrative intern with practicing K-12 principals. Within this experience, students will design a leadership plan of study to implement a research-based project, which will attest to their ability to perform as an educational leader. The project is to address the needs of the candidate, as well as the needs of the school where the internship is being completed. Required for K-12 principal certification.

#### **Pre-Requisites**

Completion of the 21 credits required for principal certification. Required for K-12 principal certification.

### **ED-598. TOPICS**

**Credits:** 3

Advanced study of topics of special interest not extensively treated in regular courses.

### **ED-610. ETHICS FOR EDUCATIONAL LEADERS**

**Credits:** 3

This course focuses on the principles, practices and issues related to ethics in educational leadership within a variety of institutional settings. The ethical dimensions of leadership will be examined through both traditional and nontraditional paradigms. Students will reflect on personal ethical stances, examine the influence of ethics and values on decision-making, and analyze and critique ethical issues in a variety of contexts to frame their professional ethical perspectives.

### **ED-612. LEADERSHIP, DIVERSITY AND SOCIETAL CHANGE**

**Credits:** 3

This course examines the impact of diversity, culture, ethnic origin and societal change on educational institutions and the emerging leadership styles resulting from these factors. This course is designed to better prepare leaders to meet the challenges of cultural diversity and rapid societal change in organizations. Attention is given as to how language, gender, race, tradition, education, economic structure, societal transitions and global events interact with organizational philosophy to create behavioral norms at all levels. The influence of these factors on leaders' behaviors, as well as their interactions with diverse groups both inside and outside the organization, will be studied.

### **ED-614. ORGANIZATIONAL AND LEADERSHIP THEORY**

**Credits:** 3

This course focuses on organizational and leadership theories as they relate to K-12 and higher education institutions. The central aim of this course is to enable students to understand the structure and function of organizations and leadership from multiple theoretical perspectives. Through the linking of theory to practice, future educational leaders will be empowered to make conscious, deliberate decisions utilizing multiple, and at times divergent, theoretical frames.

**ED-616. PUBLIC RELATIONS: ISSUES AND TRENDS FOR EDUCATIONAL LEADERS**

**Credits:** 3

This course will focus on understanding contemporary public relations issues and trends with emphasis on public relations in educational institutions, changes in society and in educational institutions, public opinions, and political contexts; understanding of public relations relative to public relations' theory and practice, legal and ethical aspects, technology, and public relations in a communication context; learning about educational leadership responsibilities relative to planning in public relations; setting goals and developing strategies, working with the media, responding to crisis, collecting and analyzing decision-oriented data, public relations in a funding campaign, and evaluating public relations programs.

**ED-620. EDUCATIONAL INSTITUTIONS AND SYSTEMS**

**Credits:** 3

This course will focus on historic foundations, institutional structures, long-standing debates, and challenges related to American Education, including pre-K-12, 2-yr institutions, public and private 4-yr. institutions, and for-profit schools. Governance, funding, and mission, and current issues will be examined. Required for Leadership Studies concentration.

**ED-623. EDUCATIONAL TECHNOLOGY LEADERSHIP**

**Credits:** 3

This course will focus on how to organize and provide leadership in instructional technology programs, facilities and resource management, including technological in-service training programs. This course will also include the laws and regulations that govern the selection and utilization of media, sources for funding, and collaboration on development of a grant proposal. Required for K-12 Administration and Educational Technology specialization.

**ED-625. PROFESSIONAL DEVELOPMENT & SUPERVISION**

**Credits:** 3

This course concentrates on the development and supervision of faculty and staff. A range of models of supervision that can be applied in all educational institutions, such as clinical and differentiated supervision, will be examined for their effectiveness in improving instructional performance. Case studies will be utilized to gain understanding of supervision and evaluation processes. The management and design of induction and professional development programs will be analyzed. The laws and policies that govern these programs, as well as employee rights and termination procedures, will be studied. Required for Ed.D. program/K-12 Administration specialization.

**ED-626. POLITICS AND POLICY FOR EDUCATIONAL LEADERS**

**Credits:** 3

This course will explore the roles of public policy and politics in education at the federal, state, and local levels. through the course students will examine policy models, frameworks, and processes as they relate to policy issues in the k-12 and higher education arenas. A second major area of focus will be the political forces that influence and shape decision-making processes, reform efforts, and community relations.

**ED-627. ADVANCED ISSUES IN EDUCATIONAL LAW**

**Credits:** 3

This course focuses on the most current laws at both the state and federal levels and their impact on the operation of educational institutions for leaders. Both state and federal statutes will be examined with a focus on accurate analysis and interpretation of the law through case reviews. Law, legislation and court decisions that may impact the rights and responsibilities of faculty, students and parents will be studied and analyzed. The course is structured to assist educational leaders in acquiring the knowledge and skills necessary to ensure that the management of their educational institution through adherence to the law produces a safe, efficient and effective learning environment for all students. Required for Ed.D. program/K-12 Administration, Curriculum and Instruction, and Higher Education Administration specializations.

**ED-628. HUMAN RESOURCE DEVELOPMENT AND LABOR NEGOTIATIONS**

**Credits:** 3

This course examines the influences of major theories of personnel leadership on public and private education. Students will learn about the use of resource management, including labor laws, labor negotiation protocols, recruitment, personnel assistance and development, and evaluation procedures. Also, students will learn to develop and implement professional development programs that reflect teacher/faculty development research and strategies that include technology utilization, simulations of various HRD functions such as labor negotiations focusing on differing perspectives that impinge on the process of creating agreement, living with the agreement, and seeking a successor agreement. Require for Ed.D. program/K-12 Administration and Higher Education specializations.

**ED-629. STRATEGIC PLANNING FOR PUBLIC AND NON-PROFIT ORGANIZATIONS**

**Credits:** 3

Students will learn about a variety of planning models, including the Pennsylvania Department of Education's Strategic Planning Model and the Strategy Change Cycle - a proven planning process used by a large number of organizations throughout the United States. Students will be provided detailed guidance on implementing the planning process and will acquire specific knowledge and skills to make the planning process work successfully in any organization. In addition, new information will be provided to students on creating public value, stakeholder analysis, strategy mapping, balanced scorecards, and collaboration. Finally, case study analysis and field assignments will serve as important component in this course. Required for Ed.D. program/K-12 Administration and Higher Education Administration specializations.

**ED-632. COGNITION AND LEARNING**

**Credits:** 3

This course covers the fundamentals of perception, memory, thinking, and emotion that collectively comprise human learning. This foundation of learning is what instruction, administration, and technology must support to promote student achievement. The last twenty-five years of brain research into learning styles, motivation, and learning science will be used to deduce sound learning and teaching practices.

**ED-633. MEDIA DESIGN FOR INSTRUCTION**

**Credits:** 3

This course will explore design and production of instructional materials using text, video, audio and photographic formats for use in both distance learning and traditional classrooms instruction. . Required for Educational Technology specialization.

## Course Descriptions

### **ED-635. INTEGRATING TECHNOLOGY FOR DIVERSE LEARNERS**

**Credits:** 3

The course will examine best practices for integrating technology into curricular planning and present models of instructional design for all learners. Required for Educational Technology specialization.

### **ED-637. SYSTEMS INFRASTRUCTURE & MANAGEMENT**

**Credits:** 3

Students will explore the design of present-day technology infrastructures. Topics include computer hardware, telecommunications, networking and general operating systems. Required for Pennsylvania Instructional Technology Specialist certification.

### **ED-638. INFORMATION SECURITY**

**Credits:** 3

This course will cover the principles of information security, within the educational environment, the foundations of information security, and the principles on which managerial strategy can be formulated and the technical solutions available to technology coordinators. Required for Pennsylvania Instructional Technology Specialist certification.

#### **Pre-Requisites**

[ED-637](#) Systems Infrastructure & Management.

### **ED-639. INTERNSHIP IN EDUCATION TECHNOLOGY LEADERSHIP**

**Credits:** 3

This course is tailored to meet the needs of students who will work as leaders in technology within educational institutions. The internship is designed to provide experience in the completion of identified tasks related to technology under the guidance of a mentoring administrator. A Leadership Competency Portfolio and internship will provide evidence of the leadership competencies attained.

#### **Pre-Requisites**

Completion of the Ed.D. Leadership core and Educational technology courses with the exception of 639. Department permission required.

### **ED-640. INSTRUCTIONAL DESIGN AND DEVELOPMENT**

**Credits:** 3

In this course students will analyze various theories of instructional design through research and application. Required for Educational Technology specialization.

### **ED-643. TRENDS AND INNOVATION IN INSTRUCTIONAL TECHNOLOGY**

**Credits:** 3

This course will explore the present trends and future vision of technology as influenced by its foundations. Factors that are likely to influence the future of the instructional technology will be explored, such as distance education and virtual environments. Required for Educational Technology specialization.

### **ED-644. GRAPHIC DESIGN FOR INSTRUCTION**

**Credits:** 3

This course will focus on the design and production of instructional computer graphics and graphic presentations. Professional, design software will be used for creative and efficient layout, editing, processing and file handling. Fundamental layout organization through the use of grid with emphasis on color, fonts and simple drawing techniques will be incorporated into the course. The value of communication and information design with graphics in the learning process will be presented.

### **ED-645. TECHNOLOGY SUPPORTED ASSESSMENT**

**Credits:** 3

Students will research and explore traditional methods of educational assessment and consider ways technology can be used to augment assessment to enhance best practices for teaching and learning.

### **ED-646. ADAPTIVE AND ASSISTIVE TECHNOLOGY IN EDUCATION**

**Credits:** 3

This course will provide an awareness of contemporary adaptive and assistive technologies for students with disabilities in an inclusive setting. Students will explore technology to support the needs of English Language Learners and the acquisition of a second language for all learners. Required for Educational Technology specialization.

### **ED-647. WEB DESIGN AND DEVELOPMENT FOR LEARNING**

**Credits:** 3

Students will apply the tools and skills of competent designers as they construct web-based learning activities. Topics such as creative applications and project-based learning will be explored. Required for the Educational Technology specialization.

### **ED-650. CURRICULUM, INSTRUCTION AND ASSESSMENT**

**Credits:** 3

This course will examine cognitive theories of learning for all learners, with a particular focus on research-based practices in instruction for diverse learners in contemporary school settings. Educational leaders will gain a strong background in differentiated modes of instruction, along with the coaching skills needed to work with instructors as they strive to improve and expand their pedagogy to enhance student learning. Current methods of curriculum and program design, development and evaluation will be studied. Implications for supporting and sustaining high-quality instruction and learning will be addressed through the relationships and importance of coherence among curriculum, instruction, and assessment. Required for Ed.D. program/K-12 Administration specialization.

### **ED-652. SPECIAL EDUCATION ADMINISTRATION**

**Credits:** 3

The content of this course is composed of professional problems; standards and procedures; the history of special education, special education philosophy, legal provisions, rules and regulations; major developments and trends at federal, state and local levels; services of other organizations and agencies. Required for Ed.D. program/K-12 Administration specialization.

### **ED-654. SCHOOL FINANCE AND FACILITIES ADMINISTRATION**

**Credits:** 3

The content of this course centers on administrative functions related to the management of school finance and facilities in educational institutions. Topics covered are budget planning related to facilities management, as well as resource allocation and scheduling to maximize the use of school facilities; school finance related to sources of revenue for capital projects and the impact of these projects on the allocation of resources, scheduling of programs, and use of personnel will be studied. Additional topics include management techniques, strategic planning approaches, building assessment, energy issues, technology in schools, community development and contract management. Required for Ed.D. program/K-12 Administration specialization.

**ED-658. ADVANCED STUDIES IN SCHOOL DISTRICT LEADERSHIP**

**Credits:** 3

This course will prepare future school district leaders for complex situations and specialized functions that are performed as part of district oversight in the central office. Students will review their prior coursework in K-12 Administration by compiling and informally assessing their Leadership Competency Portfolio, and determine the focus areas to begin the superintendent internship.

**Pre-Requisites**

Completion of Ed.D. Leadership core and K-12 School Administration courses with the exception of ED-659. Department permission required.

**ED-659. SUPERINTENDENT INTERNSHIP (90 HOURS)**

**Credits:** 3

This course will prepare future school district leaders for complex situations and specialized functions that are performed as part of district-wide oversight in the central office. Students will continue the superintendent internship, review prior learning in K-12 administration using the Leadership Competency Portfolio, and implement and complete the internship project.

**Pre-Requisites**

Completion of Ed.D. Leadership core and all K-12 School Administration courses. Department permission required.

**ED-660. HIGHER EDUCATION INSTITUTIONS AND ADULT LEARNERS**

**Credits:** 3

This course engages doctoral students in an investigation of the history and development of higher education institutions, with emphasis on the adult learners who attend them. Included in this course is a comparative study of the philosophies, objectives and functions of various types of higher education institutions and the adult learning population in contemporary colleges and universities. The various settings in which adults learn and the variety of objectives adults have for learning are also studied. Required for Ed.D. program/Higher Education Administration specialization.

**ED-662. FACULTY AND ACADEMIC GOVERNANCE IN HIGHER EDUCATION**

**Credits:** 3

The purpose of this course is to provide an intensive introduction to the organization and governance of American colleges and universities. It is designed to familiarize students with the faculty, academic and administrative contexts and organizational cultures within which they may work. The focus of study will include both individuals and groups (organizational behavior) and organizations themselves (organizational theory). Required for Ed.D. program/Higher Education Administration specialization.

**ED-663. FACULTY DEVELOPMENT & CURRICULUM MANAGEMENT**

**Credits:** 3

Three credits This course will focus on faculty development related to scholarship, teaching, and service. The relationship between faculty development and curriculum, instruction, and assessment will be examined. Topics related to curriculum management will include syllabus development and program design, instructional delivery models, and assessment at the program and institutional levels, as well as the relationship of assessment to accreditation. Required for Ed.D. program/Higher Education Administration specialization.

**ED-664. FINANCIAL MANAGEMENT IN HIGHER EDUCATION**

**Credits:** 3

The purpose of this course is to expose students to both theoretical and applied concepts of higher education financial management concepts and practices. Emphasis will be placed on developing familiarity with the financial terminology and competencies that are necessary for successful administrative performance within a higher education institution. Upon completion of the course, students should possess a greater understanding of the subject matter and inherent issues of higher education financial management. Required for Ed.D. program/Higher Education Administration specialization.

**ED-665. INSTITUTIONAL ADVANCEMENT IN HIGHER EDUCATION**

**Credits:** 3

This course enables doctoral students to refine the knowledge, skills and dispositions needed to plan and execute sound and innovative approaches to advance the institution's mission by increasing private and public financial support, promoting awareness of the institution to key publics, and involving constituents in the life of the institution. Students will be involved in problem solving and decision-making related to institutional advancement. Traditional and evolving sources of financial support will be examined with an emphasis on grant writing. Required for Ed.D. program/Higher Education Administration major.

**ED-668. STUDENT SERVICES AND ENROLLMENT MANAGEMENT IN HIGHER EDUCATION**

**Credits:** 3

This course examines the comprehensive nature of student affairs as a vital component in the evolving learner-centered environments of higher education. Theory and effective practice are used to guide the discussion, investigate the issues, and generate solutions. Students investigate and seek potential solutions to authentic problems facing leaders in student affairs, such as those concerning student enrollment management, student diversity, student induction, advising and counseling, placement testing, career development, residential life, food services, health services, student activities, Greek organizations, athletics, security and discipline. Required for Ed.D. program/Higher Education Administration specialization.

**ED-669. INTERNSHIP IN HIGHER EDUCATION ADMINISTRATION (90 HOURS)**

**Credits:** 3

This internship is tailored to address the leadership needs and goals of students in higher education administration. It is designed to provide experience in the completion of identified administrative tasks within an institution of higher education under the guidance of a mentoring administrator. A Leadership Competency Portfolio and internship project will provide evidence of the leadership competencies attained. .

**Pre-Requisites**

completion of the Ed.D. Leadership core and Higher Education Administration courses. Department permission required.

**ED-670. CURRICULUM THEORY**

**Credits:** 3

This course will focus on the theory of curriculum and its philosophical and historical foundations and the ideologies that influence and shape curriculum. governance, control, and macro and micro perspectives of curriculum will be examined.

## Course Descriptions

### **ED-671. MEASUREMENT AND ASSESSMENT**

**Credits:** 3

This course provides an introduction to issues in educational measurement and assessment with an emphasis on applications in both k-12 and higher education settings. Topics include: types of assessments including standardized tests; portfolios, performance tasks; computer adaptive tests; test development; item writing and analysis; test administration; evaluating tests and items including reliability and validity; and interpreting test results.

### **ED-672. CURRICULUM DESIGN AND INSTRUCTIONAL MODELS**

**Credits:** 3

This course will engage students in the practical aspects of curriculum design and implementation, its evaluation, and the alignment of curriculum, instruction, and assessment, instructional models appropriate to addressing the needs of diverse learners in varied learning environments and delivery formats will be examined.

#### **Pre-Requisites**

[ED-670](#) and [ED-671](#)

### **ED-673. CONTROVERSIES IN CURRICULUM, INSTRUCTION, AND ASSESSMENT**

**Credits:** 3

This course explores the varying attitudes and beliefs of teaching, learning, and assessment as they relate to present-day curricular controversies. Students will analyze the cultural and social contexts of early childhood education, k-12 schooling, and post-secondary schooling. Specific emphasis will be given to the relevant salience of class, race, age, and gender as they relate to the study of everyday inequities in pre-k-20 education.

### **ED-679. INTERNSHIP IN CURRICULUM AND INSTRUCTION**

**Credits:** 3

This course is tailored to meet the needs of students who will work as leaders in curriculum and instruction within educational institutions. The internship is designed to provide experience in the completion of identified tasks related to curriculum and instruction under the guidance of a mentoring administrator. A leadership competency portfolio and internship project will provide evidence of the leadership competencies attained.

#### **Pre-Requisites**

completion of the Ed.D leadership core and curriculum instruction courses/department permission required.

### **ED-681. INTRODUCTION TO EDUCATIONAL RESEARCH**

**Credits:** 3

This course is designed to provide foundational knowledge of quantitative and qualitative research methodologies and to develop skills in reading and evaluating the quality of research. Focus is placed on research design factors such as sampling, validity, reliability, statistical methods, and ethical safeguards. Required to be taken in the first year of the Ed.D. program.

### **ED-682. QUANTITATIVE METHODS FOR EDUCATIONAL RESEARCH I**

**Credits:** 3

This introductory quantitative methods course will provide students with a fundamental understanding of the types of quantitative designs and statistical techniques used in education research. The course will use hands-on activities and emphasize the interpretation of data. Statistical software is used throughout the course.

#### **Pre-Requisites**

[ED-681](#) Introduction to Educational Research.

### **ED-683. QUALITATIVE METHODS IN EDUCATIONAL RESEARCH I**

**Credits:** 3

This course will provide students with a foundational knowledge of qualitative research focusing on designs and methodologies, theoretical and interpretive frameworks, ethical considerations, standards of validation, and introductory data collection, analysis, and reporting.

#### **Pre-Requisites**

[ED-681](#) Introduction to Educational Research.

### **ED-684. SPECIAL TOPICS IN EDUCATIONAL RESEARCH**

**Credits:** 1-3

This is a one to three credit hour course open to students in the doctoral program in Educational Leadership, but specifically for those who have a background in educational research. Topics are designed to further student's understanding of educational research and can include topics like survey design and analysis, mixed method approaches, qualitative data analysis, or an in-depth look at a particular method of research. Prerequisites: [ED-681](#), [ED-682](#) or equivalent, [ED-683](#) or equivalent. Department permission required.

#### **Pre-Requisites**

[ED-681](#), [ED-682](#) or equivalent, [ED-683](#) or equivalent. Department permission required.

### **ED-685. QUANTITATIVE METHODS FOR EDUCATIONAL RESEARCH II**

**Credits:** 3

This second-level quantitative methods course will provide students with the knowledge and skills necessary for using a variety of statistical methods in the analysis of educational research. This course covers advanced topics in quantitative research designs and statistical techniques. Statistical software is used throughout the course.

#### **Pre-Requisites**

[ED-681](#) and [ED-682](#). Department permission required.

### **ED-686. QUALITATIVE METHODS IN EDUCATIONAL RESEARCH II**

**Credits:** 3

This course is intended for students interested in pursuing qualitative research. It is designed to provide students with an in-depth understanding of qualitative designs and methodologies as well as practice applying these designs and methodologies in original research. Through this course, students will build on the knowledge and skills learned in [ED-683](#), with an increased focus on data collection, analysis, and reporting.

#### **Pre-Requisites**

[ED-681](#) and [ED-683](#). Department permission required.

### **ED-697. DISSERTATION PROPOSAL SEMINAR**

**Credits:** 3

Doctoral students are required to register for 3 credits of dissertation proposal each semester until the proposal is successfully defended and meets all departmental requirements, at which time 3 credits will be awarded.

#### **Pre-Requisites**

Acceptance into the Ed.D. Program and successful completion of doctoral core and major coursework. Department permission required.

### **ED-698. DISSERTATION PROPOSAL**

**Credits:** 3

Doctoral students are required to register for 3 credits of dissertation proposal each semester until the proposal is successfully defended and meets all departmental requirements, at which time 3 credits will be awarded.

#### **Pre-Requisites**

[ED-697](#) Dissertation Proposal Seminar. Department permission required.

### **ED-699. DISSERTATION**

**Credits:** 3

Doctoral students are required to register for 3 credits of dissertation each semester until the dissertation is successfully defended and meets all departmental requirements, at which time 3 credits will be awarded.

#### **Pre-Requisites**

Successful completion of the proposal defense in 698. Department permission required.

### **ED-5020. USING ONLINE RESOURCES TO BRING PRIMARY SOURCES TO THE CLASSROOM**

**Credits:** 3

Students will learn how to access and analyze primary sources, explore classroom applications, and develop authentic, engaging learning experiences for students. The course will enable students to discover how digital primary source archives can enhance and improve student learning.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-5024. EDUCATING THE NET-GENERATION**

**Credits:** 3

Students will explore the learning styles, expectations, and technical acumen of the Net-Generation and identify this generation's key educational and cultural influences then create pedagogy which meets their needs. Students will apply innovative techniques that today's generation values, including advances in technology, a team approach, and social networking.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

### **ED-5030. INSTRUCTIONAL DESIGN FOR ONLINE EDUCATORS™ (PLS)**

**Credits:** 3

Students will explore instructional design theories and approaches in the e-learning environment in order to understand the basics of instructional design and philosophies of e-learning, as well as gain experience with online delivery and interaction techniques and tools. (Previously titled ED 5002 Instructional Design for Online Educators)

### **ED-5031. FACILITATING ONLINE LEARNING COMMUNITIES™ (PLS)**

**Credits:** 3

Students will experience the strategies and best practices of successful online facilitation in order to engage diverse learners, support various learning styles, and handle conflict constructively. This course will focus on the practice of skills necessary to nurture a successful online learning community, manage myriad facilitator roles, and communicate positively and effectively. (Previously titled ED 5003 Facilitating Online Learning Communities)

### **ED-5032. ONLINE TEACHING FOR PENNSYLVANIA EDUCATORS (WILKES)**

**Credits:** 3

Students will complete required field experience for the PDE Online Instruction Endorsement as they explore topics focused on the professional responsibilities, effectiveness, and competencies for Pennsylvania's online teachers. Special consideration will be given to the social and ethical issues in online teaching and learning. Required for PA Online Instruction Endorsement. 20 hours field experience.

### **ED-5033. SOCIAL AND ETHICAL ISSUES IN ONLINE LEARNING (WILKES)**

**Credits:** 3

This course will lead students through the historical development of online education and the associated ethical and social issues that have accompanied it. Students will examine issues from multiple perspectives and formulate position statements that can be translated into policy and practice in educational settings. (Previously titled ED 5001 Social & Ethical Issues in Distance Learning)

## Course Descriptions

### **ED-5034. ACTION RESEARCH IN THE E-LEARNING ENVIRONMENT™ (PLS)**

**Credits:** 3

Students will employ online data collection techniques, interpret the data to affect change in the online classroom, and develop a research plan that integrates and makes effective use of e-learning technology. (Previously titled ED 5004 Action Research in the E-Learning Environment)

### **ED-5035. BLENDED AND SYNCHRONOUS LEARNING DESIGN™ (PLS)**

**Credits:** 3

This course focuses on two different formats for online learning environments: blended and synchronous. Students will define these environments, understand the development process each one requires, and conclude with considerations for implementing each. (Previously titled ED 5021 Blended and Synchronous Learning Environments)

### **ED-5036. BUILDING ONLINE COLLABORATIVE ENVIRONMENTS™ (PLS)**

**Credits:** 3

Students will experience the Web as a means of constructing new knowledge through conversation, networking, and collaboration. This course focuses on currently-available tools, such as blogs, podcasts, and wikis, and their utilization for learner engagement in research, writing, and learning. (Previously titled ED 5023 Building Online Collaborative Environments)

### **ED-5037. DEVELOPING ONLINE PROGRAMS (WILKES)**

**Credits:** 3

This course will examine the critical resources, leadership, support, and planning needed to develop and sustain quality online programs.

### **ED-5038. TEACHING AND LEARNING IN THE ONLINE LEARNING ENVIRONMENT (WILKES)**

**Credits:** 3

This culminating course is designed to examine the competencies that drive online teaching and learning. Students will explore ways that pedagogy and technology innovation intersect to drive change in education and create learning opportunities for all students.

### **ED-5080. TECHNOLOGY FOR ASSESSMENT & ADAPTATION**

**Credits:** 3

Technology for Assessment & Adaptation is designed to provide Instructional Technology Specialists with an understanding of how technology supports various types of educational assessments and the purpose of assessment in the decision-making process. In addition, this course will provide students with an understanding of the multi-disciplinary evaluation process and ability to articulate and analyze the findings presented in an evaluation report.

### **ED-5081. TECHNOLOGY TO SUPPORT ALL LEARNERS**

**Credits:** 3

Technology to Support All Learners is designed to provide Instructional Technology Specialists with an understanding of the varied characteristics of learners with disabilities and identify appropriate instructional strategies and resources to support diverse learners to achieve success within the school culture.

### **ED-5082. TECHNOLOGY TO SUPPORT CURRICULUM & INSTRUCTION**

**Credits:** 3

Technology to Support Curriculum and Instruction is designed to provide Instructional Technology Specialists with the ability to identify instructional technology resources to support diverse learners. The course focuses on specific exceptionalities and requires students to use quantitative reasoning strategies to analyze data and draw conclusions using various forms of school-wide and district-wide data.

### **ED-5083. COMMON CORE STANDARDS IN PRACTICE**

**Credits:** 3

The Common Core State Standards (CCSS), released in 2010 and adopted by the majority of states, clearly delineate the learning expectations for k-12 students. With the goal of college and career readiness, the CCSS have strong implications for curriculum, assessment, and instruction. This course provides an in-depth examination of their rationale, design, and impact on teaching and learning of all students. Research and practical application will be provided to guide effective implementation of the CCSS in English/ Language Arts and Math.

### **ED-5401. COLLABORATIVE INQUIRY FOR STUDENTS: PREPARING MINDS FOR THE FUTURE**

**Credits:** 3

This course provides educators with research-based strategies for designing and implementing collaborative inquiry for students. Collaborative inquiry fosters the skills students need now and in the future to develop a deeper understanding and mastery of content knowledge and skills. Participants will experience and evaluate the collaborative inquiry models of problem-based learning, hypothesis-based learning, project-based learning, Appreciative Inquiry, performance-based learning, and live-event learning. Participants will identify desired results and acceptable evidence by developing standards-based essential questions, topic questions, and assessments. Participants explore the role of the facilitative leader as they learn strategies for teaching collaboration and designing collaborative inquiry experiences.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.



**ED-5402. CULTURAL COMPETENCE: A TRANSFORMATIVE JOURNEY**

**Credits:** 3

This course equips experienced and beginning educators with the knowledge, awareness, and skills they need to work in today's diverse classroom settings for the goal of student success. Participants will have opportunities to critically examine how privilege and power impact educational outcomes and to understand the role of educators as agents of change for social justice. Learners will use the framework "know yourself, your students, and your practice" to better understand their roles in student achievement. By exploring diversity through multiple perspectives, participants will gain insight into how their own cultural lenses impact their relationships with students and families.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-5403. STUDENT ENGAGEMENT AND STANDARDS-BASED LEARNING**

**Credits:** 3

This course explores high-impact learning activities designed to help teachers optimize student learning. Participants will use standards as a basis for designing learning activities, assessments, and scoring guides and will prioritize learning based on curriculum. Using alignment criteria and the POINT design components, participants will evaluate, modify, expand, and design standards-based learning activities in order to maximize student learning, engagement, and achievement. A variety of learning activities aligned to standards and the QFL Process Skills are featured in this course as participants learn to address the needs of 21st century learners and foster progress toward deeper retention and transfer of learning.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-5404. STRATEGIES FOR THE INCLUSIVE CLASSROOM**

**Credits:** 3

This course provides practical, research-based strategies that enhance student achievement, learning and proficiency for the general population while meeting the unique and specific challenges of the exceptional learner.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

**ED-5405. TEACHING THE ENGLISH LANGUAGE**

**Credits:** 3

This course provides educators with the knowledge, skills, attitudes, insights, and resources to service English language learners. Guided by the Teachers of English to Speakers of Other Languages (TESOL) standards, students will explore theories and best practices promoting the construction of learning environments that support literacy development and content area achievement among English language learners.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

This course provides practical, research-based strategies that enhance student achievement, learning and proficiency for the general population while meeting the unique and specific challenges of the exceptional learner.

ED 541 through ED 561, ED 5020, ED 5024, and ED 5401-5405 were developed by educators at PLS 3rd Learning. The coursework is tightly structured, utilizing programmed learning with integrated audio-visual materials. Students conduct research in their own classrooms and report regularly on their success in employing strategies taught. Instructors for these courses receive special training prior to assignment. To register and pay tuition for these PLS 3rd Learning courses only, contact the PLS 3rd Learning office directly @ 1-866-757-2527 or visit [www.plsweb.com](http://www.plsweb.com).

All courses listed with a "W" (for Wilkes credit) on the PLS 3rd Learning course schedule may be used toward the required 12 credits of PLS 3rd Learning courses for the Wilkes EDS degree.

## Course Descriptions

### MTH. MATHEMATICS

#### MTH-411. REAL ANALYSIS

**Credits:** 4

A rigorous treatment of fundamental concepts in analysis, with emphasis on careful reasoning and proofs. Topics covered include the completeness and order properties of real numbers; limits and continuity; conditions for integrability and differentiability; infinite sequences and series of functions. Basic notions of the topology of the real line are also introduced.

**Pre-Requisites**

[MTH-302](#) (Introduction to Higher Mathematics) or consent of instructor

#### MTH-413. FUNCTIONS OF SEVERAL VARIABLES

**Credits:** 3

A modern treatment of calculus of functions of several real variables. Topics include: Euclidean spaces, differentiation, integration and manifolds leading to the classical theorems of Green and Stokes.

**Pre-Requisites**

[MTH-214](#) (Linear Algebra) and [MTH-411](#) (Real Analysis) or consent of instructor.

#### MTH-414. COMPLEX ANALYSIS

**Credits:** 3

Complex functions, limit, continuity, analytic functions, power series, contour integration, Laurent expansion, singularities and residues.

**Pre-Requisites**

[MTH-212](#) (Multivariable Calculus) or consent of instructor.

#### MTH-431. ABSTRACT ALGEBRA I

**Credits:** 4

A rigorous treatment of fundamental concepts in algebra, with emphasis on careful reasoning and proofs. Topics covered include equivalence relations, binary operations. Integers: divisibility, factorization, integers modulo  $n$ , elementary group theory, subgroups, cyclic groups, permutation groups, quotient groups. Homomorphisms and isomorphisms. Introductory topics in ring theory as time permits.

**Pre-Requisites**

[MTH-302](#) (Introduction to Higher Mathematics) or consent of instructor

#### MTH-432. ABSTRACT ALGEBRA II

**Credits:** 3

A continuation of [MTH-431](#). Includes the study of polynomial rings, ideals, field extensions and Galois Theory.

**Pre-Requisites**

[MTH-431](#) (Abstract Algebra).

#### MTH-442. TOPOLOGY

**Credits:** 3

An introduction to point-set topology, including a study of metric spaces, topological spaces, countability and separation axioms, compactness, connectedness, product spaces.

**Pre-Requisites**

[MTH-411](#) (Real Analysis) or consent of instructor.

#### MTH-443. GEOMETRY

**Credits:** 3

A study of selected topics from Euclidean and non-Euclidean geometry.

**Pre-Requisites**

[MTH-302](#) (Introduction to Higher Mathematics) or consent of instructor

#### MTH-451. PROBABILITY AND MATHEMATICAL STATISTICS I

**Credits:** 3

Random variables, probability distributions, expectation and limit theorems, confidence intervals.

**Pre-Requisites**

A one-year calculus sequence or consent of instructor.

#### MTH-452. PROBABILITY AND MATHEMATICAL STATISTICS II

**Credits:** 3

Hypothesis testing, non-parametric methods, multivariate distributions, introduction to linear models.

**Pre-Requisites**

[MTH-451](#) or consent of instructor.

#### MTH-454. STATISTICAL METHODOLOGY

**Credits:** 3

This course emphasizes applications, using statistical computer packages (R, SPSS) and real data sets from a variety of fields. Topics include estimation and testing; stepwise regression; analysis of variance and covariance; design of experiments; contingency tables; and multivariate techniques, including logistic regression.

**Pre-Requisites**

[MTH-451](#) or consent of instructor.

#### MTH-461. PARTIAL DIFFERENTIAL EQUATIONS

**Credits:** 3

**Fees:** \$40

Partial differential equations and boundary value problems, inner product spaces, orthogonal functions, eigen value problems, Sturm-Liouville equations, Fourier series, Fourier transforms, Green's functions, and classical equations of engineering and physics.

Offered fall of odd years.

**Pre-Requisites**

[MTH-211](#) and [MTH-212](#)

#### MTH-462. ADVANCED CALCULUS

**Credits:** 3

**Fees:** \$40

Topics from advanced calculus, including matrix representation of differentials and the multivariable chain rule, vector calculus, curvilinear coordinates, tensors, change of variables in higher dimensions, improper multiple integrals, applications of line and surface integrals, differential forms and the general Stokes' theorem, potential theory, and Taylor's formula for functions of several variables.

Offered fall of even years

**Pre-Requisites**

[MTH-212](#) (Multivariable Calculus)

**MTH-463. OPERATIONS RESEARCH****Credits:** 3

A survey of operations research topics such as decision analysis, inventory models, queuing models, dynamic programming, network models, and linear programming. Cross-listed with [CS-463](#). Offered in the spring semester of odd-numbered years when demand warrants.

**Pre-Requisites**

Programming experience in a high-level language and completion of a one-year calculus sequence.

**MTH-464. NUMERICAL ANALYSIS****Credits:** 3

An introduction to numerical algorithms as tools to providing solutions to common problems formulated in mathematics, science, and engineering. Focus is given to developing the basic understanding of the construction of numerical algorithms, their applicability, and their limitations. (Cross-listed with [CS-464](#))

**Pre-Requisites**

Programming experience in a high-level language and completion of a one-year calculus sequence.

**MTH-465. NUMERICAL LINEAR ALGEBRA****Credits:** 3

Direct and iterative methods for the solution of systems of linear equations, matrix decompositions, computation of eigenvalues and eigenvectors, and relaxation techniques. The theoretical basis for error analysis including vector and matrix norms. Applications such as least squares and finite difference methods. Offered spring semester of even-numbered years.

**Pre-Requisites**

MTH 214 and CS 125 (or equivalent programming experience)

**MTH-470. READINGS IN MATHEMATICS****Credits:** 3**Pre-Requisites**

Consent of Mathematics Department Chairperson May be repeated for credit if a different topic is selected.

**MTH-511. MEASURE AND INTEGRATION****Credits:** 3

Measures, measurable functions, integration, convergence theorems, product measures, signed measures.

**Pre-Requisites**

[MTH-442](#) or consent of instructor.

**MTH-513. FUNCTIONAL ANALYSIS****Credits:** 3

Topics include: Banach spaces,  $L_p$ -spaces, Hilbert spaces, topological vector spaces, and Banach algebra.

**Pre-Requisites**

[MTH-411](#) and a course in linear algebra.

**MTH-532. MODERN ALGEBRA****Credits:** 3

A study of group theory (including the Sylow Theorems and solvable groups); ring theory (including the Noetherian rings and UFDs); modules, tensor algebra, and semi-simple rings.

**Pre-Requisites**

[MTH-431](#), and a course in linear algebra or consent of instructor.

**MTH-542. ALGEBRAIC TOPOLOGY****Credits:** 3

Polyhedra, simplicial homology theory, cohomology rings, and homotopy groups.

**Pre-Requisites**

[MTH-442](#).

**MTH-590. THESIS WRITING****Credits:** up-6**Pre-Requisites**

Consent of Department Chairperson