ACTUARIAL SCIENCE, B.S.

Program Description

The B.S. in Actuarial Science is designed to prepare students for the actuarial profession. Actuaries utilize tools from mathematics, statistics, and business to measure and manage risk in industries such as insurance, banking, investments, energy, and e-commerce. The program's curriculum prepares students to take two actuarial society exams while enrolled and to obtain actuarial society credit in all three Validation by Educational Experience areas. Students who ultimately choose not to pursue the actuarial profession can apply the problem-solving and technical skills gained as analysts in industries such as those mentioned above.

Why Take This Major?

As is the case for the mathematics major, a major in Actuarial Science helps one to think logically, to formulate complex problems in a well-defined manner, to critically analyze data, and to determine optimal solutions to real-world problems. In addition, the Actuarial Science major provides students with a well-rounded background in areas of Economics, Business, and Finance to better prepare them for careers in the field.

Degree Earned

B.S.

Required for Graduation

- Courses
  - Major: 18
  - Total: 38
- Credits
  - Major: 60
  - Total: 120
- GPA
  - Major: 2.0
  - Cumulative: 2.0

Student Learning Outcomes

Upon completion of the program, students will be able to:

- demonstrate competency in the areas that comprise the core of the mathematics major
- be able to use appropriate technologies to solve mathematical problems
- be able to construct appropriate mathematical models to solve a variety of practical problems
- demonstrate competency in the areas of Probability and Statistics
- demonstrate competency in the area of Financial Mathematics

Progress Chart

Level One - Core Courses

12 courses and 2 modules required.

Major Requirements

Major requirements include 4 Level Two ILO requirements*, fulfilled through the major.*

Students in this major must complete **38** courses in total in order to graduate. **18** courses will be from this major program.

Code	Title	Credits
Level One - Core Courses		
Universal Required Courses		
Students must complete the following 4 courses.		
ILO 8.1: Written Communication (https://catalog.lasalle.edu/undergraduate/ilo/)		
ENG 110	College Writing I: Persuasion	3
ILO 5.1: Information Literacy (https://catalog.lasalle.edu/undergraduate/ilo/)		
ENG 210	College Writing II: Research	3
ILO 1.1: Understanding Diverse Perspectives (https://catalog.lasalle.edu/undergraduate/ilo/)		
FYS 130	First-Year Academic Seminar [1]	3
ILO 2.1: Reflective Thinking and Valuing (https://catalog.lasalle.edu/undergraduate/ilo/)		
REL 100	Religion Matters	3
Elective Core Courses		
Students must complete 1 course in each of the following 4 ILOs.		
ILO 3.1a: Scientific Reasoning (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		4
ILO 3.1b: Quantitative Reasoning (https://catalog.lasalle.edu/undergraduate/ilo/)		
MTH 120	Calculus I	4
ILO 6.1: Technological Competency (https://catalog.lasalle.edu/undergraduate/ilo/)		
CSC 230	Programming Concepts and User Interfaces	4
or CSC 280	Object Programming	
ILO 8.1a/12.1: Oral Communication/Collaborative Engagement (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		3
Distinct Discipline Core Courses		
Students must complete 1 course in each of the following 4 ILOs. Each course must be from a different discipline. (A "discipline" is represented by the 3- or 4-letter prefix attached to each course.)		
ILO 4.1: Critical Analysis and Reasoning (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		3
ILO 9.1: Creative and Artistic Expression (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		3
ILO 10.1: Ethical Understanding and Reasoning (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		3
ILO 11.1: Cultural and Global Awareness and Sensitivity (https://catalog.lasalle.edu/undergraduate/ilo/)		
Choose course within ILO (https://catalog.lasalle.edu/undergraduate/ilo/)		3

Universal Required Modules		
Students must complete the following 2 non-credit modules.		2
ILO 7.1a (https://catalog.lasalle.edu/undergraduate/ilo/)		
Health Literacy Module		
ILO 7.1b (https://catalog.lasalle.edu/undergraduate/ilo/)		
Financial Literacy Module		
Major Requirements		
Level Two		
Students must complete 1 course/learning experience in each of the 4 commitments.		
ILO 2.2: Broader Identity (Capstone Course/Experience) (https://catalog.lasalle.edu/undergraduate/ilo/)		
MTH 322	Differential Equations	4
Select one ILO from 3.2a, 3.2b, 4.2, 5.2, 6.2, 7.2a, or 7.2b: Expanded Literacies (https://catalog.lasalle.edu/undergraduate/ilo/)		
MTH 240	Linear Algebra (ILO 3.2b)	4
ILO 8.2b: Effective Expression (Writing-Intensive Course) (https://catalog.lasalle.edu/undergraduate/ilo/)		
MTH 302	Foundations of Mathematics	3
Select one ILO from 10.2, 11.2, or 12.2: Active Responsibility (https://catalog.lasalle.edu/undergraduate/ilo/)		
MTH 410	Probability	3
All Other Required Courses		
MTH 120	Calculus I	4
MTH 121	Calculus II	4
MTH 222	Calculus III	4
MTH 240	Linear Algebra	4
MTH 302	Foundations of Mathematics	3
MTH 322	Differential Equations	4
MTH 410	Probability	3
MTH 411	Mathematical Statistics	3
MTH 415	Financial Mathematics	3
CSC 230	Programming Concepts and User Interfaces	4
or CSC 280	Object Programming	
Two MTH Electives 300-level or higher		6-8
ECN 150	Introductory Macroeconomics: The U.S. in the Global Economy I	3
ECN 201	Introductory Microeconomics: Business Firm and Market Analysis I	3
BUS 101	Introduction to Financial Accounting	3
BUS 206	Financial Markets and Institutions: Principles and Applications	3
BUS 208	Fundamentals of Financial Management	2-3
FIN 304	Financial Decision-Making	3
Free Electives		
In addition to the requirements listed above, students must take enough courses to the fulfill graduation credit requirements for their School and major.		
Total Credits		**114-117**

1

NOTE. The following students use Level 2 Capstone Experience in Major instead of FYS 130 First-Year Academic Seminar: Honors, BUSCA, Core-to-Core, Transfer, and Non-Traditional/Evening.

2

The Modules are **not** required for Transfer Students, Core-to-Core Students, or BUSCA Students. BUSCA students are required to take modules if/when they pursue a bachelor's degree.

Recommended Course Sequence

Students should complete the Calculus sequence (MTH 120 Calculus I/MTH 121 Calculus II/MTH 222 Calculus III) and BUS 101 Introduction to Financial Accounting within their first three semesters since many of the remaining courses rely on the knowledge from these four courses. Additionally, MTH 240 Linear Algebra and MTH 302 Foundations of Mathematics should be taken during the sophomore year, while the remaining MTH courses should be taken during the junior and senior years.

Course Descriptions

Business Administration

BUS 100 Business Perspectives
An integrative freshmen course that addresses business processes at an introductory level by examining key business areas through the preparation of a business plan. Students gain an appreciation for how each part of a business functions on its own and how business processes interact with each other. The course culminates in our signature Bankers Day event in which each team presents their final business plan to a panel of business executives for evaluation. The course emphasizes cross-disciplinary experiential learning, group dynamics, and personal interaction with faculty, business professionals and entrepreneurs in a small-class environment. Students are introduced to team-building, entrepreneurship, and business plans at the beginning of their academic program in order to build and develop their skills over the next three years. Students should take this course as early on as possible. Generally the course is not open to seniors.

BUS 101 Introduction to Financial Accounting
The course introduces financial reporting by focusing on the fundamental principles of recording business transaction with emphasis on the presentation and interpretation of corporate financial information. Topics include an overview of financial reporting and the accounting cycle, as well as, accounting and reporting of operating, investing and financing activities of a business. Assignments employ both Excel and SAP.

BUS 102 Accounting for Financial and Managerial Decision-Making
An introduction to the fundamentals of managerial accounting with a special emphasis on using accounting information in decision making. Topics covered include corporate capital stock structure, planning and control systems, cost management systems, pricing decisions, and capital expenditure decisions. Assignments employ Excel. Prerequisite(s): BUS 101, CSC 155 and MTH 114 (CSC 155 and/or MTH 114 can be taken concurrently)

BUS 121 Intro - Financial Accounting

BUS 123 Intro - Org Behavior

BUS 125 Intro - Info Technology

BUS 150 Presentation and Collaboration Skills for Business
Focuses on the skills needed to link oral communication with the ability to work effectively in the current organizational environment. This course is based on the understanding that content and effective presentation of material are equally important in the understanding of communication. Active participation through oral presentations on current business topics is required. Students will make use of computer-based presentation technology.

BUS 170 Special Topics

BUS 200 Business Professionalism and Career Preparation
The course will focus on critical professional development skills to enable students to connect their education to experiential learning opportunities and post-graduation goals. Students will become aware of industry trends relating to job opportunities, current job search techniques, personal branding strategies, the value of developing a well-connected network, and how to deliver flawless documents to targeted organizations. The course will combine the theories on professional development with real-life applications through assignments and participation in professional events to allow students to see themselves as a professional, rather than just a student. At the end of the course, students will understand the importance of demonstrating these professional skills throughout their collegiate experience (e.g. dressing professionally for presentations, developing quality resumes and cover letters, networking with alumni and guests, etc.) Restriction(s): Sophomore standing

BUS 202 Descriptive and Predictive Analytics
This course explains what happened and what will happen in business organizations using basic statistical methods relevant to descriptive and predictive analytics. The availability of massive amounts of data and technologies to process these data enables business organizations to use analytical approaches to decision-making. Descriptive analytics is the use of data to find out what has happened in the past or is currently happening; statistical techniques include descriptive statistics and visualization. Predictive analytics is the use of data to find out what could happen in the future; statistical techniques include regression analysis. This course will cover these techniques, descriptive statistics, visualization, and regression analysis, with emphasis on problem-solving and decision-making. This course will also cover probability, probability distributions, and statistical inference. Students will perform data analysis using statistical software packages. Prerequisite(s): MTH 114; CSC course recommended as a pre-requisite but may be taken concurrently

BUS 203 Organizational Behavior and Skill Development
This course examines the behavior of individuals and groups in organizations, with the goal of understanding performance in the new workplace. It is designed to enhance the career potential of people with management and team leadership responsibilities in all areas of business. Topics include: motivation, theories and practice of leadership, individual and group decision making, conflict resolution, communication, international aspects of organizational behavior, perception, individuality, working in groups and teams, and ethical issues of organizational life. The course also emphasizes interactive and experiential learning to demonstrate the issues of organizational behavior. Through active participation, students will develop skills in leadership, communication, negotiation, teamwork, and group decisionmaking. Career awareness and skill assessment will be done through brief lectures, personal inventories, and career planning experiences. Prerequisite(s): sophomore standing

BUS 204 Principles of Marketing with Applications
An overview of marketing concepts and principles applicable to business and other organizations. These include: factors influencing the marketing environment and buyer behavior; market segmentation and targeting; product development, pricing, promotion and distribution to satisfy the needs of selected target markets. Approximately one-third of the course is dedicated to planning and to applying marketing-based concepts to profit and non-profit enterprise situations.

BUS 205 Business Systems for Analytics
This course studies how business systems work and examines challenges confronting business organizations in the information age and beyond. One major challenge is to efficiently and effectively use three most important organizational resources, information, technology, and people, to provide service and value. To meet this challenge, the course studies business systems and strategies that organizations can utilize to organize data into information and synthesize information into knowledge. The course examines design and development of relational database management systems using Microsoft Access (structured query language), decision support systems using Microsoft Excel (what-if analysis, pivot tables, and decision tree analysis), enterprise information systems using SAP (ERPsim), and web-based systems using Google Analytics. The concepts, models, and frameworks are derived from both academic and professional sources. Prerequisite(s): CSC 155

BUS 206 Financial Markets and Institutions: Principles and Applications
An introduction to the basics of institutional finance. Financial instruments are generated and traded by participants in financial markets with financial intermediaries facilitating the process. Concepts, terminology, and current practices in each of these areas are examined, along with the impact they have on the economy. Students work on "mini cases" which employ actual data to help better understand the principles examined in the course. Prerequisite(s): BUS 101

BUS 208 Fundamentals of Financial Management
An introduction to the major concepts and techniques of financial management with an emphasis on time value of money, security valuation, cost of capital, capital budgeting, and financial statement analysis. Prerequisite(s): BUS 101, MTH 114, CSC 155

BUS 208E Fund Financial Mgt

BUS 209 Financial Management

BUS 250 Personal Financial Literacy: Skills for Life
This course prepares students to understand the fundamentals of managing personal finances. It will provide a broad overview of the basic issues in personal finance and help students develop an organized approach to making intelligent financial decisions in everyday life with the ultimate goal being successful money management and wealth accumulation. Topics covered will include: financial planning and goal setting; budgeting; basic financial transactions; banking services and products; consumer credit; housing decisions; current regulations and practices governing consumer financial transactions and contracts; insurance; basic investments; retirement planning; planning for education. This course is an elective for all business majors. Prerequisite(s): Junior standing

BUS 260 So PT Internship

BUS 270 Special Topics

BUS 271 Special Topics

BUS 300 International Business
Students study international aspects of accounting, finance, economics, management, marketing and management information systems. The course helps students develop an appreciation for how different cultures, governments, and approaches to doing business impact international business-to-business relationships as well as devising strategies to enter markets in other countries. In some semesters the course is taught as a travel-study course that includes company site visits. Prerequisite(s): BUS 101

BUS 303 Legal and Ethical Environment of Business
A study of the American legal system exploring how courts decide cases and the values that play a role in such adjudication. The nature, formation, and application of law to individuals and business. The development of law, with emphasis on the Constitution, personal and business torts, the employment relationship, discrimination, international legal perspectives, and an exploration of legal ethics and the ethics of corporations. Prerequisite(s): sophomore standing

BUS 304 Prescriptive Analytics
In this course students learn how to run business operations efficiently and effectively using prescriptive analytics tools and techniques in managerial decision making. The course introduces students to several quantitative models used in contemporary analytics. Analysis of business scenarios using computer software allows a focus on the conceptual understanding of prescriptive models. Prescriptive topics covered include: decision analysis, Bayesians analysis, stochastic and deterministic forecasting, inventory management, linear programming and optimization, simulation, and project management. Prerequisite(s): MTH 114, BUS 202, AND BUS 205

BUS 305 International Business

BUS 310 Read Bus: Corp Soc Respon Rptg
This course explores broad, multidisciplinary, generic business issues through various readings with a current events focus. Examples of themes that might be studied are: diversity, corporate governance, social responsibility, leadership, entrepreneurship, technology, globalization, and financial disclosure. A quasi-independent study, this course meets two or three times during the semester. Grading is on a pass/fail basis. Prerequisites: Other than junior standing, there are no prerequisites; the course may be taken by non-business majors as well as business majors.

BUS 360 Jr PT Internship

BUS 370 Bus Readings

BUS 371 Special Topics

BUS 373 Special Topics

BUS 400 Business Strategy
This is the capstone course for Business majors. It takes the perspective of company's senior management, who are tasked with building and sustaining a competitive advantage for the firm. It explores how the functions of the business are continuously shaped in response to the company's internal and external environments. The course includes industry analysis, company and competitor assessment, approaches to strategy formulation and implementation, and business ethics. Prerequisite(s): senior standing

BUS 444 Independent Research

BUS 460 PT Internship in BUS

Computer Science

CSC 151 Introduction to Computing Using Packages
This course offers a survey of computers and computer systems as well as problem-solving and computer applications for business and social science and an introduction to a PC-based Graphical User Interface/ windowed operating system. Computer packages include a word processor, electronic spreadsheet, and presentation software. Internet use includes electronic mail and the World Wide Web. Restriction(s): Credit will be given for only one of CSC 151, 152, 154, and 155.

CSC 152 Computer Technology for the Sciences
This course provides a survey of computers and computer systems as well as problem-solving and computer applications for science and mathematics, including data analysis and regression. It includes an introduction to a PC-based Graphical User Interface/ windowed operating system and covers word processing, design and use of electronic spreadsheets, and presentation software. Internet use includes electronic mail and the World Wide Web. Restriction(s): Credit will be given for only one of CSC 151, 152, 154, and 155. Prerequisites: Mth 101 or 102M Math Placement Score

CSC 154 Healthcare Informatics
This course promotes an understanding of computer systems and related technologies as they are utilized by healthcare professionals across a variety of settings. The role and value of medical record technology such as Electronic Medical Records (EMRs) and Electronic Health Records (EHRs) are explored. Also studied is the relationship of healthcare informatics to patient safety and legal and ethical issues associated with the collection of personal and health data. Students collaborate and discuss these issues using technologies such as email, blogs, wikis, Websites, e-Portfolios, and mobile devices. Strategies for searching relevant library databases as well as government and health organization Websites are developed. Restriction(s): Credit will be given for only one of CSC 151, 152, 154, and 155.

CSC 155 Introduction to Computer Applications for Business
This course addresses effective analysis, design, and presentation of information for business, including advanced word processing, presentation graphics, spreadsheets, and databases, with emphasis on analysis. Topics include formulas, functions, charting, sorting, filtering, pivot tables, what-if analysis, database queries and reports, and business-specific library databases. Restriction(s): Credit will be given for only one of CSC 151, 152, 154, and 155.

CSC 171 Special Topics

CSC 175 Special Topics

CSC 177 Special Topics

CSC 230 Programming Concepts and User Interfaces
This course addresses problem solving and programming using problem-based learning; variables, control flow, iteration, modules, arrays, file processing, classes, and objects; and basic graphical-user interface concepts (forms/pages and controls) for desktop and/or Web or mobile environments. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): MTH 101 or Math Placement Score 102M Corequisite(s): CSL 230

CSC 240 Database Management Systems
This course includes components of database systems, database models: entity-relationship, relational, hierarchical, network; normalization, integrity, relational algebra, query languages, system security, distributed databases, and social and ethical concerns. In addition, case studies using a relational DBMS will be implemented.

CSC 270 Special Topics

CSC 271 Special Topics

CSC 272 Special Topics

CSC 273 Special Topics

CSC 275 Special Topics

CSC 280 Object Programming
This course involves problem solving using a high-level object-oriented language, such as Java; analyzing problems, designing a solution, implementing a solution, testing, and debugging; abstraction, encapsulation, and inheritance; using, designing, creating, and testing classes; and selection, iteration, and simple collections, such as arrays. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): CSC 230. Corequisite(s): CSL 280

CSC 290 Introduction to Data Structures and Algorithms
This course is a continuation of CSC 280. It focuses on abstract data types, including lists, stacks, queues, binary trees, and hash tables; recursive techniques; iterators; and use of classes in the Java Collections Framework for problem solving. The course consists of three hours of lecture and three hours of laboratory per week. Prerequisite(s): CSC 280 Corequisite(s): CSL 290

CSC 301 Computer Architecture
This course is an introduction to computer architecture and hardware; underlying structures needed to accomplish tasks electronically; and hardware and software architecture components relative to memory management, I/O control, and processing capabilities. Prerequisite(s): CSIT 220

CSC 340 .Net Programming
This course focuses on programming in .NET (such as Visual Basic.NET or C#) and Active Server Pages (ASP.NET) that supports work with databases and the Web; models that support database access, such as MS SQL, Entity Framework, and LINQ; design and development of solutions to problems using database tools and programming; and database-driven Web sites, including validation, navigation, and security. (offered in alternate years) Prerequisite(s): CSC 230 and CSC 240

CSC 341 Open-Source Application Development
Students will develop Web solutions that integrate client- and server-side interfaces. The emphasis for the course will be on development for server side, with results being viewed and designed for the client. At least half of the course will include database maintenance using the open-source solution, including development of authentication and authorization. (offered in alternate years) Prerequisite(s): CSC 230 and CSC 240

CSC 343 Client-Side Scripting
This course will require students to design and develop standards-based client interfaces for Web/client-side applications using the latest versions of HTML, CSS, and Javascript. Students will study Web-based standards and application/design styles. Students will also use popular Web-development tools. Some mobile development will be included in the course. (offered in alternate years) Prerequisite(s): CSC 230

CSC 349 Mobile Computing
This course covers software mobile application development, its architecture and lifecycle as well as its inherent design considerations. Students will learn about mobile resources, activities, views, layouts, and intents in addition to interacting with the location-based services, messaging services, multimedia interfaces, and sensors available on the mobile device. The applications developed will manage data input from and output to files, databases, and content providers. After developing applications in an emulation environment, students will install them on individual mobile devices as well as prepare them for marketplace distribution. (offered in alternate years) Prerequisite(s): CSC 280

CSC 366 Language Theory and Design
This course involves programming languages; historical perspective and underlying serial computation model; theory: finite automata, Backus-Naur Form, representations, and grammars; and design: syntax, semantics, run-time implementation, and application domains. Language paradigms will include procedural, functional, logical, object-oriented, and non-sequential processing. (offered in alternate years) Prerequisite(s): CSC 290 and MTH 261

CSC 370 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 371 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 372 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 373 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 374 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 375 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 376 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 377 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 378 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 379 Selected Topics in Computer Science
This course is an introduction to specialized areas of computer science. The topics will vary from term to term. Prerequisite(s): junior or senior standing

CSC 381 Software Engineering
The intent of this course is to focus on basic concepts and major issues of project design using a software engineering approach; the software development life cycle; structured analysis and object-oriented design techniques; and modeling, project planning, requirements definition, and requirements testing. Prerequisite(s): CSC 290

CSC 444 Research in CSC I
This course provides the student with an opportunity to do research with a faculty member. The student and the faculty member agree on the research project before the student registers for the course.

CSC 445 Research in CSC II
This course is a continuation of the 444 research course. It provides the student with an opportunity to continue to conduct research with a faculty member.

CSC 446 Data Mining
This course introduces data mining, with an emphasis on applying machine learning techniques for data mining; popular methods, such as learning of decision trees, decision tables, rules, and cases; algorithms and applicability; practical applications; data preparation and evaluation of results, including human role in data mining; and ethical issues. (offered in alternate years) Prerequisite(s): CSC 280

CSC 456 Artificial Intelligence
Intelligent systems technologies that have or may become practical for organizational use will be addressed in this course. Topics may include simple expert systems and expert systems with certainty factors, case-based reasoning, machine learning, neural networks, genetic algorithms, fuzzy logic, and two-person game playing. (offered in alternate years) Prerequisite(s): CSC 280 and MTH 260

CSC 457 Operating Systems
Principles and concepts of process and resource management in operating systems will be the focus of this course. I/O programming; interrupt mechanism and memory management; processor management; scheduler; priority queues; traffic controller; device management; and information management and file systems are select topics. (offered in alternate years) Prerequisite(s): CSC 290

CSC 460 Internship
Internships offer part-time, paid, or non-paid employment in a cooperating site to provide practical experience in the discipline. Working under professional supervision for at least 20 hours per week, students learn how to apply their education to the everyday demands of the world of work. Students will meet regularly with a faculty member and will be encouraged to reflect on the relationship between coursework and their internship experience. Prerequisite(s): junior or senior standing, 2.5 GPA overall and in the major, and departmental approval

CSC 464 Theory of Algorithms
Students will engage in problem-solving strategies, including divide and conquer, greedy, backtracking, and dynamic programming; will focus on the complexity analysis of algorithms; and will be introduced to complexity classes P and NP, with strategies for NP-complete problems. (offered in alternate years) Prerequisite(s): CSC 290 and MTH 261

CSC 470 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 471 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 472 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 473 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 474 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 475 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 476 Selected Topics in Computer Science
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 477 Selected Topics in Computer Sc
This course provides an introduction to specialized research in computers and computing, concentrating on one particular aspect of computer science. The subject matter will vary from term to term. Prerequisite(s): junior or senior standing

CSC 478 Selected Topics in Computer Sc

CSC 479 Selected Topics in Computer Sc

CSC 481 Project Implementation
This course addresses implementation issues, programming language features, validation and verification techniques, and software maintenance. It requires a team project to develop, document, test, and maintain a software system. Prerequisite(s): CSC 381

Economics

ECN 150 Introductory Macroeconomics: The U.S. in the Global Economy I
After introducing students to the what and how of economic thinking, the course explores the causes of national economic prosperity and economic problems such as unemployment and inflation. It also discusses the role of fiscal and monetary policies, economic growth, and international economic relations among the U.S. and other countries.

ECN 170 Special Topics

ECN 201 Introductory Microeconomics: Business Firm and Market Analysis I
This course explores many issues pertaining to the operation of businesses and the markets in which they operate. Among these are the behavior of consumers, the determinants of prices and production levels, and the efficiency of market outcomes. As time allows, the course applies economic thinking to issues like economic inequality, environmental concerns, international trade, and firms with monopoly power. Prerequisite(s): ECN 150

ECN 213 Statistics for Economics and Political Science
This course focuses on basic statistical methods used in the analysis of economic and political phenomena and decision-making. Emphasis is on the application of statistical techniques and the sound interpretation of statistical results. Topics include descriptive statistics, probability, sampling and sampling distributions, statistical estimation, hypothesis testing, simple regression, and correlation.

ECN 221 Intermediate Microeconomics: Business Firm and Market Analysis II
This course studies how business firms interact with consumers and one another in product and resource markets. Besides distilling profit-maximizing criteria for different firms in different markets, the course also evaluates how the operation of firms impacts the welfare of society in general. Prerequisite(s): ECN 201; MTH 114 or 120 or equivalent

ECN 222 Intermediate Macroeconomics: The U.S. in the Global Economy II
This course analyzes the factors behind countries' long-term growth and also those responsible for short-term fluctuations in their levels of output and prices. It also demonstrates how economic booms and busts have prompted economists to search for explanations and possible policies for addressing these instabilities. Finally, the course compares and contrasts U.S. historical experience with that of other nations. Prerequisite(s): ECN 150; MTH 114 or 120 or equivalent

ECN 270 Special Topics in Economics
Topics include Labor Markets, Employment and Wages; Women in the Economy; European Union; Economics of Sports; Economics of Entertainment; and Law and Economics. Prerequisite(s): Permission of instructor

ECN 271 Special Topics

ECN 272 Special Topics

ECN 273 Special Topics

ECN 274 Special Topics

ECN 275 Special Topics

ECN 276 Special Topics

ECN 277 Special Topics

ECN 279 Special Topics

ECN 287 Economics Internship
Working approximately 10 to 15 hours per week under professional supervision, students learn experientially the linkages between their formal studies and the demands of particular positions. Under faculty supervision, students complete informal and formal written assignments and an oral presentation that describe their duties and interpret their intern experience. Prerequisite(s): ECN 201, at least sophomore standing, and permission of Department Chair

ECN 288 Economics Internship
Working approximately 10 to 15 hours per week under professional supervision, students learn experientially the linkages between their formal studies and the demands of particular positions. Under faculty supervision, students complete informal and formal written assignments and an oral presentation that describe their duties and interpret their intern experience. Prerequisite(s): ECN 201, at least sophomore standing, and permission of Department Chair

ECN 314 Econometrics
This course introduces the student to advanced statistical techniques used by economists, other social scientists, and people in business and law to test theories, predict future events, and provide empirical support for various types of hypotheses. The course emphasizes the applied nature of econometrics. As such, the student will construct, estimate, and evaluate well-specified regression models through computer application-based exercises using SAS statistical software. Prerequisite(s): ECN 213 or BUS 202 or permission of Chair

ECN 331 International Economics
This course involves an introduction to the theory of international trade. Topics include specialization and the gains from trade, tariffs, and protectionist policies, trade imbalances, the role of international institutions, foreign exchange markets, and monetary and fiscal policies in an open economy. Prerequisite(s): ECN 150 and ECN 201

ECN 332 Political Economy of Africa
This course examines the political and economic conditions in Sub-Saharan Africa and provides a historical perspective on these conditions. Issues examined include the political and economic consequences of colonialism, post-independence political forces and economic policies, and U.S. foreign policy toward Africa. Prerequisite(s): ECN 150

ECN 333 Ecn of International Business
This course examines trade theory and applies the theory to business firms. It introduces the cultural, environmental, and ethical issues facing international businesses and examines the impact of trade policies, foreign exchange, and the balance of payments on businesses' decision making. Prerequisites: ECN 150, 201; MTH 114 or 120; junior standing.

ECN 334 The Political Economy of Latin America
This course begins by examining aspects of the indigenous societies prior to the arrival of Europeans in what has come to be called "Latin America." Throughout, it considers issues such as colonialism, militarism, race, gender relations, and religion that have shaped the societies, polities, and economies of nations from Mexico and the Caribbean to those of the Southern Cone. The goal of the course is to afford class members the opportunity to better understand Latin America's history as a basis for comprehending its likely future. Cross-listed with HIS334 and POL 334.

ECN 335 International Trade and Trade Wars
This course provides an overview of the U.S. in the global economy and the history of the World Trade Organization (WTO), an examination of the WTO's dispute settlement mechanism, and an examination of major trade disputes that involve the U.S. The course ultimately explores how international trade laws, politics, diplomacy, and multi-national corporations in pursuit of profits interact. Prerequisite(s): ECN 150

ECN 337 Political Economy of Eastern Europe
This course first explores the structure and outcomes of a centrally-planned economic system in contrast to a market-based economic system. Second, it examines how the transition from planned to market took place (or is still under way) in Eastern Europe and the countries of the former Soviet Union. Lastly, it considers a wide range of contemporary political and economic challenges facing countries across the region, from building democratic institutions and strengthening the rule of law to establishing competitive markets and addressing social and economic injustices. Prerequisite(s): ECN 150

ECN 340 American Economic History
This course describes and analyzes long-term economic growth and development since colonization. It stresses changes in demographic, technological, and institutional factors as they interact with the market system. Basic economic concepts and theories of growth are applied to significant historical questions. Prerequisite(s): ECN 150

ECN 351 Environmental Economics
Provides an introduction to the trade-offs (costs versus benefits) associated with environmental issues. Evaluating trade-offs requires an examination of the magnitude or current environmental problems and some consideration of how to measure the costs and benefits of regulatory changes. Approximately half the course will be devoted to examining the current regulations, how the regulatory process works, and the economic implications of the regulations. Prerequisite(s): ECN 150 or permission of Chair

ECN 352 Labor Economics

ECN 354 Economics of the Entertainment Industry
The course surveys the economics of the entertainment industry with an emphasis on the importance of market structure (perfect competition, monopolistic competition, oligopoly, monopoly) in determining behaviors and profitability. In this course, we will apply many microeconomic, and a few macroeconomic, concepts to evaluate structure, workings, and profitability of various segments in the entertainment industry, ranging from movies to music, TV, radio, publishing, casinos, and theme parks. Case studies will be used to highlight the issues facing particular firms. Prerequisite(s): ECN 150

ECN 356 Healthcare Economics
This course explores the economics of health and health care. It introduces students to different economic perspectives on the determinants of health, how health insurance markets are organized, and the challenges facing the U.S. health care system. The course also examines how health care services are financed and delivered in other countries. Special attention is paid to recent health care reforms, including the Affordable Care Act. Prerequisite(s): ECN 150

ECN 370 Special Topics in Economics
Topics include Labor Markets, Employment and Wages; Women in the Economy; European Union; Economics of Sports; Economics of Entertainment; and Law and Economics. Prerequisite(s): Permission of instructor

ECN 373 Special Topics

ECN 375 Special Topics

ECN 385 Cooperative Education
This experience will be a full-time paid employment in a cooperating firm such as a bank, economics forecasting company, or public utility; a nonprofit company such as a Community Development Corporation; or a government agency such as a county planning department or a statistical analysis office. Under faculty supervision, students also complete job-related learning assignments that involve oral and written presentations. Prerequisite(s): ECN 214; ECN 221; and junior standing or senior standing, and permission of Department Chair

ECN 386 Cooperative Education
This experience will be a full-time paid employment in a cooperating firm such as a bank, economics forecasting company, or public utility; a nonprofit company such as a Community Development Corporation; or a government agency such as a county planning department or a statistical analysis office. Under faculty supervision, students also complete job-related learning assignments that involve oral and written presentations. Prerequisite(s): ECN 214; ECN 221; and junior standing or senior standing, and permission of Department Chair

ECN 389 Econ Internship II

ECN 432 Comparative Econ Sys

ECN 441 History of Economic Thought
The course details the development of economics as a coherent analytical discipline through a historical study of its main schools and contributors, including the Physiocrats; the Classical Economists (especially Jevons, Walras, and Clark), Marshall, and Keynes. Lesser figures are treated as time allows. Attention throughout is given to the changing philosophical and cultural background of economic thought. Prerequisite(s): ECN 150 and ECN 201

ECN 442 Modern Econ Thought

ECN 444 Research in ECN I
This course provides the student with an opportunity to do research with a faculty member. The student and the faculty member agree on the research project before the student registers for the course.

ECN 445 Research in ECN II
This course is a continuation of the 444 research course. It provides the student with an opportunity to continue to conduct research with a faculty member.

ECN 452 20th Century Russia & the USSR

ECN 455 Public Finance
This course involves an analysis of the revenue and expenditure activity of government with particular emphasis on the rationale of federal government activity. Also considered are the issues of distribution, efficiency, equity, and stability in the economy. Prerequisite(s): ECN 150; ECN 201

ECN 470 Special Topics in Economics
Topics include Labor Markets, Employment and Wages; Women in the Economy; European Union; Economics of Sports; Economics of Entertainment; and Law and Economics. Prerequisite(s): Permission of instructor

ECN 471 Special Topics

ECN 474 Special Topics

ECN 475 Independent Study

ECN 481 Seminar in Economics
This course is intended to be a capstone course for economics majors, one that aids the student in integrating the material from diverse economics courses. It stresses techniques for the preparation of written research reports. Students will ordinarily deliver to the seminar an oral presentation of their research results. Prerequisite(s): Senior standing in ECN 213, ECN 221 or ECN 222

ECN 485 Seminar in Economics and International Studies
This capstone course for Economics and International Studies majors aims to assist students to research, integrate, and communicate information about the global economy. Specifically, students will learn to conduct research on economic problems and policies of countries and regions of the world not native to them. Students will compose a 250 to 300 word abstract of their seminar papers in two languages, English and a second language. Further, students will be expected to demonstrate at least one of the following competencies: a) to write, in a non-native language, summaries of research in sources written in non-native language; b) to write the seminar paper in a non-native language; or c) to present research results orally in a non-native language. Prerequisite(s): Senior standing in ECN 213, ECN 221 or ECN 222

Finance

FIN 301 Fundamentals of Risk and Insurance
(Cross-listed with RMI 301) Introduction to the underlying principles, practices, and the legal aspects of insurance; discussion of industry structure and company operations; and survey of personal lines (auto, homeowners, and life) and commercial lines coverages.

FIN 304 Financial Decision-Making
This course focuses on how managers can construct a decision-making process and manage the creation of shareholder value. As the majority of financial decisions require an estimate of future events, we will spend considerable time investigating how to achieve the above objectives, subject to the constraints of an uncertain future. Outside readings, case studies, and text material will be used to integrate current financial theory with pragmatic financial decision making. Prerequisite(s): BUS 202, 206, and 208

FIN 306 The Financial Services Industry
An examination of the firms, such as banks, insurance companies, finance companies, securities firms, and mutual funds, that provide financial services to consumers and businesses. Topics include the domestic and international financial environment in which financial service firms operate; financial market risk and its management; ethical and legal issues; and managerial problems specific to each service firm. Prerequisite(s): BUS 202, 206, 208

FIN 308 Financial Services Marketing
(Cross-listed with MKT 308) Financial Services Marketing is cross-listed with the Marketing Department. The course focuses on how financial institutions design and market their services and products. The marketing mix for financial services, consumer and commercial markets, and their buying behavior are also studied. The impact of regulatory factors on marketing financial services and products is studied. This course is designed especially for marketing and/or finance majors contemplating careers in financial services marketing. Prerequisite(s): BUS 204, 206, 208

FIN 313 Employee Benefit Planning
(Cross-listed with RMI 313) A study of the nature and operation of employer-sponsored benefit plans offered in a complex socioeconomic and political environment. Topics include mandated benefits such as Social Security, workers compensation, and unemployment insurance, as well as a more in-depth examination of group life, health, disability, and qualified and non-qualified retirement plans. Emphasis is on benefit plan design, administration, cost, funding, and regulation as viewed from a benefit manager's financial perspective. Prerequisite(s): BUS 208

FIN 314 Risk Management
(Cross-listed with RMI 314) Designed to acquaint the student with the nature of risk management and the role of the risk manager in business or governmental organizations. Emphasis on the risk management process of identification and measurement of loss exposures and selection of treatment techniques, including finance and control techniques from a holistic perspective. Prerequisite(s): BUS 202, 208

FIN 350 Cooperative Education (Junior Standing)
This is a full-time, paid, approximately four-month assignment in a cooperating firm. Involves job-related learning under faculty supervision.The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. A co-op counts as a free elective and not as a course in the major. Grading for co-ops is on a pass/fail basis (grading for internships is on a letter grade, i.e., not pass/fail, basis); the faculty member who is supervising the experience has the discretion as to whether to roster it as a co-op or internship. Students in the Business Scholars Co-op Program must take it pass/fail. Prerequisite(s): 2.5 minimum GPA (higher for students in the Business Scholars Co-op Program) and completion of BUS 206 or 208

FIN 351 Co-op Education II

FIN 360 Part-Time Internship in Finance
Part-time, generally non-paid,employment in a financial/insurance setting to provide on-the-job training. Involves appropriate job-related learning assignments under faculty supervision. The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. An internship counts as a free elective and not as a course in the major. Grading for internships is on a letter grade, i.e., not pass/fail, basis. The number 260 is used if taken in sophomore year, 360 is used if taken in junior year, and 460 if taken in senior year. Prerequisite(s): 2.5 minimum GPA and completion of BUS 206 or 208, or permission of the Assistant Dean.

FIN 361 Internship II

FIN 365 Full-Time Internship in Finance
Full-time, paid employment in a financial/insurance setting to provide on-the-job training. Involves appropriate job-related learning assignments under faculty supervision. The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. An internship counts as a free elective and not as a course in the major. Grading for internships is on a letter grade, i.e., not pass/fail, basis (grading for co-ops is on a pass/fail basis); the Experiential Education Advisor in the Finance Department has the discretion as to whether to roster it as a co-op or internship. The number 365 is used if taken in junior year and 465 if taken in senior year. Prerequisite(s): 2.5 minimum GPA and completion of BUS 206 or 208

FIN 370 Special Topics

FIN 375 Financial Statement Analysis
Financial Statement Analysis focuses on the interpretation and use of financial statements for decision-making by investors, creditors, and internal management. Financial statements provide users with a scorecard of historical performance and the ability to look forward and project likely future financial performance. Outside readings, case studies, and text material will be used to integrate current financial statement guidelines with financial statement analysis. Prerequisite(s): BUS 208

FIN 401 Investment Analysis
Focuses on current practice and recent theoretical developments in the securities market. Special emphasis on the stock and bond markets. Deals with the characteristics of individual securities and portfolios. Also criteria and models for alternative portfolio composition, and criteria for evaluation and measurement of portfolio performance, all in a global context. Prerequisite(s): BUS 202, 206, 208

FIN 403 International Finance
The study of multinational business practice, direct foreign investment, and managerial challenges in operating abroad. Foreign exchange markets, exchange rate determination, forecasting and hedging, and other contemporary issues in global finance. Prerequisite(s): BUS 202, 206, 208

FIN 420 Financial Management of The Insurance Firm
(Cross-listed with RMI 420) A functional course emphasizing the interrelationships among underwriting, investment, regulation, and other aspects of insurance company and insurance agency operations. Spreadsheets are used to demonstrate effective financial management of the insurance firm. Prerequisite(s): BUS 202, 206, 208

FIN 444 Independent Research

FIN 445 Independent Research

FIN 450 Cooperative Education (Senior Standing)
This is a full-time, paid, four- to eight-month assignment in a cooperating firm. Involves job-related learning under faculty supervision. The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. A co-op counts as a free elective and not as a course in the major. Grading for coops is on a pass/fail basis (grading for internships is on a letter grade, i.e., not pass/fail, basis); the faculty member who is supervising the experience has the discretion as to whether to roster it as a co-op or internship. Students in the Business Scholars Co-op Program must take it pass/fail. Prerequisite(s): 2.5 minimum GPA (higher for students in the Business Scholars Co-op Program) and completion of BUS 206 or 208

FIN 460 Part-Time Internship in Finance
Part-time, generally non-paid,employment in a financial/insurance setting to provide on-the-job training. Involves appropriate job-related learning assignments under faculty supervision. The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. An internship counts as a free elective and not as a course in the major. Grading for internships is on a letter grade, i.e., not pass/fail, basis. The number 260 is used if taken in sophomore year, 360 is used if taken in junior year, and 460 if taken in senior year. Prerequisite(s): 2.5 minimum GPA and completion of BUS 206 or 208, or permission of the Assistant Dean.

FIN 461 Internship II

FIN 465 Full-Time Internship in Finance
Full-time, paid employment in a financial/insurance setting to provide on-the-job training. Involves appropriate job-related learning assignments under faculty supervision. The position must be approved by the department; consult the Experiential Education Adviser in the Finance Department for registration information. An internship counts as a free elective and not as a course in the major. Grading for internships is on a letter grade, i.e., not pass/fail, basis (grading for co-ops is on a pass/fail basis); the Experiential Education Advisor in the Finance Department has the discretion as to whether to roster it as a co-op or internship. The number 365 is used if taken in junior year and 465 if taken in senior year. Prerequisite(s): 2.5 minimum GPA and completion of BUS 206 or 208

FIN 470 Selected Topics in Finance
Selected topics in finance studied in depth under the direction of faculty. Prerequisite(s): Senior standing

FIN 471 Special Topics

FIN 472 Special Topics

FIN 480 Selected Topics

FIN 483 Senior Seminar
In-depth coverage of issues in financial analysis, such as ethics, financial reporting, equity investments, portfolio management, fixed income investments, derivatives, and others. Course includes mock exams for the CFA I exam, and students agree to sit for the actual CFA I exam in June. Prerequisite(s): Senior standing; completion of FIN 304, 375, 401, and either FIN 306 or 420; grade of B or better in BUS 101, BUS 202, BUS 102 (formerly BUS 207), BUS 208, and all FIN courses (or a combined GPA in these courses of 3.25 or higher); or permission of the instructor

Math

MTH 101 College Algebra
Topics include functions and graphs; equations and inequalities; systems of equations; polynomial, rational, exponential, and logarithmic functions. Students who have other college credits in mathematics must obtain permission of the department chair to enroll in this course.

MTH 114 Applied Business Calculus
An introduction to mathematical modeling and single-variable differential calculus with an emphasis on data analysis and applications to business and economics. Topics include modeling data using polynomial, exponential, and logarithmic functions; rates of change; derivative rules, including the Product Rule and Chain Rule; applications of derivatives. Applications include compound interest; revenue, cost, profit, average cost; break-even analysis; elasticity of demand; marginal cost; optimization; concavity and inflection points. A TI graphing calculator is required. Prerequisite(s): MTH 101 or a Mathematics Placement of 102M

MTH 119 Precalculus
This course provides a review of algebra and trigonometry as a preparation for courses in the calculus sequence. Topics include: exponents and radicals; polynomials and rational expressions; factoring; division with polynomials; solving equations and inequalities in one variable; graphing in the coordinate plane; linear, quadratic, and higher-degree polynomial functions; horizontal and vertical transformations of functions; rational zeros of functions; exponential and logarithmic functions and their graphs; laws of logarithms; solving exponential and logarithmic equations; radian and degree measure; reference angles; trigonometric functions and graphs; right triangle trigonometry; trigonometric identities and formulas; solving trigonometric equations. A TI graphing calculator is required. Prerequisite(s): MTH 101 or a Mathematics Placement of 102M

MTH 120 Calculus I
Topics in this course include functions of various types: rational, trigonometric, exponential, logarithmic; limits and continuity; the derivative of a function and its interpretation; applications of derivatives, including finding maxima and minima and curve sketching; antiderivatives, the definite integral and approximations; the fundamental theorem of calculus; and integration using substitution. A TI graphing calculator is required. Prerequisite(s): MTH 119 or its equivalent

MTH 121 Calculus II
This course addresses differentiation and integration of inverse trigonometric and hyperbolic functions; applications of integration, including area, volume, and arc length; techniques of integration, including integration by parts, partial fraction decomposition, and trigonometric substitution; L'Hopital's Rule; improper integrals; infinite series and convergence tests; Taylor series; parametric equations; polar coordinates; and conic sections. A TI graphing calculator is required. Prerequisite(s): MTH 120

MTH 150 Mathematics: Myths and Realities
This course offers an overview of mathematical concepts that are essential tools in navigating life as an informed and contributing citizen, including logical reasoning, uses and abuses of percentages, financial mathematics (compound interest, annuities), linear and exponential models, fundamentals of probability, and descriptive statistics. Applications include such topics as population growth models, opinion polling, voting and apportionment, health care statistics, and lotteries and games of chance.

MTH 170 Special Topics

MTH 221 Calculus & Anal Geom II
This course addresses differentiation and integration of inverse trigonometric and hyperbolic functions; applications of integration, including area, volume, and arc length; techniques of integration, including integration by parts, partial fraction decomposition, and trigonometric substitution; L'Hopital's Rule; improper integrals; infinite series and convergence tests; Taylor series; parametric equations; polar coordinates; and conic sections. A TI graphing calculator is required. Prerequisite: MTH 120.

MTH 222 Calculus III
This course addresses three-dimensional geometry, including equations of lines and planes in space, and vectors. It offers an introduction to multi-variable calculus including vector-valued functions, partial differentiation, optimization, and multiple integration. Applications of partial differentiation and multiple integration. A TI-89 graphing calculator is required. Prerequisite(s): MTH 121

MTH 240 Linear Algebra
This course includes vectors and matrices, systems of linear equations, determinants, real vector spaces, spanning and linear independence, basis and dimension, linear transformations, eigenvalues and eigenvectors, and orthogonality. Applications in mathematics, computer science, the natural sciences, and economics are included. Prerequisite(s): MTH 120

MTH 260 Discrete Structures I
This course is the first half of a two-semester course in discrete mathematics and is intended for computer science and information technology majors. Topics in the course include logic, sets, functions, numeric bases, matrix arithmetic, divisibility, modular arithmetic, elementary combinatorics, probability, graphs, and trees. There will be an emphasis on applications to the broad field of computing. Prerequisite(s): MTH 101 or a Mathematics Placement of 102M

MTH 261 Discrete Structures II
This course is the second half of a two-semester course in discrete mathematics and is intended for computer science majors. Topics in the course include rules of inference, proof methods, sequences and summation, growth of functions, complexity of algorithms, prime numbers and their application to cryptography, proof by induction, recursion, recurrence relations, and properties of relations. There will be an emphasis on applications to computer science. Prerequisite(s): MTH 260

MTH 302 Foundations of Mathematics
Topics in this course include propositional logic, methods of proof, sets, fundamental properties of integers, elementary number theory, functions and relations, cardinality, and the structure of the real numbers. Prerequisite(s): MTH 120 Corequisite(s): MTH 121

MTH 321 Real Analysis
This is a course that emphasizes the theory behind calculus topics such as continuity, differentiation, integration, and sequences and series (both of numbers and of functions); basic topology, Fourier Series. Prerequisites: MTH 222 and 302.

MTH 322 Differential Equations
This course focuses on analytical, graphical, and numerical techniques for first and higher order differential equations; Laplace transform methods; systems of coupled linear differential equations; phase portraits and stability; applications in the natural and social sciences. (offered in alternate years) Prerequisite(s): MTH 121

MTH 330 Modern Geometries
Topics from Euclidean geometry including: planar and spatial motions and similarities, collinearity and concurrence theorems for triangles, the nine-point circle and Euler line of a triangle, cyclic quadrilaterals, compass and straightedge constructions. In addition, finite geometries and the classical non-Euclidean geometries are introduced. (offered in alternate years) Prerequisite(s): MTH 240 or MTH 302

MTH 335 Graph Theory
This course introduces students to the field of graph theory and leads them through an exploration of the major branches of this subject, incorporating both theoretical results and current applications for each area studied. From a theoretical perspective, students re-derive well-known existing results and construct proofs related to new topics which have been introduced. From an applied standpoint, members of the class learn to formulate graph models to solve problems in computer science, the natural sciences, engineering, psychology, sociology, and other fields. We also consider some open problems and pose new questions of our own. In addition to fundamental definitions and concepts in graph theory, some specific topics that will be introduced are the following: Eulerian, Hamiltonian, planar, and directed graphs; trees, connectivity, matching, decomposition, coloring, covering, and independent sets and cliques; techniques and algorithms on graphs; and optimization problems and network flows. Prerequisite(s): Junior/senior mathematics standing or permission of the department chair

MTH 341 Abstract Algebra
Sets and mappings; groups, rings, fields, and integral domains; substructures and quotient structures; homomorphisms and isomorphisms; abelian and cyclic groups; symmetric and alternating groups; polynomial rings are topics of discussion in this course. (offered in alternate years) Prerequisite(s): MTH 302

MTH 345 Combinatorics
This course addresses permutations and combinations, generating functions, recurrence relations and difference equations, inclusion/exclusion principle, derangements, and other counting techniques, including cycle indexing and Polya's method of enumeration. Prerequisite(s): MTH 121

MTH 360 Internship/Jrs

MTH 370 Selected Topics in Mathematics
This is an introductory course to specialized areas of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

MTH 371 Selected Topics in Mathematics
This is an introductory course to specialized areas of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

MTH 373 Selected Topics in Mathematics
This is an introductory course to specialized areas of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

MTH 405 History of Mathematics
This course is an in-depth historical study of the development of arithmetic, algebra, geometry, trigonometry, and calculus in Western mathematics (Europe and the Near East) from ancient times up through the 19th century, including highlights from the mathematical works of such figures as Euclid, Archimedes, Diophantus, Fibonacci, Cardano, Napier, Descartes, Fermat, Pascal, Newton, Leibniz, Euler, and Gauss. A term paper on some aspect of the history of mathematics is required. (offered in alternate years) Prerequisite(s): MTH 302

MTH 410 Probability
Topics in this course include sample spaces and probability measures, descriptive statistics, combinatorics, conditional probability, independence, random variables, joint densities and distributions, conditional distributions, functions of a random variable, expected value, variance, various continuous and discrete distribution functions, and the Central Limit Theorem. (offered in alternate years) Prerequisite(s): MTH 222

MTH 411 Mathematical Statistics
Topics in this course include measures of central tendency and variability, random sampling from normal and non-normal populations, estimation of parameters, properties of estimators, maximum likelihood and method of moments estimators, confidence intervals, hypothesis testing, a variety of standard statistical distributions (normal, chi-square, Student's t, and F), analysis of variance, randomized block design, correlation, regression, goodness of fit, and contingency tables. (offered in alternate years) Prerequisite(s): MTH 410

MTH 415 Financial Mathematics
This course introduces students to the fundamental concepts of financial mathematics and provides opportunities to apply those concepts to real-world problems. Students will gain an understanding of concepts behind present and future values for various streams of cash flows and will work with reserving, valuation, pricing, asset and liability management, investment income, budgeting, and contingencies. Pre-requisite(s): Math 121 or permission of Chair.

MTH 421 Numerical Analysis
A survey of numerical methods commonly used in algebra and calculus with emphasis on both algorithms and error analysis. Topics include round-off error, numerical methods for solving equations in one variable, interpolation and polynomial approximation, and numerical differentiation and integration. Methods and techniques studied include Bisection, Fixed-Point Iteration, Newton's Method, MÃ¼ller's Method, Lagrange Polynomials, Neville's Method, Divided Differences, Cubic Splines, Three-point and Five-point Numerical Differentiation Formulas, Newton-Cotes Formulas, Composite Numerical Integration, Adaptive Quadrature, Gaussian Quadrature. Prerequisite(s): MTH 121

MTH 424 Complex Variables
This course examines analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem; power series; infinite series; calculus of residues; contour integration; conformal mapping. Prerequisite(s): MTH 222

MTH 425 Mathematical Modeling
This course addresses the uses of mathematical methods to model real-world situations, including energy management, assembly-line control, inventory problems, population growth, predator-prey models. Other topics include: least squares, optimization methods interpolation, interactive dynamic systems, and simulation modeling. Prerequisite(s): MTH 121

MTH 430 Topology
Topics in the course include topological spaces; subspaces; product spaces, quotient spaces; connectedness; compactness; metric spaces; applications to analysis. (offered in alternate years) Prerequisite(s): MTH 302

MTH 444 Research in MTH I
This course provides the student with an opportunity to do research with a faculty member. The student and the faculty member agree on the research project before the student registers for the course.

MTH 445 Research in MTH II
This course is a continuation of the 444 research course. It provides the student with an opportunity to continue to conduct research with a faculty member.

MTH 450 Cooperative Educ

MTH 460 Internship I

MTH 470 Selected Topics in Mathematics
This course is an introduction to specialized research, concentrating on one particular aspect of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

MTH 471 Selected Topics in Mathematics
This course is an introduction to specialized research, concentrating on one particular aspect of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

MTH 473 Selected Topics in Mathematics
This course is an introduction to specialized research, concentrating on one particular aspect of mathematics. The subject matter will vary from term to term. Restriction(s): junior or senior standing

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