DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS & PHYSICS

Overview

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The Department of Computer Science, Mathematics and Physics is a major contributor to general studies and provides students with the skills needed in careers such as business, government, industry, technology, and educational institutions. The Department offers degrees in computer science and cybersecurity, and a broad range of minors in computer science and mathematics.

Majors

- Computer Science (Bachelor of Science, B.S.) (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/computer-science-bs/)
- Cybersecurity (Bachelor of Science, B.S.) (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/cybersecurity-bs/)

Minors

- Applied Mathematics Minor (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/applied-mathematics-minor/)
- Cognitive Science Minor (http://catalog.missouriwestern.edu/undergraduate/interdisciplinary-studies/cognitive-science-minor/)
- Computer Science Minor (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/computer-science-minor/)
- Cybersecurity Minor (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/cybersecurity-minor/)
- Data Science Minor (http://catalog.missouriwestern.edu/undergraduate/science-and-health/computer-science-mathematics-physics/data-science-minor/)
- Entrepreneurship Minor (http://catalog.missouriwestern.edu/undergraduate/interdisciplinary-studies/entrepreneurship-minor/)

Courses
Applications of Computer Technology (ACT)

ACT 101 Introduction to Information Technology   Credits: 3
Typically Offered: Fall, Spring.
Course Description: This course introduces students to the basic concepts of information technology relevant to all applications of computing. Upon completion, students will be well prepared to use computers to solve problems in other domains and pursue more advanced studies in computer science and cybersecurity. This course will prepare students to attempt the pre-professional ITF+ certification exam from CompTIA.

ACT 102 Introduction to Web Page Development   Credits: 3
Typically Offered: Fall.
Course Description: This course is an introduction to the design, creation, and maintenance of web pages and websites. Students learn how to critically evaluate website quality, create and maintain quality web pages, investigate web design standards, and create and manipulate images. The course progresses through web design tools HTML, XHTML, Cascading Style Sheets, and concludes with PHP. Each student will develop a fictitious organization website.

ACT 201 Microcomputer Applications   Credits: 3
Typically Offered: Spring.
Course Description: Applications of productivity software such as Microsoft Office Word, Excel, Access, and PowerPoint for careers, school, and home. Impact of technology on society by computer information systems, networks, e-commerce, and the Internet is included. Previous computer experience recommended.

ACT 211 Internet Scripting   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course covers basic internet scripting technologies such as PHP, JavaScript, and ASP. **Prerequisite(s):** A grade of C or higher in ACT 102 and CSC 184.

ACT 301 Applied Database Systems   Credits: 3
Typically Offered: Fall.
Course Description: Emphasis is placed upon the core concepts of relational database application development. Students will gain proficiency in Microsoft Access; the concepts learned will allow the students to apply database application development concepts to a real world type application. **Prerequisite(s):** A grade of C or higher in ACT 201 or credit or concurrent enrollment in CSC 184 or CSC 187.

ACT 302 Data Analytics   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Introduction to the application of statistics and algorithms to finding patterns in data sets and building predictive models. Fundamental algorithms for performing descriptive and predictive analytics will be studied along with techniques for judging the utility of models and datasets. Students will gain experience with advanced features of spreadsheet software and specialized statistical software packages for data analysis. 3 hours, offered in Spring semesters. **Prerequisite(s):** A grade of C or higher in CSC 184, ACT 201, or GBA 201 and a grade of C or higher in MAT 111, MAT 111E, GBA 210, or PSY 300.

ACT 311 Web Development Tools   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course uses Adobe Design Suite tools to lead the student through the process of web-application development. Students will gain knowledge and hands-on practice in building and maintaining web applications using Dreamweaver, Flash, and Photoshop. Students will use Java, PHP and MySql to interact with external databases. **Prerequisite(s):** A grade of C or higher in ACT 211.

ACT 405 Business Intelligence   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Students learn how to make better business decisions, use fewer resources, and improve the company's bottom line by developing and using a data warehouse. This course provides an overview of business intelligence and data warehousing and gives students a look at all the major facets of developing and using a data warehouse to make effective business decisions. **Prerequisite(s):** A grade of C or higher in CSC 305.

ACT 476 Applications of Computer Information Sciences Capstone   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: The capstone course will encompass and consolidate all of the concepts covered in the ACT curriculum. In this course, students will manage an Information Systems project, design an appropriate database and incorporate both LAN and Web-based distributed information solutions to support a business process, effectively document the system and incorporate elements of the general education into a successfully implemented information systems solution. **Prerequisite(s):** A grade of C or higher in CSC 400.

ACT 490 Information Technology Career Preparation   Credits: 1
Typically Offered: Departmental Discretion.
Course Description: In this course students will begin applying their MWSU education towards building a career in IT. Students will learn how to navigate a career path in IT, explore alternative career paths, and explore opportunities for continuing education and professional development. Students will develop application materials and attempt entrance, exit, and / or certification exams in preparation for graduation, applying to jobs, and applying to graduate schools. **Prerequisite(s):** Senior status and a declared major in ACT.

Computer Science (CSC)

CSC 184 Introduction to Computer Programming   Credits: 3
Typically Offered: Fall.
Course Description: Introduction to problem solving utilizing the Python programming language. Topics include algorithm and program development, syntax of Python, file input/output, variables, program control structures, functions, and collections. **Prerequisite(s):** ACT math subscore of at least 22, a sufficient score on the math placement exam, or a grade of C or higher in either ACT 101 or a general studies math course.

CSC 187 Java Programming Fundamentals   Credits: 3
Typically Offered: Fall, Spring.
Course Description: Introduction to problem solving utilizing the Java programming language. Topics include algorithm and program development, syntax of Java, input/output, assignment operations, program control structures, character data manipulation, functions, and single dimension arrays. Emphasis is placed on program design techniques and program modularity. **Prerequisite(s):** An ACT math sub score of 22 or higher, a sufficient score on the math placement exam, or a grade of C or higher in either ACT 101 or a general studies math course.

CSC 208 Discrete Structures I   Credits: 3
Typically Offered: Spring.
Course Description: This course is a study of mathematical reasoning including the nature and methods of proof, relations and functions, combinatorics and graph theory, Boolean algebra, and applications of these topics. Attention will be given to the direct applications to computer science. **Prerequisite(s):** CSC 187, MAT 147, or MAT 167.

CSC 245 Enterprise Systems Computing: COBOL I   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course explores the structure of the COBOL programming language, to include basic syntax, flow control, record and memory structures, input/output and report writing. A real-world enterprise system environment will be used to provide exposure to JCL and various tools that support business processes and information flow. **Prerequisite(s):** A grade of C or higher in CSC 254.

CSC 246 Programming Languages and Paradigms   Credits: 3
Typically Offered: Fall.
Course Description: This course explores major programming paradigms (including the functional, object-oriented, and logic programming paradigms) and principles of the design of programming languages. Students will learn to adapt quickly to new programming languages, select appropriate programming languages for projects, compare and contrast languages, and make the best use of features of languages they have learned. **Prerequisite(s):** A grade of C or higher in CSC 254.

CSC 254 Object Oriented Programming   Credits: 3
Typically Offered: Fall, Spring.
Course Description: This course is a continuation of CSC 187 and introduces the Java programming language. Java is used to introduce Object Oriented Programming concepts including data abstraction, classes, inheritance, and polymorphism. Other programming topics covered include multidimensional arrays and array processing, elementary sorting and searching techniques, dynamic memory allocation, linked lists, and GUI interface creating. **Prerequisite(s):** A grade of C or higher in CSC 187.

CSC 264 Computer Architecture and Assembly Language Programming   Credits: 3
Typically Offered: Fall.
Course Description: This course is an investigation of the logical basis of computers at the machine language level. Machine representation of numbers and characters, instruction formats, machine operations, addressing techniques, and assembly level programming techniques will be covered. **Prerequisite(s):** A grade of C or higher in CSC 184 or CSC 187.

CSC 274 Introduction to Unix/Linux   Credits: 3
Typically Offered: Fall.
Course Description: An introductory course on UNIX/Linux and its applications. Topics covered include: basic commands, connecting to remote machines, basic system structures, system tools, output redirection, command line text editing, file system basics, security basics, and basic shell scripting. The course material is intended to prepare students for versatile use of any UNIX/Linux system and as a foundation for numerous UNIX/Linux certification programs. **Prerequisite(s):** Previous computer experience recommended.

CSC 283 Introduction to Research Methods in Computer Science   Credits: 1-2
Typically Offered: Departmental Discretion.
Course Description: Introduction to basic research methods in Computer Science. Individual and team projects involving methods for solving computer science-related research problems. **Prerequisite(s):** Departmental approval.

CSC 285 Data Structures   Credits: 3
Typically Offered: Fall.
Course Description: Topics include algorithm analysis and the implementation of stacks, queues, linked lists, trees, and other data structures. Principles of data abstraction are emphasized throughout the course. **Prerequisite(s):** A grade of C or higher in both CSC 254 and MAT 112, MAT 116, or higher.

CSC 289 Computational Methods for Computer Science   Credits: 3
Typically Offered: Fall.
Course Description: This course provides the underlying mathematical foundations and applied algorithms that are used across the basic fields in Computer Science. The course will focus on the computational algorithms in the fields of semantic search, data encryption and computer security, computer graphics, gaming and simulation. Further the course will consider the impact/computational limitations of current hardware on the application of these algorithms. **Prerequisite(s):** A grade of C or higher in CSC 254.

CSC 294 Networking and Telecommunications   Credits: 3
Typically Offered: Fall.
Course Description: An examination of current computer communication technologies and their protocol structures as applied to computer networks and telecommunication systems. Topics include the physical layers, architectural elements, and information layers of a communication network; protocols; switching; routing; LANs; and WANs. **Prerequisite(s):** Credit or concurrent enrollment in CSC 184 or CSC 187.

CSC 305 Database Architecture and Concepts   Credits: 3
Typically Offered: Spring.
Course Description: An introduction to Database Concepts and Architecture, with an emphasis on the Relational Database Model. **Prerequisite(s):** A grade of C or higher in ACT 301.

CSC 318 Simulation and Modeling   Credits: 3
Typically Offered: Spring.
Course Description: An introduction to computerized simulations. Focus is on the architecture and development of time-step and event-sequenced models used extensively by industry and government. Other topics include process generators for random events, the development of computerized games for management training, and current simulation research. **Prerequisite(s):** A grade of C or higher in CSC 285.

CSC 324 Software Testing and DevOps   Credits: 3
Typically Offered: Spring.
Course Description: This course covers fundamentals of software testing and DevOps important to software developers, system administrators, and quality assurance / software testing engineers. A vendor neutral approach will be taken, focusing on popular open source tools for unit testing, integration testing, system testing, version control, build automation, configuration management, virtualization, continuous integration, and deployment management. Relevant software development principles and philosophies such as test-driven development and agile software development will also be discussed. **Prerequisite(s):** A grade of C or higher in CSC 184 and CSC 274.

CSC 328 Computer Graphics   Credits: 3
Typically Offered: Fall.
Course Description: A course in the techniques for picture transformation, curve and surface approximation; study and implementation of graphical languages and data structure; organization of graphical systems; use of the microcomputer as tools for displaying graphical data. **Prerequisite(s):** A grade of C or higher in CSC 285.

CSC 345 Enterprise Systems Computing: COBOL II   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course explores the advanced features of COBOL, to include validation and exception handling, table control processing, sorting, master/transaction indexed file processing and management of large-scale software development. Students will continue using a real-world enterprise system environment to integrate their business driven software packages. This is a continuation of CSC 245. **Prerequisite(s):** A grade of C or higher in CSC 245.

CSC 346 Enterprise Systems with Java   Credits: 3
Typically Offered: Spring.
Course Description: This course covers the front and back end development of large software systems. The course includes data exchange and the use of APIs. Use of frameworks and professional development tools is emphasized. **Prerequisite(s):** ACT 301 with a grade of C or higher and either ACT 211 or CSC 254 with a grade of C or higher.

CSC 374 UNIX/Linux System Administration   Credits: 3
Typically Offered: Spring (odd-numbered years).
Course Description: This course covers the essential skills needed to administer a mainstream linux distribution such as Fedora, Ubuntu, SUSE, etc. The key topics include hardware and system configuration, system operation and maintenance, security, troubleshooting and diagnostics, automation and scripting. **Prerequisite(s):** CSC 274.

CSC 386 Operating Systems Concepts   Credits: 3
Typically Offered: Spring.
Course Description: This course is an introduction to operating system principles. Students will become familiar with the function and implementation of modern operating systems from the perspectives of a user, designer, and developer. Topics include user interfaces, programming interfaces, system resource management, multiprocessing, concurrent programming, and system security. **Prerequisite(s):** CSC 264 and a grade of C or higher in CSC 274.

CSC 400 Systems Analysis and Design   Credits: 3
Typically Offered: Fall.
Course Description: Study of structured systems development. Emphasis on strategies and techniques of structured analysis and object oriented design for producing logical methodologies for dealing with the development of information systems. **Prerequisite(s):** Credit or concurrent enrollment in CSC 305.

CSC 406 Object Oriented Applications and Program Development   Credits: 3
Typically Offered: Spring.
Course Description: This course emphasizes the application of Object Oriented Programming (OOP) concepts in the java programming language to large-scale programming problems. The course includes application of techniques such as the Unified Modeling Language (UML). **Prerequisite(s):** A grade of C or higher in CSC 285 and credit or concurrent enrollment in CSC 305.

CSC 410 Network Security Technologies   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course covers various facets of network security and the tools that are available to secure and monitor networks. Topics include commercial and open source security tools, public-key cryptography, firewalls, authentication, intrusion detection, control of malicious code, OS hardening fundamentals, and security assessment. **Prerequisite(s):** A grade of C or higher in CSC 294.

CSC 445 Mobile Device Application Development   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course focuses on developing applications for modern Smartphone operating systems. Most of the course is dedicated to some specific mobile device OS at the discretion of the instructor. Rapid application development techniques are covered, as well as setup of the development environment, real-world testing, and deployment.
Prerequisite(s): A grade of C or higher in CSC 254.

CSC 450 Independent Research/Project   Credits: 1-3
Typically Offered: Fall, Spring.
Course Description: Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit.
Prerequisite(s): Minimum of 2.5 GPA in major field and departmental approval.

CSC 451 Internship in Computer Science   Credits: 1-3
Typically Offered: Fall, Spring, Summer.
Course Description: An academic program which offers Computer Science majors an opportunity to integrate theory with practice. Students work full-time or part-time for a company in a position related to the Computer Science major. Anticipated learning objectives are established in a contract agreed to by the student, the company supervisor, and the departmental faculty sponsor. May be repeated for credit, but at most 3 hours may count towards the total number of hours required for the major. **Prerequisite(s):** Declared Computer Science or Computer Information Systems major or declared CIS minor, a minimum of 2.5 GPA, and permission of the faculty sponsor.

CSC 452 Professional Certification in Computing   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course provides an opportunity for students to prepare for a professional certification exam at the intermediate and advanced levels while being tutored by a faculty member holding the certification they are seeking. Students will meet individually with their instructor to develop a study plan, review study materials, and make other preparations for the exam.

CSC 475 Advanced Topics in Computer Science   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Selected advanced topics in computer science.
Prerequisite(s): Departmental approval.

CSC 484 Compiler Theory   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: An introduction to the basic structures of compilers and their design. Course topics include computer language structure, translation/recognition techniques of lexical analysis, parsing and syntax-directed translation. The course will also consider the impact of run-time environments on the design of computer languages and the constraints of code optimization on code generation. A small compiler will be developed. **Prerequisite(s):** A grade of C or higher in CSC 264.

CSC 487 Digital Animation and Production   Credits: 3
Typically Offered: Fall (even-numbered years).
Course Description: This class will concentrate on the methods used to build digital animated characters. Subjects will include character design and development, animation of characters, lighting, camera shots, sound and production editing. **Prerequisite(s):** Junior standing and declared Computer Information Systems, Computer Science, or Communication Studies and Theatre major.

CSC 490 CS Career Preparation   Credits: 1
Typically Offered: Fall.
Course Description: In this course students will begin applying their MWSU education towards building a career in CS. Students will learn how to navigate a career path in CS, explore alternative career paths, and explore opportunities for continuing education and professional development. Students will develop application materials and attempt entrance, exit, and / or certification exams in preparation for graduation, applying to jobs, and applying to graduate schools. Graded pass/fail.
Prerequisite(s): Senior status and a declared major in CSC.

Cybersecurity (SEC)

SEC 300 Introduction to Cybersecurity   Credits: 3
Typically Offered: Spring.
Course Description: This course covers the fundamental issues and principles of computer-and-network security through studying theory and through hands-on assignments and lab exercises. The course will look at the capabilities of modern cryptographic systems and the NIST Cybersecurity Framework. Students will learn how to secure a computer, or a network, by analyzing its security requirements and applying common techniques to enforce them. **Prerequisite(s):** CSC 274 and CSC 294.

SEC 335 Network and Endpoint Security I   Credits: 3
Typically Offered: Fall (odd-numbered years).
Course Description: This course will introduce students to system security in terms of securing software components, physical/software interfaces, and networks. Vulnerabilities of common network protocols, threats that exploit those vulnerabilities, and attack models will be discussed. Students will learn about the basics of software security, software vulnerabilities, and cloud administration. Students will learn the underlying security theory and will gain hands on experience through lab exercises. **Prerequisite(s):** SEC 300.

SEC 415 Data Security and Identity Management   Credits: 3
Typically Offered: Fall (even-numbered years).
Course Description: This course will cover techniques used to protect data from unauthorized access or corruption, and techniques used to identify, authenticate, and authorize individuals or groups to access protected resources. Students will work with open-source tools for cryptography and identity management. **Prerequisite(s):** SEC 300.

SEC 425 Ethical Hacking   Credits: 3
Typically Offered: Spring (odd-numbered years).
Course Description: This course will cover how to identify different vulnerabilities from an attacker's point of view, what they might do with these vulnerabilities, and what measures you can take to mitigate these risks. Students will gain practical skills through red-team exercises and penetration labs. **Prerequisite(s):** SEC 300.

SEC 435 Network and Endpoint Security II   Credits: 3
Typically Offered: Spring (even-numbered years).
Course Description: In this course, students will master their skills in securing an endpoint, which can be a computer or an IoT device, through hardening its software components, physical/software interfaces, and the networks and endpoints will be discussed together with the threats that exploit those vulnerabilities, the attach vectors for various hardware and software components, and countermeasures that thwart the attacks. Students will also learn about documenting for the purpose of securing computer systems and networks. **Prerequisite(s):** SEC 335.

SEC 445 Security Program Governance   Credits: 3
Typically Offered: Fall (odd-numbered years).
Course Description: This course introduces the development and management of cybersecurity programs within organizations. Governance frameworks and regulations will be studied through development of policy, implementation of controls and audits, analysis of risks, and response to simulated incidents. Students will gain skill with management tools, analyze security concerns with employees and vendors, and implement communication strategies with a variety of stakeholders. **Prerequisite(s):** SEC 300.

SEC 455 Cyberlaw and Investigations   Credits: 3
Typically Offered: Fall (even-numbered years).
Course Description: This course introduces the US and international laws on cybersecurity, including law related to privacy, data security, crime, and intellectual property. Students will also explore the implications of culture and international agreements on policy and critical infrastructure. Students will learn the essentials of computer investigations through the application of forensic tools. **Prerequisite(s):** SEC 300.

SEC 490 Cybersecurity Career Preparation   Credits: 1
Typically Offered: Fall.
Course Description: In this course students will begin applying their MWSU education towards building a career in Cybersecurity. Students will learn how to navigate a career path in IT, explore alternative career paths, and explore opportunities for continuing education and professional development. Students will develop application materials and attempt entrance, exit, and/or certification exams in preparation for graduation, applying to jobs, and applying to graduate schools. **Prerequisite(s):** Senior standing.

Mathematics (MAT)

MAT 083 Foundations for University Mathematics   Credits: 3
Typically Offered: Fall, Spring.
Course Description: The study of fundamental arithmetic and algebraic concepts prerequisite to university level mathematics.

MAT 110 Contemporary Problem Solving   Credits: 3
Typically Offered: Fall, Spring.
Course Description: Mathematics for solving selected real-world problems using elementary graph theory, data analysis, techniques of decision making, and the mathematics of finance. Course content is equivalent to MAT 110E. **Prerequisite(s):** ACT math subscore of at least 22 or a sufficient score on the math placement exam or departmental approval.
CORE 42: MOTR MATH 120; Mathematical Reasoning and Modeling (attribute MO41)

MAT 110E Contemporary Problem Solving   Credits: 4
Typically Offered: Fall, Spring.
Course Description: Mathematics for solving selected real-world problems using elementary graph theory, data analysis, techniques of decision making, and the mathematics of finance. Course content is equivalent to MAT 110. Three hours lecture, two hours lab.
CORE 42: MOTR MATH 120; Mathematical Reasoning and Modeling (attribute MO41)

MAT 111 Introductory Statistics   Credits: 3
Typically Offered: Fall, Spring.
Course Description: A general introduction to statistics for students whose academic interests involve the analysis and interpretation of data. Emphasis is placed on the development of statistical thinking and the use of technology. Topics include graphical and numerical methods for summarizing univariate and bivariate data, basic probability, discrete and continuous probability distributions, linear regression, characteristics of good study designs, confidence intervals and hypothesis testing. Course content is equivalent to MAT 111E. **Prerequisite(s):** ACT math subscore of at least 22; a sufficient score on the math placement exam; a minimum grade of C in MAT110E/110 or higher; departmental approval.
CORE 42: MOTR MATH 110; Statistical Reasoning (attribute MO41)

MAT 111E Introductory Statistics   Credits: 4
Typically Offered: Fall, Spring.
Course Description: A general introduction to statistics for students whose academic interests involve the analysis and interpretation of data. Emphasis is placed on the development of statistical thinking and the use of technology. Topics include graphical and numerical methods for summarizing univariate and bivariate data, basic probability, discrete and continuous probability distributions, linear regression, characteristics of good study designs, confidence intervals and hypothesis testing. Course content is equivalent to MAT 111. Three hours lecture, two hours lab.
CORE 42: MOTR MATH 110; Statistical Reasoning (attribute MO41)

MAT 112 Finite Mathematics   Credits: 3
Typically Offered: Fall, Spring.
Course Description: Linear and quadratic equations, graphs, and functions including exponential and logarithmic functions; mathematics of finance, annuities, sinking funds and mortgages; linear programming; counting methods, probability, expectation; descriptive statistics. Not open to the student with credit in MAT 167. **Prerequisite(s):** ACT math subscore of at least 22; a sufficient score on the math placement exam; a minimum grade of C in MAT 110 or MAT 110E or higher; departmental approval.
CORE 42: MOTR MATH 120; Mathematical Reasoning and Modeling (attribute MO41)

MAT 116 College Algebra   Credits: 3
Typically Offered: Fall, Spring.
Course Description: Linear, quadratic, and miscellaneous equations and inequalities; relations and functions including polynomial, exponential, and logarithmic functions; graphing; systems of equations; and matrices. Not open to the student with credit in MAT 167. **Prerequisite(s):** ACT math subscore of at least 22; a sufficient score on the math placement exam; a minimum grade of C in MAT 110 or MAT 110E or higher; departmental approval.
CORE 42: MOTR MATH 130; Pre-Calculus Algebra (attribute MO41)

MAT 119 Trigonometry   Credits: 2
Typically Offered: Fall, Spring.
Course Description: Trigonometric functions, trigonometric identities, trigonometric equations, solution of triangles, inverse trigonometric functions. Not open to the student with credit in MAT 167.
Prerequisite(s): ACT math subscore of at least 22; a sufficient score on the math placement exam; a minimum grade of C in MAT 110 or MAT 110E or higher; departmental approval.

MAT 147 Applied Calculus   Credits: 5
Typically Offered: Fall.
Course Description: An applied course in techniques of differentiation and integration; applications primarily from the technological fields; analytic geometry, functions, differential and integral calculus.
Prerequisite(s): ACT math score of 25 or higher or a grade of C or higher in MAT 116.
CORE 42: MOTR MATH OTHER; Mathematical Sciences (attribute MO41)

MAT 167 Calculus with Analytic Geometry I   Credits: 5
Typically Offered: Fall.
Course Description: The first of three sequenced courses in calculus. Includes the study of limits and continuity of real functions, the derivative and its applications, the integral, and the integration and differentiation of trigonometric, exponential and logarithmic functions. **Prerequisite(s):** ACT math score of 25 or higher or a grade of C or higher in MAT 116 and MAT 119.
CORE 42: MOTR MATH OTHER; Mathematical Sciences (attribute MO41)

MAT 177 Calculus with Analytic Geometry II   Credits: 3
Typically Offered: Spring (odd-numbered years).
Course Description: The second of three sequenced courses in calculus. Includes the study of applications of integration, integration techniques, improper integrals, differential equations, and infinite sequences and series. **Prerequisite(s):** A grade of C or higher in MAT 147 or MAT 167.

MAT 206 Mathematical Transitions   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course is designed to prepare students thoroughly for the transition into university level mathematics. It main content is the development of formal proof, concise logical reasoning and the ability to write mathematically. Topics include but not limited to proof techniques, induction, number systems, function and sets, complex numbers, series and sequences, matrices. **Prerequisite(s):** Credit or concurrent enrollment in MAT 177.

MAT 211 Applied Statistical Reasoning   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Fundamental principles and techniques of statistical investigations and data analysis. Going beyond the typical introductory statistics course, this course focuses on the methods of analysis of variance and linear regression. Students are introduced to the R programming language for exploring data sets and performing statistical tests. **Prerequisite(s):** Credit or concurrent enrollment in MAT 147 or MAT 167.

MAT 217 Modeling and Simulation   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Fundamental principles and techniques of modeling and simulation. Iterative and recursive algorithms will be used to explore mathematical problem-solving techniques such as factoring and simplifying expressions, solving equations, differentiation and integration, and plotting curves and surfaces. **Prerequisite(s):** Credit or concurrent enrollment in MAT 147 or MAT 167.

MAT 283 Introduction to Research Methods in Mathematics   Credits: 1-2
Typically Offered: Departmental Discretion.
Course Description: Introduction to basic research methods in Mathematics. Individual and team projects involving methods for solving mathematics-related research problems. **Prerequisite(s):** Departmental approval.

MAT 287 Multivariable Calculus   Credits: 3
Typically Offered: Spring (even-numbered years).
Course Description: The third of three sequenced courses in calculus. Includes the study of solid analytic geometry, vectors and vector calculus, partial differentiation, and multiple integrals. **Prerequisite(s):** A grade of C or higher in MAT 147 or MAT 167.

MAT 305 Applied Matrix Theory   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: The study of systems of equations, matrices, linear transformations, matrix operations, determinants, matrix inversion, linear systems, eigenvalues and eigenvectors, with an emphasis on concrete computations and applications. **Prerequisite(s):** A grade of C or higher in MAT 217.

MAT 306 Linear Algebra   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Vector spaces, linear transformations, matrix operations, determinants, matrix inversion, linear systems, eigenvalues, canonical forms. **Prerequisite(s):** Credit or concurrent enrollment in MAT 287.

MAT 309 Data Visualization   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: An introduction to the basic principles of effective data visualization. Students gain hands-on experience with tools and techniques used for accessing, exploring, and summarizing large data sets. Students learn to create graphics and data dashboards to effectively convey and communicate their observations and insights. **Prerequisite(s):** A grade of C or higher in MAT 211.

MAT 315 Topics in Geometry   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Synthetic projective geometry; basic symbolic logic; mathematical systems and finite geometries; algebraic geometry; non-Euclidean geometry. **Prerequisite(s):** Credit or concurrent enrollment in MAT 306.

MAT 317 Differential Equations   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Common types of ordinary differential equations; differential operators, Laplace transforms; systems of differential equations; partial differential equations; Fourier series; applications. **Prerequisite(s):** A grade of C or higher in both MAT 287 and MAT 305.

MAT 332 Probability Theory   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: The study of discrete and continuous probability distributions. **Prerequisite(s):** A grade of C or higher in MAT 177 or MAT 287.

MAT 352 Mathematics for Elementary and Middle School Teachers I   Credits: 3
Typically Offered: Fall, Spring.
Course Description: The development of a teacher's understanding of elementary school mathematics, including the study of whole number arithmetic, mental mathematics, pre-algebra, problem solving, number theory, and operations on fractions, integers, decimals, and irrational numbers. Not applicable to the major or minor in mathematics. **Prerequisite(s):** A grade of C or higher in MAT 112 or MAT 116.

MAT 353 Mathematics for Elementary and Middle School Teachers II   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Introductory geometry; geometric constructions; measurement geometry; motion geometry; introductory probability and statistics. Not applicable to the major or minor in mathematics. **Prerequisite(s):** A grade of C or higher in MAT 352.

MAT 401 Advanced Modeling   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: A study of the modeling process including creative and empirical model construction, model analysis, and model research. **Prerequisite(s):** A grade of C or higher in MAT 317.

MAT 409 Statistical Learning   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: This course will provide a broad introduction to machine learning and cover the fundamental algorithms for supervised and unsupervised learning, with a focus on regression and classification methods. Emphasis will be on statistical learning methodology and the models, intuition, and assumptions behind it, as well as applications to real-world problems. Algorithms are implemented using the R programming language. **Prerequisite(s):** A grade of C or higher in MAT 211 and MAT 305.

MAT 411 Bayesian Data Analysis   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: An applied approach to Bayesian Data Analytics. This course starts with an introduction to Bayes rules and then uses concepts in calculus to develop Markov Chain Monte Carlo methods. Topics include, but are not limited to, Bayesian multiple linear regression, logistic regression, binomial models, and hierarchical models. **Prerequisite(s):** A grade of C or higher in MAT 217 or a grade of C or higher in CSC 184 and MAT 167.

MAT 416 Abstract Algebra   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Groups, rings, and fields; definitions and fundamental theorems; homomorphisms and isomorphisms; polynomials and field extensions. **Prerequisite(s):** A grade of C or higher in MAT 206 and MAT 306.

MAT 450 Independent Research/Project   Credits: 1-3
Typically Offered: Departmental Discretion.
Course Description: Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit. **Prerequisite(s):** Minimum of 2.5 GPA in major field, a grade of C or higher in MAT 287, and departmental approval.

MAT 462 Number Theory   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Study of divisibility, primes, congruencies, diphantine equations, arithmetic functions, partitions, Fibonacci numbers, and continued fractions. An independent method of study will be used. **Prerequisite(s):** A grade of C or higher in MAT 206.

MAT 465 Mathematics Teaching: Methods and Materials   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Techniques, materials, and resources used in the mathematics curriculum in secondary schools. Not appropriate for the major in mathematics without teacher certification. **Prerequisite(s):** A grade of C or higher in EDU 203 and credit or concurrent enrollment in MAT 206.

MAT 470 Seminar in Mathematics   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Selected topics in mathematics. May be repeated for credit. **Prerequisite(s):** Departmental approval.

Physics (PHY)

PHY 101 How Things Work   Credits: 4
Typically Offered: Fall.
Course Description: A conceptual study of the physical principles that govern everyday life. Designed to provide an introduction to the scientific method and its application to today's technology to a broad audience without overwhelming them with mathematics. Provides an introduction to the terminology and concepts of a broad range of topics including motion, fluids, thermodynamics, energy, sound, light, and electricity. Three hours lecture, two hours lab. Not open to the student with credit in PHY 107, PHY 110, or PHY 210.
CORE 42: MOTR PHYS 100L; Essentials in Physics with Lab (attributes MO38, MLAB)

PHY 104 Introduction to Astronomy   Credits: 4
Typically Offered: Fall, Spring.
Course Description: Basic course in astronomy, mostly descriptive in nature; solar system, stellar astronomy, structure of galaxy and universe. Three hours lecture and two hours lab.
CORE 42: MOTR ASTR 100L; Astronomy with Lab (attributes MO31, MLAB)

PHY 107 Introduction to Physics   Credits: 4
Typically Offered: Departmental Discretion.
Course Description: A comprehensive, quantitative study of the concepts and laws of physics. Designed for students majoring in fields other than the physical sciences, mathematics, or engineering. Topics include motion, gravity, electromagnetism, atomic and nuclear physics, optics, and relativity. Three hours of lecture, two hours lab. Not open to the student with credit in PHY 110 or PHY 210. **Prerequisite(s):** ACT math subscore of at least 22 or a sufficient score on the math placement exam or a grade of C or higher in MAT 110 or MAT 110E or MAT 111 or MAT 111E or departmental approval.
CORE 42: MOTR PHYS 110L; Essentials in Physical Sciences with Lab (attributes MO37, MLAB)

PHY 110 College Physics I   Credits: 4
Typically Offered: Fall, Spring.
Course Description: Classical treatment of mechanics, energy, waves, and heat. Three hours lecture, three hours lab. Not open to students with credit in PHY 210. **Prerequisite(s):** Grade of C or higher in MAT 116.
CORE 42: MOTR PHYS 150L; Physics I with Lab (attributes MO38, MLAB)

PHY 111 College Physics II   Credits: 4
Typically Offered: Spring.
Course Description: Electricity, magnetism, optics, relativity, atomic physics and nuclear physics. Three hours lecture, three hours lab. Not open to students with credit in PHY 211. **Prerequisite(s):** PHY 110 or PHY 210.

PHY 210 University Physics I   Credits: 5
Typically Offered: Departmental Discretion.
Course Description: This course is a comprehensive study of mechanics, relativity, oscillations, waves, and thermodynamics involving simulations, applications, and experimentation. Course assignments require the student to have a thorough knowledge of college algebra, trigonometry, and calculus. Three hours lecture, two hours computer aided instruction lab, two hours experimentation lab. **Prerequisite(s):** MAT 167.
CORE 42: MOTR PHYS 200L; Advanced Physics I with Lab (attributes MO38, MLAB)

PHY 211 University Physics II   Credits: 5
Typically Offered: Departmental Discretion.
Course Description: This course is a comprehensive study of electricity, magnetism, optics, and introductory quantum physics involving simulations, applications, and experimentation. Course assignments require the student to have a thorough knowledge of college algebra, trigonometry, and calculus. Three hours lecture, two hours computer aided instruction laboratory, two hours experimentation laboratory. **Prerequisite(s):** PHY 210 and MAT 177. MAT 287 recommended.

PHY 283 Introduction to Research Methods in Physics   Credits: 1-2
Typically Offered: Departmental Discretion.
Course Description: Introduction to basic research methods in Physics. Individual and team projects involving methods for solving physics-related research problems. **Prerequisite(s):** Departmental approval.

PHY 312 University Physics III   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Calculus-level modern physics. Three hours lecture. **Prerequisite(s):** PHY 211.

PHY 313 Modern Physics Laboratory   Credits: 1
Typically Offered: Departmental Discretion.
Course Description: Selected experiments in modern physics. Three hours laboratory. **Prerequisite(s):** Credit or concurrent enrollment in PHY 111 or PHY 312.

PHY 410 Selected Topics in Physics   Credits: 3
Typically Offered: Departmental Discretion.
Course Description: Presentation of one of the following topics: 01-mathematical physics; 02-classical mechanics; 03-thermodynamics; 04-electricity and magnetism; 05-optics; 06-quantum mechanics; 07-astrophysics; 08-solid state physics; 09-nuclear and particle physics; 10-computational physics. **Prerequisite(s):** Departmental approval.

PHY 450 Independent Research/Project   Credits: 1-3
Typically Offered: Departmental Discretion.
Course Description: Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit. **Prerequisite(s):** Minimum 2.5 GPA in minor field, and departmental approval.

PHY 465 Physics Teaching: Methods and Materials   Credits: 2
Typically Offered: Departmental Discretion.
Course Description: Techniques, materials, and equipment used in teaching physics in secondary schools. **Prerequisite(s):** PHY 111 or PHY 312.

Faculty

Kevin Anderson (2001) Professor, Mathematics. Ph.D., Kansas State University.

Brian Bucklein (2010) Associate Professor, Physics. Ph.D., Brigham Young University.

Jennifer Elder (2023) Assistant Professor, Mathematics. Ph.D., Arizona State University.

Lori McCune (2012) Associate Professor, Mathematics. Ph.D., University of Nebraska-Lincoln.

David McWilliams (1996) Instructor, Mathematics. M.A., Southwest Missouri State University.

Herschel Pickett (1980) Assistant Professor, Computer Science. M.S., University of Missouri-Rolla.

Jeffrey Poet (2002) Professor, Mathematics. Ph.D., University of Wyoming.

Glenn Rice (2006) Associate Professor, Mathematics. Ph.D., University of Kansas.

Gavin Waters (2006) Professor, Mathematics. Ph.D., University of Iowa.

Baoqiang Yan (2009) Professor, Computer Science. Ph.D., University of Mississippi.