

# DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS & PHYSICS

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The Department of Computer Science, Mathematics and Physics contributes to the liberal arts education of all students and, in addition, provides specialized programs in computer science, computer information systems, mathematics, and physics for those students who desire a more thorough preparation for jobs in business, government, industry, and educational institutions.

## Admission

### Admission Requirements

Majors in the department which have admission requirements are listed below. Majors which are not listed on this page do not have specific requirements for admission. Information about the recommended coursework a student might take prior to declaring the major can be obtained from the department.

#### Applied Computer Technology

The student must be enrolled in CSC 184 Computing Concepts I or have completed CSC 184 Computing Concepts I with a grade of C or higher, or have an ACT composite score of 25 or higher, or an ACT Science Reasoning score of 28 or higher. In addition, the student must have an overall GPA of at least 2.0.

#### Computer Information Systems

The student must be enrolled in CSC 184 Computing Concepts I or have completed CSC 184 Computing Concepts I with a grade of C or higher, or have an ACT composite score of 25 or higher, or an ACT Science Reasoning score of 28 or higher. In addition, the student must have an overall GPA of at least 2.0. CS-CIS majors must take ECO 260 Principles of Macroeconomics or ECO 261 Principles of Microeconomics to meet the Social Sciences portion of the General Studies program.

#### Computer Science

The student must be enrolled in CSC 184 Computing Concepts I or have completed CSC 184 Computing Concepts I with a grade of C or higher, or have an ACT composite score of 25 or higher, or an ACT Science Reasoning score of 28 or higher. In addition, the student must have an overall GPA of at least 2.0.

#### Mathematics

The student must have completed MAT 166 Calculus with Analytic Geometry I: Integration or MAT 167 Calculus with Analytic Geometry I with a grade of C or higher, or have an ACT Mathematics score of 28 or higher.

#### Mathematics (Education)

- ACT composite score on file

- Successful completion of the Missouri General Education Assessment (MoGEA)
- Overall GPA of 2.75
- Education course GPA of 3.0
- Content area GPA of 3.0
- Satisfactory completion of EDU 202/203

ACT and MoGEA scores should be received the semester before application for admission to teacher education is made (up to 4 months should be allowed for scores to be processed).

\*Alternative avenues to Teacher Education available for recruitment of historically under-served populations. Contact the Department Chairperson for guidelines and procedures.

## Majors

- Applied Computer Technology (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/applied-computer-technologies-bs>)
- Computer Science (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/computer-science-bs>)
- Mathematics (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/mathematics-bs>)
- Teacher Education in Mathematics (Bachelor of Science, B.S.) (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/teacher-education-mathematics-bs>)

## Minors

### Minors

- Applied Computer Technology Minor (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/applied-computer-technology-minor>)
- Cognitive Science Minor (<http://catalog.missouriwestern.edu/undergraduate/interdisciplinary-studies/cognitive-science-minor>)
- Computer Science Minor (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/computer-science-minor>)
- Mathematics Minor (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/mathematics-minor>)
- Physics Minor (<http://catalog.missouriwestern.edu/undergraduate/liberal-arts-sciences/computer-science-mathematics-physics/physics-minor>)

## Courses

### Applications of Computer Technology (ACT)

#### ACT 102 Introduction to Web Page Development Credits: 3

**Typically Offered:** Fall, Spring.

**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 202 Introduction to Web Graphics Credits: 3

**Typically Offered:** Fall.

**Course Description:** This course provides a comprehensive introduction to the Adobe Design Suite exploring the design applications Illustrator, Fireworks, Flash, and Photoshop CS. With the use of exercises and projects, the student will develop an extensive understanding of the tools and methods associated with the software. Real-world issues will be addressed to build problem-solving and critical thinking skills necessary for advanced course work. **Prerequisite(s):** A grade of C or higher in ACT 102.

#### ACT 211 Internet Scripting Credits: 3

**Typically Offered:** Fall.

**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 CSC 184 or CSC 201.

#### ACT 302 Decision Support Systems Credits: 3

**Typically Offered:** Spring.

**Course Description:** This course uses statistics to help solve business problems, examines case examples of statistical analysis in areas such as marketing, finance and management, and teaches descriptive and inferential techniques using a statistical computer software application - Excel. Topics to be covered include Creating Charts, Working with Charts, Using List Features and Templates, Working with Advanced Functions, Analyzing Data, Using PivotTables, and Working with Data Analysis Tools. **Prerequisite(s):** A grade of C or higher in CSC 201.

#### ACT 311 Web Development Tools Credits: 3

**Typically Offered:** Spring.

**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:** Fall.

**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:** Spring.

**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.

## Computer Science (CSC)

#### CSC 184 Computing Concepts I 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 in input/output, assignment operations, program control structures, character data manipulation, functions, and single dimension arrays. LAS Computer Literacy. **Prerequisite(s):** A grade of C or higher in either ACT 102 or EGT 102, or an ACT math score of 22 or higher or the equivalent.

#### CSC 200 Computer Systems and Architectures Credits: 3

**Typically Offered:** Fall.

**Course Description:** This course is an introduction to microcomputer systems including the Windows operating system and microcomputer architecture. IT infrastructures including database, networking, and systems development as well as basic hardware/software concepts will be emphasized. Security and ethical issues are considered throughout the course. This course will not be accepted as a Computer Science elective for CSC degree programs.

#### CSC 201 Microcomputer Applications Credits: 3

**Typically Offered:** Fall, 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.

#### CSC 208 Discrete Structures I Credits: 3

**Typically Offered:** Fall.

**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):** A grade of C or higher or concurrent enrollment in both CSC 254 and MAT 166 or MAT 167.

**CSC 245 Enterprise Systems Computing: COBOL I Credits: 3****Typically Offered:** Fall (even-numbered years).**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 High-Level Programming Language Credits: 3****Typically Offered:** Fall (odd-numbered years).**Course Description:** This course explores the structure of a high-level programming language different from java and COBOL. This course typically includes coverage of topics such as data types, flow control structures, record or class structures, input/output commands, and basic user interface design. **Prerequisite(s):** A grade of C or higher in CSC 254.**CSC 254 Computing Concepts II Credits: 3****Typically Offered:** Fall, Spring.**Course Description:** This course is a continuation of CSC 184. Topics include multidimensional arrays and array processing, elementary sorting and searching techniques, classes, dynamic memory allocation, linked lists, data abstraction, and GUI interface creating. **Prerequisite(s):** A grade of C or higher in CSC 184.**CSC 274 Introduction to Unix/Linux Credits: 3****Typically Offered:** Spring.**Course Description:** An introductory course on UNIX/Linux and its applications. Topics covered include: basic commands and system structures; system tools; output redirection; command line text editing, e-mail and system calls; file system basics; and, basic shell scripting. Basic security issues will also be discussed. 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):** A grade of C or higher in CSC 184.**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:** Spring.**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:** Spring (even-numbered years).**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):** A grade of C or higher in CSC 184.**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 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:** Spring (odd-numbered years).**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 Data Exchange Technologies Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** This course explores the exchange of data between computer systems. It explores data exchange technologies such as XML and JSON. Programming techniques such as AJAX will also be used in conjunction with various API's to develop web-based or desktop applications. Students are encouraged to review HTML, CSS, and JavaScript prior to the beginning of the course. **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 384 Computer Architecture and Assembly Language Programming****Credits: 3****Typically Offered:** Fall (even-numbered years).**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 254.

**CSC 386 Operating Systems Concepts Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** This course is an introduction to operating system principles. Topics include processor management, real and virtual storage management, device management and scheduling, multiprocessing, concurrent programming, and other topics related to operating systems. The course also includes a survey of major operating systems. **Prerequisite(s):** A grade of C or higher in both CSC 285 and CSC 384.**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. LAS Writing. **Prerequisite(s):** Credit or concurrent enrollment in CSC 305.**CSC 406 Object Oriented Applications and Program Development Credits: 3****Typically Offered:** Fall.**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). LAS Writing. **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:** Fall (even-numbered years).**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):** Completion of at least six credit hours of CSC courses numbered 300 or higher, or completion of CIS minor core.**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. **Prerequisite(s):** Declared Computer Information Systems or Computer Science major, 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 484 Compiler Theory Credits: 3****Typically Offered:** Spring (odd-numbered years).**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 384.**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.

## Mathematics (MAT)

**MAT 081 Foundations for University Mathematics I Credits: 3****Typically Offered:** Fall, Spring, Summer.**Course Description:** A study of the fundamental arithmetic and algebraic concepts prerequisite to university level mathematics. The specific topics studied are determined by assessment of the individual student's mathematical background.**MAT 083 Foundations for University Mathematics II Credits: 3****Typically Offered:** Fall, Spring, Summer.**Course Description:** A continuing study of the fundamental arithmetic and algebraic concepts prerequisite to university level mathematics initiated in MAT 081. The specific topics studied are determined by assessment of the individual student's mathematical background. **Prerequisite(s):** A grade of C or better in MAT 081 or the equivalent.

**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. Same as 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

**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. Same as MAT 110.

Three hours lecture, two hours lab. **Prerequisite(s):** ACT math subscore of at least 18 or a sufficient score on the math placement exam or successful completion of MAT 083 or departmental approval.

**CORE 42:** MOTR MATH 120; Mathematical Reasoning and Modeling

**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. Same as MAT 111E. **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 110; Statistical Reasoning

**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. Same as MAT 111. Three hours lecture, two hours lab. **Prerequisite(s):** ACT math subscore of at least 18 or a sufficient score on the math placement exam or successful completion of MAT 083 or departmental approval.

**CORE 42:** MOTR MATH 110; Statistical Reasoning

**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 165 or MAT 167. **Prerequisite(s):** ACT math subscore of at least 22 or a grade of C or higher in MAT 110E or a sufficient score on the math placement exam or departmental approval.

**CORE 42:** MOTR MATH 120; Mathematical Reasoning and Modeling

**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 165 or MAT 167.

**Prerequisite(s):** ACT math subscore of at least 22 or a grade of C or higher in MAT 110E or a sufficient score on the math placement exam or departmental approval.

**CORE 42:** MOTR MATH 130; Pre-Calculus Algebra

**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

**MAT 165 Calculus with Analytic Geometry I: Differentiation Credits: 3**

**Typically Offered:** Fall.

**Course Description:** Includes the study of limits and continuity of real functions, the derivative of algebraic and trigonometric functions, and applications of the derivative. Not open to the student with credit in MAT 167. **Prerequisite(s):** ACT math score of 25 or higher, or a grade of C or higher in MAT 116 and a grade of C or higher or concurrent enrollment in MAT 119.

**CORE 42:** MOTR MATH OTHER; Mathematical Sciences

**MAT 166 Calculus with Analytic Geometry I: Integration Credits: 3**

**Typically Offered:** Spring.

**Course Description:** Includes the study of the integral, and the derivative and integral of exponential logarithmic, and other transcendental functions. Not open to the student with credit in MAT 167. **Prerequisite(s):** A grade of C or higher in MAT 165.

**MAT 167 Calculus with Analytic Geometry I Credits: 5**

**Typically Offered:** Fall, Spring.

**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. Not open to the student with credit in MAT 166. **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

**MAT 177 Calculus with Analytic Geometry II Credits: 5**

**Typically Offered:** Fall, Spring.

**Course Description:** The second of three sequenced courses in calculus. Includes the study of applications of integration, integration techniques, L'Hopital's Rule, improper integrals, infinite series, conic sections, plane curves, parametric equations, and polar coordinates. **Prerequisite(s):** A grade of C or higher in MAT 166 or MAT 167.

**MAT 201 Combinatorics Credits: 3**

**Typically Offered:** Spring (odd-numbered years).

**Course Description:** A study of the basic techniques for counting finite discrete structures subject to given constraints. Combinatorial problems from various areas of mathematics will be explored. **Prerequisite(s):** A grade of C or higher in MAT 147, MAT 166, or MAT 167.

**MAT 206 Mathematical Transitions Credits: 3**

**Typically Offered:** Fall.

**Course Description:** This course is designed to prepare students thoroughly for the transition into university level mathematics. Its 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. LAS Writing. **Prerequisite(s):** Credit or concurrent enrollment in MAT 177.

**MAT 217 Mathematics and Technology Credits: 3****Typically Offered:** Spring (odd-numbered years).**Course Description:** An introduction to numerical methods and symbolic computation using a computer algebra system. 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. LAS Computer Literacy. **Prerequisite(s):** Credit or concurrent enrollment in MAT 177.**MAT 263 History of Mathematics Credits: 3****Typically Offered:** Fall (even-numbered years).**Course Description:** A study of the most important proofs from the history of mathematics and the lives of the mathematicians who produced them. **Prerequisite(s):** Credit or concurrent enrollment in MAT 177.**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 Calculus with Analytic Geometry III Credits: 5****Typically Offered:** Spring.**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 177.**MAT 306 Linear Algebra Credits: 3****Typically Offered:** Spring.**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 315 Topics in Geometry Credits: 3****Typically Offered:** Spring (even-numbered years).**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:** Fall (even-numbered years).**Course Description:** Common types of ordinary differential equations; differential operators, Laplace transforms; systems of differential equations; partial differential equations; Fourier series; applications. LAS Computer Literacy. **Prerequisite(s):** A grade of C or higher in both MAT 287 and MAT 306.**MAT 332 Probability Theory Credits: 3****Typically Offered:** Fall (odd-numbered years).**Course Description:** The study of discrete and continuous probability distributions. **Prerequisite(s):** A grade of C or higher in MAT 177.**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. Elementary and Middle School education majors may not take the course until officially admitted to teacher education. **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:** Fall, Spring.**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:** Spring (odd-numbered years).**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 407 Advanced Calculus Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** Elementary topological aspects of the real numbers, sequences, limits and continuity, differentiation, integration, and infinite series. **Prerequisite(s):** A grade of C or higher in MAT 206 and MAT 306.**MAT 416 Abstract Algebra Credits: 3****Typically Offered:** Fall (even-numbered years).**Course Description:** Groups, rings, and fields; definitions and fundamental theorems; homomorphisms and isomorphisms; polynomials and field extensions. LAS Writing. **Prerequisite(s):** A grade of C or higher in MAT 206 and MAT 306.**MAT 432 Mathematical Statistics Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** A continuation of MAT 332 to include the theory and applications of estimation, hypothesis testing, regression and correlation, analysis of variance and nonparametric statistics. **Prerequisite(s):** A grade of C or higher in MAT 332.**MAT 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. **Prerequisite(s):** Declared Mathematics major, a minimum of 2.5 GPA in major field, a grade of C or higher in MAT 287, and departmental approval.**MAT 451 Internship in Mathematics Credits: 1-3****Typically Offered:** Fall, Spring, Summer.**Course Description:** An academic program which offers mathematics majors an opportunity to integrate theory with practice. Students work full-time or part-time for a company in a position related to the mathematics 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 a total of 6 credits. **Prerequisite(s):** Declared Mathematics major, a minimum of 2.5 GPA, MAT 287, and permission of the faculty sponsor.

**MAT 462 Number Theory Credits: 3****Typically Offered:** Fall (odd-numbered years).**Course Description:** Study of divisibility, primes, congruencies, diophantine 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:** Fall (even-numbered years).**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:** Fall (odd-numbered years).**Course Description:** Selected topics in mathematics. May be repeated for credit. **Prerequisite(s):** Departmental approval.

## Physics (PHY)

**PHY 101 Physics for the Liberal Arts Credits: 4****Typically Offered:** Fall.**Course Description:** A comprehensive, descriptive study of the scientific principles of the physical world, including the history of science, motion, energy, cosmology, geophysics, etc. Designed to provide students without significant previous coursework in the physical sciences with a solid introduction to the terminology and concepts required for further study. 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**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**PHY 107 Introduction to Physics Credits: 4****Typically Offered:** Spring.**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 score of 20 or higher or the equivalent.**CORE 42:** MOTR PHYS 110L; Essentials in Physical Sciences with Lab**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):** MAT 116.**CORE 42:** MOTR PHYS 150L; Physics I with Lab**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:** Fall.**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 166 or MAT 167. **CORE 42:** MOTR PHYS 200L; Advanced Physics I with Lab**PHY 211 University Physics II Credits: 5****Typically Offered:** Spring.**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:** Fall.**Course Description:** Calculus-level modern physics. Three hours lecture. **Prerequisite(s):** PHY 211.**PHY 313 Modern Physics Laboratory Credits: 1****Typically Offered:** Fall (odd-numbered years).**Course Description:** Selected experiments in modern physics. Three hours laboratory. **Prerequisite(s):** Credit or concurrent enrollment in PHY 111 or PHY 312.**PHY 320 History of Physics Credits: 3****Typically Offered:** Spring (even-numbered years).**Course Description:** Comprehensive discussion of chronological development of concepts in classical and modern physics. **Prerequisite(s):** PHY 111 or PHY 312.**PHY 410 Selected Topics in Physics Credits: 3****Typically Offered:** Spring (odd-numbered years).**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:** Fall, Spring.**Course Description:** Investigation of a research problem, project, or topic on an individual conference basis. **Prerequisite(s):** Completion of the minor declaration in physics, minimum 2.5 GPA in minor field, and departmental approval.**PHY 465 Physics Teaching: Methods and Materials Credits: 2****Typically Offered:** Fall (even-numbered years).**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. B.A., Bethany College; M.S., Ph.D., Kansas State University.

**Brian Bucklein** (2010) Associate Professor, Physics. B.S., B.A., East Carolina University; Ph.D., Brigham Young University.

**Lori Chester** (2016) Instructor, Mathematics. B.S., University of Oklahoma; M.S., Tulsa University.

**Christopher Godfrey** (1982) Professor, Physics. B.S., University of Central Arkansas; Ph.D., Iowa State University.

**Connie Hecker** (2000) Assistant Professor, Computer Science. B.S., Missouri Western State College; M.S., Regis University.

**Jennifer Hegeman** (1990) Chairperson and Professor, Mathematics. B.A., Augustana College; M.A., Indiana University; Ph.D., University of Missouri-Kansas City.

**Joseph Kendall-Morwick** (2017) Assistant Professor, Computer Science. B.S., Ohio State University; M.S, Ph.D., Indiana University.

**Steven Klassen** (1995) Associate Professor, Mathematics. B.S., Friends University; M.S., University of Houston-Clear Lake; Ph.D., Texas A & M University.

**Yipkei Kwok** (2015) Assistant Professor, Computer Science. B.S., Hong Kong Baptist University; M.S., California State University; Ph.D., The University of Texas at El Paso.

**Greg Lawson** (2016) Instructor, Computer Science. A.A., Community College of the Air Force; B.S., University of Maryland-College Park; M.A.S., Missouri Western State University.

**Lori McCune** (2012) Assistant Professor, Mathematics. B.S., University of Akron; M.S., Ph.D., University of Nebraska-Lincoln.

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**J. Evan Noynaert** (1985) Assistant Professor, Computer Science. B.A., University of Illinois; M.S. University of Iowa; M.S., Midwestern State University.

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

**Jeffrey Poet** (2002) Professor, Mathematics. B.A., Ottawa University; M.S., Kansas State University; Ph.D., University of Wyoming.

**Glenn Rice** (2006) Associate Professor, Mathematics. B.A., Tabor College; M.A., Ph.D., University of Kansas.

**Alec Sithole** (2016) Assistant Professor, Physics. B.S., M.S., University of Zimbabwe; M.S., Ph.D., Portland State University.

**Gavin Waters** (2006) Professor, Mathematics. B.A., University of Wales; M.S., Ph.D., University of Iowa.

**Baoqiang Yan** (2009) Assistant Professor, Computer Science. B.S., China Youth University for Political Sciences; M.S., Ph.D., University of Mississippi.