

Mathematics *Minor*

REQUIRED COURSES

COURSE #	TITLE	UNITS
MTH 164	Calculus I	4
MTH 174	Calculus II	4
MTH 232	Linear Algebra	2
<i>Choose 12 additional units from:</i>		
MTH 242	Number Theory with Proofs	2
MTH 274	Calculus III	4
MTH 312	Advanced Linear Algebra	2
MTH 334	Applied Mathematics	4
MTH 344	Discrete Mathematics	4
MTH 352	History of Mathematics	2
MTH 364	Probability and Mathematical Statistics	4
MTH 372	Numerical and Symbolic Computation	2
MTH 402	Topics in Geometry	2
MTH 412	Complex Analysis	2
MTH 424	Real Analysis I	4
MTH 432	Real Analysis II	2
MTH 444	Abstract Algebra I	4
MTH 452	Abstract Algebra II	2
MTH 471	History of Mathematics Study Tour	1
MTH 492	Special Topics in Mathematics	2
	TOTAL	22

Computer Science *Courses*

CSC 122 (2) INTRODUCTION TO COMPUTERS

An introduction to the tools used for computing, including operating system commands, word-processing, spreadsheets, network communication, graphical presentation tools, and database application programs. In addition an introduction to personal computer hardware, its characteristics and the ethical considerations of computing.

Prerequisite: Mathematics 099.

CSC 132 (2) INTRODUCTION TO COMPUTER SCIENCE

An overview of the field of computer science, including computer architecture, operating systems and networks, algorithms, programming languages, software engineering, and the theory of computation. Lecture two hours and laboratory four hours each week.

Prerequisite: Mathematics 113 (or equivalent).

CSC 142 (2) INTRODUCTION TO COMPUTER PROGRAMMING

Introduces the syntax of a high level programming language with emphasis on the programming environment and the use of the constructs of the language to write simple application programs. Lecture two hours and laboratory four hours each week.

Prerequisite: Computer Science 132 or consent of instructor.

CSC 154 (4) FUNDAMENTALS OF COMPUTER SCIENCE

In the context of a modern programming language, such topics as problem solving strategies, basic data structures, and data and procedural abstraction are discussed. Programming problems involve game playing and the use of a graphical user interface. Lecture two hours and laboratory four hours each week.

Prerequisite: Computer Science 142.

CSC 252 (2) DATA STRUCTURES WITH PROGRAMMING

This course introduces students to advanced programming concepts such as pointers and dynamic memory allocation necessary to implement elementary data structures such as stacks, queues, linked lists, hash tables, and binary search trees. Three lecture hours and two lab hours each week. Students who have taken Computer Science 254 may not take this class for credit. Offered on a Quad basis.

Prerequisite: Computer Science 154.

CSC 254 (4) DATA STRUCTURES AND ALGORITHMS

Standard data structures, including queues, stacks, trees, and graphs, as objects are defined and illustrated with associated dynamic storage management mechanisms; computational complexity is explored through the design and analysis of searching, sorting, and graph algorithms. Lecture three hours and laboratory two hours each week.

Prerequisite: Computer Science 154.

CSC 314 (4) OPERATING SYSTEMS

A course in systems software that is largely concerned with operating systems. Such topics as process management, device management, and memory management are discussed, as are relevant issues associated with security and protection. Computer hardware concepts related to operating systems are also covered. A significant component of the course covers graphical user interface, application programmer interface (API) provided by modern operating systems such as Windows NT and Unix.

Prerequisite: Computer Science 254.

CSC 324 (4) SOFTWARE ENGINEERING

This course offers an in-depth treatment of the software development process. Software analysis and design study emphasizes an object-oriented approach that is introduced and contrasted with traditional design methodologies. CASE tools are used during the design process. Lecture three hours and laboratory two hours each week. Offered 2006-07.

Corequisite: Computer Science 254.

CSC 334 (4) ARTIFICIAL INTELLIGENCE

An introduction to theoretical issues and computational techniques arising from a comparison of human and machine intelligences. Knowledge representation languages; problem-solving heuristics; machine learning; artificial neural networks; genetic algorithms and application areas including vision, robotics, and natural language understanding will be reviewed. Offered 2005-06.

Prerequisite: Computer Science 254.

CSC 354 (4) DESIGN AND ANALYSIS OF ALGORITHMS

Introduces formal techniques to support the design and analysis of algorithms, focusing on both the underlying mathematical theory and practical considerations of efficiency. Topics include measuring the complexity of algorithms, algorithmic strategies, the concept of intractability and the theory of NP. Emphasis is placed on non-numerical algorithms such as sorting, searching, and graph and network algorithms. Offered 2005-06.

Prerequisites: Computer Science 254 and Mathematics 344.

CSC 374 (4) COMPUTER NETWORKS AND PARALLEL PROCESSING

Current methods and practices in the use of computer networks are covered. The physical and architectural elements and information layers of a communication network are explained. Further discussion includes: the diagnostic, design, operational, and performance measurement tools used to implement, operate, and tune such a network. Different network architectures are contrasted and compared with traditional mainframe and time-shared computer models. Offered 2005-06.

Corequisite: Computer Science 254.

CSC 394 (4) PROGRAMMING LANGUAGES

This course in programming languages covers language design issues and language translators. Laboratories give students a practical understanding of programming language concepts as well as give experience in programming using several programming languages. Lecture three hours and laboratory two hours each week. Offered 2005-06.

Prerequisites: Computer Science 254 and Mathematics 344.

CSC 412 (2) TOPICS IN COMPUTER SCIENCE

Study of an area of computer science not otherwise included in the curriculum. Topics are determined by the needs and interest of the students and faculty involved. Offered 2006-07. Quad course.

Prerequisites: Computer Science 254, Mathematics 131 and 144 or Mathematics 164 and consent of instructor.

CSC 422 (2) THEORY OF COMPUTATION

An introduction to the theory of computation. Topics include Finite Automata and Regular Expressions, Context-Free Grammars and Push-down Automata, Turing Machines, Decidability and Reducibility. Offered 2006-07. Quad course.

Prerequisites: Computer Science 254 and Mathematics 344.

CSC 454 (4) COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE

An in-depth treatment of computer architecture, including digital logic, digital systems, memory system organization, interfacing and communications, and alternative architectures. Students gain experience writing assembly language programs. Lecture three hours and laboratory two hours each week. Offered 2006-07.

Prerequisite: Computer Science 154.

CSC 481 (1) SENIOR SEMINAR IN COMPUTER SCIENCE

This one-unit capstone course is a seminar in which faculty members, some guests, and the students give lectures on topics of general interest in computer science. Graded Credit/No Credit.

Prerequisite: Senior standing or Junior standing if a December graduate.

CSC 491 (1-4) INDEPENDENT STUDIES IN COMPUTER SCIENCE

Study of a selected problem or topic under the direction of an instructor. The instructor and student propose the course of study. Approval by the department chair is required. May be repeated for a total of six units.

Prerequisite: Consent of instructor.

CSC 494 (4) SENIOR SOFTWARE PROJECT

This course presents the student with a strong experience in software engineering. Students, working in teams, investigate, design, implement and present to their classmates a significant software project. The project should solve a significant, complex and generalizable problem, dealing with constraints and trade-offs in the solution. The course includes study of project management concerns such as planning, scheduling, and assessing progress.

Prerequisites: Computer Science 324 and Senior standing.

Information Systems *Courses*

ISS 162 (2) INFORMATION SYSTEMS PRACTICUM

This laboratory based course gives students in-depth technical knowledge about computers, operating systems, hardware components, and their functionality and interoperability. It is designed to prepare students to take a computer hardware certification exam.

Prerequisite: Computer Science 132.

ISS 234 (4) INTRODUCTION TO INFORMATION SYSTEMS

This course is an overview of the field of information systems and is intended to give the student a summary of the topics to be covered in the IS major. The topics covered include an introduction to the computer-based information system, information use in the marketplace, product and service quality, system theory and methodologies, the ethical implications of information technology, and the fundamentals of computer processing and database management. Further topics are the computer based information system in accounting, decision support and office automation, organizational information systems and information as a managed resource.

Prerequisite: Computer Science 154.

ISS 304 (4) BUSINESS APPLICATIONS SOFTWARE

The course focuses on core concepts and features of Visual Basic.NET, such as data types, control structure, object-oriented programming, classes, graphical user interface concepts, event-driven programming, and information retrieval from databases. Along with mastering the programming of Visual Basic.Net, the student is required to program many real world business applications using the language.

Prerequisite: Computer Science 154.

ISS 314 (4) OPERATING SYSTEMS

A course in systems software that is largely concerned with operating systems. Such topics as process management, device management, and memory management are discussed, as are relevant issues associated with security and protection. Computer hardware concepts related to operating systems are also covered. A significant component of the course covers graphical user interface application programmer interface (API) provided by modern operating systems such as Windows NT and Unix.

Corequisite: Computer Science 254.

ISS 324 (4) SOFTWARE ENGINEERING

This course offers an in-depth treatment of the software development process. Software analysis and design study emphasizes an object-oriented approach that is introduced and contrasted with traditional design methodologies. CASE tools are used during the design process. Lecture three hours and laboratory two hours each week. Offered 2006-07.

Corequisite: Computer Science 254.

ISS 413 (3) DATA BASE MANAGEMENT SYSTEMS

Physical data organization, data models (including relational, network, and hierarchical), the CODASYL approach, query optimization, integrity, and security of data bases. An examination of currently available models that can be used to evaluate the trade-offs in systems and data base developments. Offered 2005-06.

Prerequisites: Computer Science 154.

ISS 422 (2) INTERNET APPLICATIONS DEVELOPMENT

An information technology course designed as a comprehensive introduction to the programming tools and the skills required to build and maintain the server sites on the Internet. Provides an overview of how the Internet works, as well as experience with many of the most widely used Internet technologies. Offered 2006-07.

Prerequisite: Computer Science 254, 314 or

Information Systems 314 or consent of the instructor.

ISS 472 (2) INTERNSHIP IN INFORMATION SYSTEMS

A supervised experience in which the student works with industry professionals to gain experience with managing information systems. May be repeated to a total of four units. This course is graded Credit/No Credit only.

Prerequisite: Consent of instructor.

ISS 481 (1) SENIOR SEMINAR IN INFORMATION SYSTEMS

This one-unit capstone course is a seminar in which faculty members, some guests and the students give lectures on topics of general interest in information systems. Graded Credit/No Credit.

Prerequisite: Senior standing or Junior standing if a December graduate.

ISS 484 (4) OPERATIONS MANAGEMENT

An analysis of the information support systems which aid the manager in the decision-making process. Topics include mathematical and computer models for production and operations management, allocation of resources, planning, and financial analysis. Offered 2006-07.

Prerequisite: Mathematics 203 or Mathematics 364.

Mathematics *Courses*

MTH 099 (3) ELEMENTARY ALGEBRA

An introduction to algebra, including a study of the real number system, solutions of linear and quadratic equations, polynomials, factoring, systems of equations, graphing, inequalities, and radicals.

Note: This course does not count toward the 128 units required for graduation.

MTH 113 (3) INTERMEDIATE ALGEBRA

A review and extension of elementary algebra, solutions of linear and quadratic equations, radicals, inequalities, linear and quadratic functions, polynomial functions, exponential and logarithmic functions, and graphing.

Prerequisite: Mathematics 099 (or equivalent).

MTH 123 (3) ELEMENTARY FUNCTIONS

A basic introduction to functions designed to meet the prerequisite skills necessary for the study of calculus. A study of polynomial, rational, exponential, logarithmic, and trigonometric functions, coordinate geometry, and graphing.

Prerequisite: Mathematics 113 (or equivalent).

MTH 131 (1) COMPUTER AIDED CALCULUS

Introduction to the use of a computer algebra system to complement the knowledge of Calculus.

Corequisite: Mathematics 144 or a score of 3 or more on AP114 or AP115.

MTH 144 (4) CALCULUS WITH APPLICATIONS–GE

Differential and integral calculus of the elementary functions of one variable. Limits, continuity, derivatives, integrals, and applications.

Prerequisites: Mathematics 123 or equivalent.

MTH 164 (4) CALCULUS I–GE

Calculus of the elementary functions of one variable, supported by the use of computer graphics and a symbolic computer algebra system. Limits, continuity, derivatives, integration and applications.

Prerequisite: Mathematics 123 or equivalent.

MTH 174 (4) CALCULUS II

A continuation of Calculus I. Methods of integration, sequences, series, elementary differential equations, polar coordinates and parametric equations.

Prerequisites: Mathematics 131 and 144 or 164.

MTH 203 (3) INTRODUCTION TO STATISTICS

A first course in statistics for the general student. Description of sample data, probability theory, theoretical frequency distributions, sampling, estimation, and hypothesis testing. Not applicable toward a major in mathematics.

Prerequisite: Mathematics 099 or equivalent.

MTH 213 (3) FUNDAMENTALS OF ELEMENTARY MATHEMATICS I

A comprehensive approach to the mathematical knowledge necessary for a California multiple-subject teaching credential (K-8). Topics covered in this course include whole numbers, numeration systems, fractions, decimals, ratios, proportions and an introduction to number theory. The integers, rational numbers, irrational numbers and real numbers are studied along with algebraic expressions, inequalities, graphs and polynomials. This class is highly interactive and emphasizes group work and cooperative learning. Not applicable toward a major in Mathematics. Passing an 8th grade mathematics proficiency test is a requirement for the completion of this course.

Prerequisite: Mathematics 113 or equivalent.

MTH 223 (3) FUNDAMENTALS OF ELEMENTARY MATHEMATICS II

A continuation of Mathematics 313 focusing on additional knowledge necessary for a California multiple-subject teaching credential (K-8). Topics covered in this course include data analysis and statistics, probability, combinations and permutations, simulations as well as standard and non-standard measurement. Planar and three dimensional geometry and geometric constructions are studied, including an algebraic approach to geometry. This class is highly interactive and emphasizes group work and cooperative learning.

Prerequisite: Mathematics 213.

MTH 232 (2) LINEAR ALGEBRA

A computational introduction to linear algebra with applications. A study of linear equations, matrix algebra, Euclidean spaces and subspaces supported by the use of a symbolic computer algebra system. Offered on a Quad basis..

Prerequisite: Mathematics 144 or 164.

MTH 242 (2) NUMBER THEORY WITH PROOFS

An introduction to proofs using the study of natural numbers, integers, prime factorization, divisibility, congruences, multiplicative functions, continued fractions, quadratic residues. Methods used include investigation, conjecture, inductive and deductive proofs. Offered on a Quad basis..

Prerequisite: Mathematics 144 or 164.

MTH 274 (4) CALCULUS III

Conceptual development of the calculus of functions of more than one variable supported by the use of a symbolic computer algebra system. Limits and continuity, partial derivatives, chain rule, extreme values, Taylor's theorem, multiple integrals, line and surface integrals, Green's Theorem and Stokes' Theorem.

Prerequisite: Mathematics 174.

MTH 303 (3) PROBLEM SOLVING-GE

A General Education course whose major goal is to develop the ability to solve non-routine problems through dynamic processes of inquiry and exploration, logical reasoning, making and testing conjectures and investigating implications of conclusions. A study of quantitative reasoning with emphases on active problem solving and developing connections with other disciplines. Not applicable toward a major in Mathematics.

Prerequisites: Mathematics 099 or equivalent and Junior or Senior standing.

MTH 312 (2) ADVANCED LINEAR ALGEBRA

A continuation of MTH 232 with emphasis on the theory of vector spaces, linear transformations, eigenvalues, eigenvectors and inner products. Offered on a Quad basis. Offered 2006-07.

Prerequisite: Mathematics 232.

MTH 334 (4) APPLIED MATHEMATICS

Ordinary differential equations, Laplace transformation, Fourier analysis, partial differential equations, optimization, and mathematical modeling. Offered 2006-07.

Prerequisite: Mathematics 274.

MTH 344 (4) DISCRETE MATHEMATICS

Sets, functions, propositional logic and switching theory, graphs including trees, matrices, induction and proof by contradiction, combinatorics, and probability. Selected applications from computer science included. Offered 2005-06.

Prerequisite: Mathematics 131 and 144 or 164.

MTH 352 (2) HISTORY OF MATHEMATICS

Development of mathematics from pre-Greek to recent times. Perspectives and contributions of persons from diverse cultural, ethnic, and gender groups. Impact of culture on mathematical progress. Offered 2006-07. Offered on a Quad basis.

Prerequisite: Mathematics 144 or 164.

MTH 364 (4) PROBABILITY AND MATHEMATICAL STATISTICS

A study of statistics including random variables, probability, density functions, limit theorems and the estimation of parameters. Offered 2005-06.

Prerequisite: Mathematics 274.

MTH 372 (2) NUMERICAL AND SYMBOLIC COMPUTATION

A study of computer-based methods for solving numeric problems. Includes error analysis, zeros of functions, interpolation, approximation and numeric integration. Offered on a Quad basis. Offered 2005-06.

Prerequisite: Mathematics 274.

MTH 402 (2) TOPICS IN GEOMETRY

A study of the foundations of geometry, Affine, non-Euclidean and projective geometries. A synthetic development of advanced Euclidean geometry including geometric transformations, convexity, and constructions. Offered on a Quad basis. Offered 2006-07.

Prerequisite: Mathematics 144 or 164.

MTH 412 (2) COMPLEX ANALYSIS

Complex numbers, analytic functions, integration, series, contour integration, residues and conformal maps. Offered on a Quad basis. Offered 2005-06.

Corequisite: Mathematics 274.

MTH 424 (4) REAL ANALYSIS I

Real numbers, topology of Euclidean n-space, continuity, differentiation and integration theory. Offered 2005-06.

Corequisites: Mathematics 232 and 242 and Junior standing.

MTH 432 (2) REAL ANALYSIS II

Continuation of Mathematics 424. Differentiation and integration in Euclidean n-space, uniform convergence. Quad course. Offered 2005-06.

Prerequisite: Mathematics 424.

MTH 444 (4) ABSTRACT ALGEBRA I

A study of groups, rings, fields and related structures with selected applications. Offered 2006-07.

Corequisites: Mathematics 232 and 242 and Junior standing.

MTH 452 (2) ABSTRACT ALGEBRA II

Continuation of Mathematics 444. Polynomial rings, finite fields and extension fields. Offered on a Quad basis. Offered 2006-07.

Prerequisite: Mathematics 444.

MTH 463 (3) SECONDARY SCHOOL MATHEMATICS

An analysis of the secondary school mathematics curriculum from the perspective of collegiate mathematics. Strategies and models for developing mathematical concepts and skills for understanding and communicating mathematical ideas effectively. Emphasis on critical thinking, problem solving, mathematical connections, use of technology, assessment issues and field experiences. Offered 2006-07.

Prerequisites: Mathematics 274.

Corequisite: Education 304 and Junior standing.

MTH 471 (1) HISTORY OF MATHEMATICS STUDY TOUR

This course is conducted as a European trip (countries vary). The course uses specific museums, library collections and historic sites to investigate the development of mathematics in relation to specific problems. Lectures and meetings are held during the semester and a series of lectures by the professor and others are presented on location. Offered 2005-06.

Prerequisite: Consent of the instructor.

MTH 481 (1) SENIOR SEMINAR IN MATHEMATICS

This one-unit capstone course is a seminar in which faculty members, some guests, and the students give lectures on topics of general interest in mathematics. Graded Credit/No Credit.

Prerequisite: Senior standing or Junior standing if a December graduate.

MTH 491 (1-4) INDEPENDENT STUDY IN MATHEMATICS

Study of a selected problem or topic under the direction of an instructor. The instructor and student propose the course of study. Approval by the department chair is required. May be repeated for a total of six units.

Prerequisite: Consent of instructor.

MTH 492 (2) SPECIAL TOPICS IN MATHEMATICS

Study of an area of mathematics not otherwise included in the curriculum. The needs and interests of students and faculty involved determine the topics. May be repeated for a total of six units.

Prerequisite: Consent of instructor.