Semester System

Samford University

Catalog
2005-2006
Academic Year

Birmingham, Alabama U.S.A. 35229
(205) 726-2011
www.samford.edu

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Undergraduate Degree Requirements

Associate Degree Requirements

See Evening Studies Program–Metro College for requirements.

Bachelor's Degree Requirements

Total Credits

A minimum of 128 credits must be successfully completed. Not more than eight credits in music ensembles, drama participation, and physical education activity courses may apply toward the minimum of 128 credits required for graduation. No more than two credits in physical education activity courses beyond those required for graduation may be part of the combined eight credits. *In order to receive a first undergraduate degree, students must earn at least 50 percent of their total credits from Samford. At least 40 credits must be earned in junior-level and senior-level courses.*

A second undergraduate degree requires at least 32 additional credits and completion of all curricular requirements for the second degree.

Majors/Concentrations

Students are required to earn at least 50 percent of the credit for a first undergraduate degree in each degree program from Samford. Also, a minimum of 15 credits in the major field (with nine at the 300–400 level) must be earned at Samford. Each bachelor degree student must declare a major by the junior year. This information must be on file in the Office of Student Records. Students desiring to change a declared major must do so at the beginning of the registration periods for each semester or term. An undeclared major is acceptable for the freshman and sophomore years. In addition to a major, a specialized curriculum in pre-law or pre-medicine may be followed. See Pre-Law Program or Health Professions Program in the Special Academic Programs section of this catalog.

Minors

For a minor, a minimum of nine credits in the minor field (with six at the 300–400 level) must be earned at Samford. A minor is not required in all majors; however, a student is encouraged to consult with his/her academic advisor to determine whether a minor or some selection or concentration of courses might enhance the academic experience.

Grade Point Average (GPA)

A grade point average of 2.00 in the Samford University (SU) average (calculated on all work taken at Samford) is required. Consult departmental listings for specific major course requirements, number of required credits, and grade point averages to achieve. A student must have at least a 2.00 GPA in both the major and minor fields.

Writing Proficiency Requirement

Samford University considers the development of students' writing proficiency one of its most important objectives. To emphasize this objective, the University has a twofold writing requirement. All students must complete Communication Arts II (UCCA 102) at Samford with a grade of C- or better; however, students who transfer the equivalent of this course into Samford must pass a Writing Proficiency Exam. (The Writing Proficiency Exam is not required of students who already have a bachelor's degree from an accredited university.) In addition, students must pass two approved courses at the 300 level or above that require a significant amount of writing. These courses are designated with a W following the course number in the course listings of this catalog.

Convocation Requirement

Campuswide Chapel/Convocation Programs for faculty, staff, and students are held twice a week during the academic year. Full-time students are required to earn at least eight (8) convocation credits each semester. University regulations for attendance are outlined in the *Student Handbook*.

Synopsis of Undergraduate Degree Requirements and Normal Completion Times

Degree	Minimum Requirements (Credit Hours)	Normal Completion Times
Associate of Science	64	3 years part-time
Baccalaureate degrees	128	4 years full-time
Bachelor of General Studies	128	6 years part-time

Physical Activity Course Requirements

Most schools require one or two physical activity course(s) in addition to UCFH 120. Students with physical disabilities may consult the Chair of the Department of Exercise Science and Sports Medicine to determine how to fulfill this requirement. If PHED 138 (Water Safety Instructor's Course) is passed, the successful completion of UCFH 120 will fulfill the student's physical education requirement.

In order to meet the general education physical activity requirement, a student may register and receive credit only once for the same activity course, with the exception of student-athletes participating in NCAA varsity sports. Student-athletes may count a single varsity sport up to three times, once for the general education requirement and twice for general electives that count toward the overall 128 credits in the standard degree, provided that degree allows for general electives. For majors that require no physical education activity courses, students may apply a maximum of two (2) activity credits as general electives towards the total credits required to earn a degree.

Additional Bachelor's Degrees

In order to receive an additional bachelor's degree, a student who has already received a bachelor's degree must complete a minimum of 32 credits at Samford, including four credits of religion (if transfer student) beyond the first degree. Completion of the first bachelor's degree satisfies Samford's Writing Proficiency requirements. All additional curricular and minimum GPA requirements of the second degree must be met.

University Core and General Education Curriculum Requirements

The University Core and General Education curricula are designed to provide an academic foundation for work toward the major field of study and should be completed as early as possible. All freshmen are required to take the University Core Curriculum at Samford (22 credits)*. All students should be registered for Cultural Perspectives I (UCCP 101) in their first semester at Samford. They should also register for Communication Arts I (UCCA 101) or Communication Arts II (UCCA 102), depending on their placement.** Students should consult their academic advisors for recommended scheduling.

Additional courses in general education are also required to provide the foundation for the more specialized courses in the major. In some cases the particular course required to satisfy a general education requirement is specified by the major. Students should consult the section of the catalog that describes the major under consideration to learn about these special requirements.

* Core curriculum requirements cannot be met through transient enrollment.

** Placement into UCCA 102, bypassing the requirement to complete UCCA 101, does not exempt students from the minimum number of hours required for their chosen degree program (usually 128). These students may need to complete an additional four hours of a General Elective.

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University Core Curriculum Courses (22 credits)

UCBP 101 Biblical Perspectives I (4)
Examination of historical context and religious teachings of Hebrew and Christian Scriptures. Cultivation of critical competencies necessary for the academic study of traditional texts. Course objectives include an understanding of the historical context in which the Bible took shape; appreciation of the development of religious thought within the biblical period; examination of how biblical teachings have been and are interpreted and applied; and study of the Bible, using a variety of modern critical methods. Offered: Every semester.

UCCA 101 Communication Arts I (4)
Introductory course in communication, emphasizing guided practice in speaking, listening, reading, and writing. Students gain proficiency in the use of library resources and in foundational computing skills. Students must write a minimum of four essays that are revised through multiple drafts and carefully edited before submission. They also must make at least three oral presentations during the course. Students must pass this course with a grade of C- or better to advance to UCCA 102.

UCCA 102 Communication Arts II (4)
Continuation of UCCA 101 with additional guided practice in speaking, listening, reading, and writing. Special emphasis placed on research-based writing and argumentation. Students must write a minimum of four essays that are revised through multiple drafts and carefully edited before submission. They also must make at least three oral presentations during the course. Prereq: Grade of C- or better in UCCA 101. Students must pass this course with a grade of C- or better.

UCCP 101 Cultural Perspectives I (4)
First in a two-semester sequence that examines the Western intellectual tradition within a global context. Through interdisciplinary study, students increase their awareness of the cultural, historical, literary, philosophical, and religious influences upon the development of civilizations.

UCCP 102 Cultural Perspectives II (4)
Second in a two-semester sequence that examines the Western intellectual tradition within a global context. Through interdisciplinary study, students increase their awareness of the cultural, historical, literary, philosophical, and religious influences upon the development of civilizations.

UCFH 120 Concepts of Fitness and Health (2)
Physical fitness course, with emphasis on exercises that develop cardiorespiratory, muscular, and flexibility fitness. All aspects of fitness, such as principles of aerobic fitness, nutrition, flexibility, strength training, common fitness injuries, and weight control and body composition are discussed and applied.

Academic Regulations

Students are expected to know regulations and policies found in this catalog and the Student Handbook. Keeping abreast of the school calendar, critical deadlines, and all University mail received in one's University mailbox and/or electronic mail is also the student's responsibility

Undergraduate Academic Achievement Recognition

Honors Curriculum - University Honors Program
For more information about the University Honors Program, see Honors Curriculum in the University-Wide Academic Opportunities section of this catalog.

Dean's List
At the end of each semester, a Dean's List is compiled consisting of undergraduate students who have earned a grade point average of at least 3.50 while completing at least 12 quality credits of work in the semester.

Graduation with Honors
Honors are awarded on the basis of all academic work taken at Samford University. Students who earn at least 90 credits at Samford and a grade point average (calculated on all work done at Samford University) of 3.500 through 3.749 are graduated *cum laude*; of 3.750 through 3.899 are graduated *magna cum laude*; and of 3.900 through 4.000 are graduated *summa cum laude*.

Honor Organizations

University-wide
Alpha Lambda Delta
Omicron Delta Kappa
Phi Kappa Phi
Alpha Epsilon Delta (Pre-Med)

Howard College of Arts and Sciences
Biology – Beta Beta Beta
Communication Studies – Lambda Pi Eta
English – Sigma Tau Delta
History, Political Science
Phi Alpha Theta
Pi Gamma Mu
Pi Sigma Alpha
Journalism/Mass Communication
Kappa Tau Alpha
Mathematics – Pi Mu Epsilon
Philosophy – Phi Sigma Tau
Psychology – Psi Chi
Sociology – Alpha Kappa Delta
World Languages and Cultures
Pi Delta Phi (French)
Delta Phi Alpha (German)
Sigma Delta Pi (Spanish)

School of Business
Beta Alpha Psi
Beta Gamma Sigma

Orlean Bullard Beeson School of Education and Professional Studies
Teacher Education
Kappa Delta Epsilon
Kappa Delta Pi
Family and Consumer Education
Kappa Omicron Nu

Ida V. Moffett School of Nursing
Sigma Theta Tau

School of Performing Arts
Alpha Psi Omega
Phi Kappa Lambda

McWhorter School of Pharmacy
Rho Chi

Metro College
Alpha Sigma Lambda

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Mathematics and Computer Science

Faculty

Bruce W. Atkinson, Chair, Professor
Kurt E. Wheeler, Research Professor
David L. Foreman, Associate Professor
Sonya S. Stanley, Associate Professor
Steven K. Donaldson, Assistant Professor
Emily A. Hynds, Assistant Professor
Janie A. Kennedy, Assistant Professor
Brian R. Toone, Assistant Professor
Gregory A. Kawell, Instructor
Candace H. Todd, Instructor

Undergraduate Programs and Requirements

Majors

Mathematics
Computer Science
Dual-Degree Engineering Program

Minors

Mathematics
Computer Science

The department offers two majors: mathematics and computer science, both leading to the bachelor of science degree. Students planning to earn an Alabama teacher's certificate in mathematics should consult the department chair and refer to the Orlean Bullard Beeson School of Education and Professional Studies section of this catalog.

The department also offers a dual-degree engineering program in conjunction with the Department of Physics and the engineering schools of several regional universities. The five-year program leads to two degrees: a bachelor of science degree from Samford with a major in mathematics or physics, and a bachelor of engineering degree from the participating university. (See the Undergraduate Dual-Degree Engineering Program section below for more details.)

Students interested in pursuing an engineering career need not necessarily enter the dual-degree program. Since mathematics, physics, computer science, and chemistry are basic in all engineering curricula, students taking basic courses in these fields are well prepared to transfer to any engineering school. At Samford, students can complete half the curriculum required in any of the following fields of engineering: mechanical, electrical, civil, chemical, highway, and aeronautical. Interested students are advised to check with several engineering schools to determine which Samford courses would transfer directly.

University Core Curriculum and General Education Requirements

See University Core Curriculum and General Education Requirements in the Howard College of Arts and Sciences introductory pages for a list of required and applicable courses. Note: Any math course taken to meet requirements for a major or minor in the department may also be used to meet the general education mathematics requirement.

Undergraduate Dual-Degree Engineering Program

The Department of Mathematics and Computer Science and the Department of Physics offer a dual-degree engineering program jointly with the following universities: University of Alabama at Birmingham, Auburn University, Washington University (Missouri) and Mercer University (Georgia).

Students in this five-year program will first pursue a three-year general curriculum at Samford, followed by a two-year general technical curriculum at one of the participating engineering schools. Students apply to the engineering school during their third year at Samford. Applications must include a letter of recommendation from the chair of the Department of Mathematics and Computer Science or from the chair of the Department of Physics (depending on the track selected), as well as documentation that the candidate will complete the required coursework at Samford. Candidates must satisfy the admission requirements for the participating engineering school, and should contact the school well in advance of application. The program consists of 96-108 credits at Samford (depending on placement in world languages). Both departments have checklists available for this program: one for the mathematics track and one for the physics track. Please see either department chair for further information.

Mathematics Major

The Department of Mathematics strongly recommends that students planning on graduate studies in mathematics take MATH 430 (Abstract Algebra) and MATH 440 (Introductory Real Analysis). Such students are likely to take at least one or two courses more than the minimum requirement for the major.

Note: Students may also receive secondary certification by completing 44 credits of professional studies. Contact the chair of the Department of Teacher Education for more information.

Mathematics Major Required Courses		Course Credits	Total Required Credits
University Core Curriculum			22
General Education Requirements			30-42
Mathematics Major:			44
Mathematics			32
MATH 240	Calculus I	4	
MATH 260	Calculus II	4	
MATH 270	Calculus III	4	
MATH 280	Intro to Advanced Mathematics	4	
MATH 330	Differential Equations	4	
MATH 340	Linear Algebra	4	
MATH 430	Abstract Algebra *or*	4	
MATH 440	Introductory Real Analysis		
MATH 490W	Senior Seminar	4	
Mathematics Upper-Level Electives (at least four credits must be at the 400 level)			8
Computer Science			4
COSC 110	Introduction to Programming	4	
General Electives			20-32
	Total Required Credits		128

Computer Science Major

In conjunction with the standard major, the department supports special interdisciplinary tracks in neuroinformatics, bioinformatics, and cognitive science. Consult the Computer Science Web site at http://www.samford.edu/schools/artsci/math/cs-home.html or contact the department for details.

Computer Science Major Required Courses		Course Credits	Total Required Credits
University Core Curriculum			22
General Education Requirements			30-42
Computer Science Major:			48
Computer Science			44
COSC 110	Introduction to Programming	4	
COSC 200	Discrete Structures for Computer Science	4	
COSC 210	Data Structures and Algorithms	4	
COSC 305	Computer Organization & Architecture	4	
COSC 306	Principles of Bioinformatics *or*	4	
COSC 315	Databases & Information Management		
COSC 325	Languages and Theory	4	
COSC 335	Operating Systems & Networking	4	
COSC 420	Software Engineering	4	
COSC 460	Current Topics in Computing	4	
COSC 470	Artificial Intelligence and Advanced Computing Strategies	4	
COSC 495W	Senior Seminar and Project	4	
Mathematics			4
MATH 240	Calculus I	4	
General Electives*			16-28
	Total Required Credits		128

*Must include 16 hours in an approved Applications Area. This is another discipline or plan of study defined with a student's advisor in which computing may be used as a tool. Typical choices include, but are not limited to, mathematics, natural or social sciences, GIS, and business. A student planning to do graduate work in computing should select mathematics as his/her Applications Area, and take as electives any upper-level computing courses specified as prerequisites for the graduate program.

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Mathematics Minor

Mathematics Minor Required Courses		Course Credits	Total Required Credits
Mathematics Core			**16**
MATH 240	Calculus I	4	
MATH 260	Calculus II	4	
MATH 270	Calculus III	4	
MATH 280	Intro to Advanced Mathematics	4	
Mathematics Upper-Level Elective			**4**
Computer Science			**4**
COSC 110	Introduction to Programming	4	
Total Required Credits			**24**

Computer Science Minor

Computer Science Minor Required Courses		Course Credits	Total Required Credits
Computer Science Core			**12**
COSC 110	Introduction to Programming	4	
COSC 200	Discrete Structures for Computer Science	4	
COSC 210	Data Structures and Algorithms	4	
Computer Science Electives			**12**
Total Required Credits			**24**

Courses

MATHEMATICS

MATH 100 Intermediate Algebra (4)
Review of intermediate-level algebra, this course is designed primarily as a remedial course for freshmen whose curriculum requirements include precalculus. Does not satisfy any mathematics requirement for graduation at Samford University. Offered: Fall only.

MATH 107 Mathematics for Elementary Teachers (4)
Designed to strengthen understanding of the mathematics that prospective teachers will teach. Includes review of natural numbers, whole numbers, integers, rational numbers, real numbers, and their properties; the variety of representations of different operations; algebraic reasoning and representation; measurements of area, perimeter, surface area, and volume; and geometry concepts including transformations, constructions, and similarities. Offered: Fall, Spring, and possibly Jan Term or summer.

MATH 110 Contemporary Mathematics (4)
Development of problem-solving skills obtained by studying a wide range of contemporary applications of mathematics. Connections between contemporary mathematics and modern society are stressed. Prereq: Suitable score on placement exam. Offered: Fall, Jan Term, Spring, and Summer 1 only.

MATH 150 Precalculus (4)
Introduction to a combination of standard topics from college algebra and trigonometry. Includes examples of modern mathematical modeling, ideas, and applications, plus the skills and knowledge needed for subsequent mathematics courses and/or real world applications. Covers linear, quadratic, exponential, power, logarithmic, polynomial, inverse, and trigonometric functions. Graphing calculator required; consult department for recommended model. Prereq: Suitable score on placement exam. Offered: Fall, Jan Term, Spring, and Summer 1 only.

MATH 210 Elementary Statistics (4)
Introduction to algebra-based statistics. Includes review of descriptive and inferential statistics with probability decision-making skills necessary for today's complex civilization. Covers frequency, probability, binomial, normal, chi-square and sampling distributions, estimation, hypothesis testing for one and two populations, linear correlation and regression, and analysis of variance. Some class assignments completed using a statistical computing software package. Graphing calculator required; consult department for recommended model. Prereqs: Suitable score on placement exam. Offered: Fall, Spring, Summer 1, possibly Summer 2 or Jan Term.

MATH 240 Calculus I (4)
Introductory study of calculus, beginning with a review of precalculus functions with an emphasis on graphical, numerical, and modeling applications. Topics include: limits, continuity, derivatives and their interpretations, tangent line approximations, the definite integral as a limit of Riemann sums, applications of the definite integral to area and average value, the Fundamental Theorem of Calculus, rules of derivatives, formulas for derivatives of precalculus functions, implicit functions, economics applications, optimization and modeling, and Newton's method. Some class assignments/projects completed using the computer algebra system, Mathematica. Graphing calculator required; consult department for recommended model. Prereqs: MATH 150 or suitable score on placement exam. Offered: Fall, Jan Term, Spring, and possibly summer.

MATH 260 Calculus II (4)
Sequel to MATH 240. Topics include: Antiderivatives, integration by substitution, integration by parts, approximation of definite integrals, improper integrals, setting up of Riemann sums in applications, applications of definite integrals to geometry, physics, and economics, probability distributions, simple first order differential equations, slope fields, Euler's method, separation of variables, growth and decay, systems of differential equations, applications of second order equations to oscillations, Taylor approximations, and Taylor series. Some class assignments/projects completed using the computer algebra system, Mathematica. Graphing calculator required; consult department for recommended model. Prereq: Grade of C or better in MATH 240. Offered: Fall and Spring only.

MATH 270 Calculus III (4)
Sequel to MATH 260. Topics include: Functions of two and three variables, graphs of surfaces, contour plots, vectors, dot products, cross products, partial derivatives, local linearity, differentials, directional derivatives, gradients, chain rule, partial differential equations, constrained and unconstrained optimization, multivariable integration, iterated integrals, numerical integration by the Monte Carlo method, change of variables in multivariable integrals, parameterized curves, and surfaces. Some class assignments/projects completed using the computer algebra system, Mathematica. Graphing calculator required; consult department for recommended model. Prereq: Grade of C or better in MATH 260. Offered: Fall and Spring only.

MATH 280 Introduction to Advanced Mathematics (4)
Transition from calculus sequence to upper-level math. Primary objective is learning how to read, understand, and write proofs; hence, logic and proof techniques and strategies are heavily discussed. Secondary objective is learning certain basic math concepts needed for upper-level math courses, including set theory, functions, and relations. Other topics may include infinite sets, the set of integers, the set of real numbers, discrete math, and basic number theory. Prereq or co-req: MATH 270. Offered: Fall and Spring only.

MATH 320 Numerical Analysis (4)
Study of fine differences, interpolations, differentiation and integration, Lagrangian formulas, solutions of equations, systems of equations initial-value problems for ordinary differential equations, curve fitting, and approximation theory. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200.

MATH 330 Differential Equations (4)
Study of ordinary differential equations. Methods of solutions to differential equations are presented and applied in detail. Topics include the general solution to a linear differential equation, linear homogeneous and nonhomogeneous differential equations of higher order with constant coefficients, Laplace transforms, infinite series methods, Legendre Polynomials, Bessel Functions, and linear systems of differential equations. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200. Offered: Spring only.

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MATH 340 Linear Algebra (4)
Study of fields, systems of linear equations, matrices, vector spaces, subspaces, bases and dimension, linear transformations, isomorphism, representation of transformations by matrices, linear functionals, determinants, eigenvalues and eigenvectors, invariant subspaces, inner product spaces, stochastic matrices, matrix exponentials, and numerical methods. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200. Offered: Fall only.

MATH 350 Vector Calculus (4)
Study of vector algebra in two and three dimensions, equations of lines in space, scalar products, orientation, vector products, triple scalar products, vector identities, tensors, vector valued functions, velocity, tangent vectors, acceleration, vector fields, gradients, divergence, curl, the Laplacian, line integrals, potentials, conservative fields, irrotational fields, surface integrals, volume integrals, divergence theorem, Green's formula, and Stoke's theorem. Applications to electrostatics, force fields, potential theory, fluid flow, heat flow, gravitation, and wave equations. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200; PHYS 203 and PHYS 204.

MATH 360 Complex Variables (4)
Study of functions of a complex variable. Topics include analytic and harmonic functions, transformation and mapping, complex integration, power series, residues and poles, conformal mapping, and additional theory of functions. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200.

MATH 370 Mathematical Statistics (4)
Introduction to calculus-based probability theory and statistical inference. Topics include: probability measures, independence and conditional probability, discrete random variables, continuous random variables, distribution functions, expectations, multivariate distributions, correlations, binomial, Poisson, gamma, chi-square, normal distributions, sampling distributions, order statistics, moment-generating functions, functions of random variables, convergence of distributions, central limit theorem, point estimators, maximum likelihood, confidence intervals, hypothesis testing, sufficient statistics, Bayesian estimation, likelihood ratio tests, analysis of variance, linear regression, and nonparametric statistics. Prereq: MATH 270. Strongly recommended prereq: MATH 280 and/or COSC 200.

MATH 410W Number Theory (4)
Introduction to the theory of numbers. Topics include divisibility, factorization, prime numbers, congruencies, arithmetic functions, quadratic residues, and Diophantine equations. Additional topics may include primitive roots, continued fractions, cryptography, Fibonacci numbers, and numerical techniques. Prereq: MATH 280.

MATH 420 College Geometry (4)
Axiomatic, proof-oriented treatment of different geometries, including synthetic, metric, absolute, and Euclidean geometries. Other topics may include finite geometries, fractals, constructions, and specific non-Euclidean geometries. Prereq: MATH 280.

MATH 430 Abstract Algebra (4)
Introduction to abstract algebra, groups, rings, and fields. Topics include: binary operations, groups, subgroups, cyclic groups, groups of permutations, cosets, finitely generated groups, homeomorphisms, isomorphisms, factor groups, rings, fields, and integral domains. Additional topics may include fields of quotients, rings of polynomials, factor rings, ideals, unique factorization domains, and the Sylow Theorems. Prereqs: MATH 340 or MATH 410.

MATH 440 Introductory Real Analysis (4)
Proof-oriented introduction to topics in mathematical analysis. Topics include: field axioms of real numbers, completeness axiom, set theory, relations and functions, infinite sets, countable sets, open and closed sets, closure, limit points, Bolzano-Weierstrass theorem, limits and partial limits of sequences, monotone sequences, Cauchy sequences, limits of functions, continuity, extreme value theorem, intermediate value theorem, uniform continuity, differentiation, chain rule, mean value theorem, L'Hopital's rule, convergent series, tests for convergence of series, rearrangement of series, Riemann sums, Riemann integrability, Fundamental Theorem of Calculus, change of variables, sequences of functions, uniform convergence, and power series. Prereq: MATH 280.

MATH 450 General Topology (4)
Survey of the fundamental concepts of general topology which depend upon the elementary properties of sets and functions. Includes topological spaces, subspaces, continuity, homeomorphisms, product spaces, connectedness, compactness, separation properties, and metric spaces. Prereq: MATH 280.

MATH 480 Topics in Mathematics (1-4)
Independent study arranged between a student (or students) and a faculty member. Topics vary. May be repeated for credit. Prereqs: At least one upper-level mathematics course.

MATH 490W Senior Seminar (4)
Seminar with three components: 1) Topic selected by instructor and presented in the "Moore style" (i.e., list of results distributed to students, students responsible for proving results in class). Past topics: fractals, game theory, wavelets, cryptography, combinatorics, and graph theory. 2) Students write a paper surveying a major area in mathematics. 3) Students complete a term project in the form of a Mathematica notebook. Project involves extensive writing, programming in Mathematica, and numerical/graphical examples using Mathematica. Students also required to present their projects in class and to take the Major Field Test (MFT). Prereqs: At least one 400-level mathematics course. Offered: Fall and Spring only.

COMPUTER SCIENCE

COSC 107 Introduction to Computer Science (4)
Exploration of the foundations of computing as a science, including how computing represents the effective merger of science, mathematics, and engineering. Incorporates hands-on experience to illustrate how computers operate based on simple principles of logic and abstraction; demonstrates how to communicate with them via algorithms and use of a simple programming language; evaluates limitations; examines alternative computing paradigms; considers emerging technologies; contemplates major innovations such as the Internet, virtual reality, and intelligent systems; and surveys a variety of issues facing society. Not a computer literacy course. Prereqs: Basic computer literacy (familiarity with file/folder manipulation, word processing, and spreadsheet applications); mathematics background suitable for placement into Precalculus.

COSC 110 Introduction to Programming (4)
Introduction to the fundamental techniques of programming as a foundation for more advanced study of computer science and as a tool for other disciplines. Includes introduction to object-oriented programming using Java. Focus on development of effective software engineering practice, emphasizing such principles as design, decomposition, encapsulation, procedural abstraction, testing, and software reuse. Topics include programming constructs, problem-solving strategies, the concept of an algorithm, recursion, fundamental data structures, and an introduction to machine representation, graphics, networking, and interactive development environments. Prereqs: Basic computer literacy (familiarity with file/folder manipulation, word processing, and spreadsheet applications); mathematics background suitable for placement into Precalculus.

COSC 200 Discrete Structures for Computer Science (4)
Introduction to discrete mathematics as it is used in computer science, fostering logical methods of problem solving and thinking. Topics include functions, relations, sets, propositional and predicate logic, simple circuit logic, proof techniques, finite state machines, Turing machines, elementary formal language theory, graph theory, Boolean algebra, computability, complexity, elementary combinatorics, and discrete probability. Prereqs: Mathematical preparation sufficient to take calculus at the college level. Offered: Fall.

COSC 210 Data Structures and Algorithms (4)
Extension of previously acquired foundational programming experiences, with particular emphasis on the use of data abstraction and object-oriented programming in the design and implementation of fundamental data structures and algorithms. Topics include recursion, basic data structures, efficiency, complexity, primary algorithms for searching, sorting, tree and graph manipulation, hashing, inheritance, and polymorphism. Includes significant programming experiences in a language such as Java. Prereqs: Grade of C or better in COSC 110; grade of C or better in COSC 200 desirable as prereq, but may be taken concurrently or with permission of the instructor.

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COSC 305 Computer Organization and Architecture (4)
Study of concepts of computer systems and computer architecture. Focus on fundamentals of logic design, organization and structure of the major hardware components of computers, and the mechanics of information transfer and control within a computer system. Includes lab experiences in assembler language programming and simulation of computer circuits, and investigation of different architectures (composition and connection of larger blocks) supporting parallel computing and data communications. Prereqs: COSC 200 and COSC 210, with grades of C or better. Offered: Fall.

COSC 306 Principles of Bioinformatics (4)
Interdisciplinary biological and computational approach to science to gain new insights into complex living systems. Methods developed in this discipline address outstanding questions in medicine, behavior, health, pharmacy, genetics, the environment, and other biologically related areas. Co-listed as BIOL 306. Prereqs for all majors: BIOL 105, 110, or 203; or permission of the instructor. Additional prereqs for computer science majors: COSC 200 and COSC 210, with grades of C or better. Offered: Spring

COSC 315 Databases and Information Management (4)
Study of underlying concepts and structures in the design and implementation of database management systems. Includes lab experiences, such as implementation of DBMS projects using commercially available software. Also covered: design, creation, and maintenance of data files, and implementation of several methods in high-level language(s); sorting and searching techniques, and how they relate to various data structures; design and construction of user interfaces; ethical issues involving security and privacy, and other issues related to the use of distributed databases. Prereqs: COSC 200 and COSC 210, with grades of C or better. Offered: Spring.

COSC 325 Languages and Theory (4)
Study of the history of programming languages and styles; programming paradigms; language features supporting parallel and distributed computing; formal language theory, special purpose languages, automata, syntax, grammars, semantics, bindings, symbol tables, data types, scoping, parameter passing, abstract data types, computability and solvability, and complexity classes; design and implementation of (part of) a compiler; simulation of theoretical machines such as finite state automata; empirical comparisons of various algorithms and programming paradigms; and utility of interactive tools and environments. Prereqs: COSC 200, COSC 210, and MATH 240, with grades of C or better. Offered: Spring.

COSC 335 Operating Systems and Networking (4)
Introduction to the fundamentals of operating systems, networking, and communications; in-depth treatment of operating systems and their interface with hardware, applications, and system user; contemporary social and professional issues, such as intellectual property, risks and liabilities, and system security in the context of operating systems design; data communications and transmission methods; wide- and local-area networks; and simulation of (parts of) an operating system and of network protocols. Prereqs: COSC 200 and COSC 210, with grades of C or better. Offered: Spring.

COSC 380 Scientific Methods of Computer-Based Instrumentation (4)
Survey of computer-based instrumentation and software/hardware integration used to develop experiments or tests critical in the modern laboratory or industrial environment. Covers laboratory programming using fourth-generation visual computer language, acquisition and conditioning of real-world signals, and control of ASCII conversation-based bench-top instruments. Co-listed as CHEM 380 and PHYS 380. Prereqs: PHYS 102 or PHYS 204, and COSC 110 or equivalent. Offered: Fall, on rotation.

COSC 410 Computer Science Research/Internship (1-4)
Research project or internship completed under the supervision of a faculty member, with results presented in a written paper or other appropriate document (e.g., user's manual, if the project involves software development). Cannot substitute for required courses in the computer science major. May be repeated for a total of eight credits. Prereqs: COSC 110, with a grade of C or better, and permission of the instructor, in response to written proposal submitted by the student.

COSC 420 Software Engineering (4)
Examination of a range of topics integral to the design, implementation, and testing of a medium-scale software system, with practical experience of implementing such a project as a member of a programming team. Also includes material on professionalism and ethical responsibilities in software development and human-computer interaction. Prereqs: COSC 315, with a grade of C or better. Offered: Fall.

COSC 460 Current Topics in Computing (4)
In-depth exploration of a designated "topic of the year," providing a mechanism for study of important topics of current interest in the rapidly changing discipline of computer science. Includes research, simulation, and/or analysis of various approaches related to the topic(s) under study. Major emphasis on demonstration of maturity in use of various computer science tools in investigations. Such tools include programming, software development, research skills, communications skills, data structures, and algorithm analysis. Prereqs: Grades of C or better in at least one 300-level COSC course and MATH 240. Offered: Fall.

COSC 470 Artificial Intelligence and Advanced Computing Strategies (4)
Exploration of one of the ultimate computer science objectives: simulating intelligence in machines. Considers intelligent behavior in living beings, identifies problems confronting AI researchers, and explores a variety of approaches to the development of intelligent systems. Methodologies include traditional knowledge representation, search, and heuristic strategies, as well as alternative computational paradigms such as artificial neural networks. Cognitive behaviors in machines are modeled via computer simulation and robotics. Techniques presented draw on knowledge accumulated from a broad range of disciplines. Prereqs: Permission of the instructor. Computer science majors should have grades of C or better in at least one 300-level computer science course and should be proficient in Java or C++. A math background that includes calculus and advanced courses is helpful but not essential. Offered: Spring.

COSC 495W Senior Seminar and Project (4)
Capstone experience for computer science majors. Major emphasis on reviewing the entire range of topics studied within the curriculum and providing individual students an opportunity to accomplish a significant research or software development project. Students give both oral and written presentations of their projects and are required to take the Major Field Test (MFT) exam. Topic, scope, and (if appropriate) software to be used in the project must be approved in advance by the professor(s). Prereqs: Grades of C or better in one 400-level and two 300-level COSC courses and MATH 240. Offered: Spring.