

MATHEMATICS

Mathematics is the study of patterns and the logical connections between them. The patterns can be numerical, algebraic, or geometric. The logical connections are typically computations and proofs. When the patterns come from the real world, we get applied mathematics. The logical connections might then take the form of a differential equation that predicts how a disease outbreak will unfold, a statistical model that allows an actuary to assess risks, or a geometric algorithm that displays a three-dimensional object on a flat computer screen. When the patterns come from our collective imaginations, we get the myriad sub-disciplines of pure mathematics: real analysis, abstract algebra, topology, non-Euclidean geometry, probability, and many others.

Goals

The mathematics program has the following goals:

- To give all students who take mathematics courses a sense of the nature of mathematics and its place in society;
- To give our mathematics majors and minors an understanding of mathematics, its nature and uses; to prepare students to become effective users of mathematics in their careers;
- To prepare future high school teachers of mathematics;
- To give our students interested in continuing to graduate study in mathematics, statistics, or computer science an adequate preparation to succeed in that study.
- To prepare students to excel in their majors. This includes students in distribution courses, mathematics and computer science minors, and students with double majors, who will gain deeper insights into their other majors.

The mathematics major can tailor upper-level courses to his interests (including pure mathematics, applied mathematics and statistics) and career goals (including actuarial science, computer science and secondary education).

Advanced Placement

- A student who gets a 4 or 5 on the AB calculus exam receives immediate credit for MAT-111 Calculus I and is placed into MAT-112 Calculus II.
- Any student starting in MAT-112 Calculus II (by the AP exam or our internal placement) who gets a B- or better will receive retroactive credit for MAT-111 Calculus I.
- A student who gets a 4 or 5 on the BC calculus exam receives immediate credit for MAT-111 Calculus I and MAT-112 Calculus II, and is placed into MAT-223 Elementary Linear Algebra.
- A student who gets a 4 or 5 on the statistics AP exam receives immediate credit for MAT-103 Probability and MAT-104 Statistics.
- A student who gets a 4 or 5 on the computer science A AP exam receives immediate credit for CSC-111 Intro to Programming.
- A student who gets a 4 or 5 on the computer science principles AP exam receives immediate credit for CSC-101 Intro to Computer Science.

Mathematics majors may opt for the Pure Mathematics track, the Computational Mathematics track, or the Financial Mathematics track. There is a great deal of overlap among these choices, and all include the four core courses.

Major in Mathematics

Code	Title	Credits
Mathematics Core Courses		
MAT-111	Calculus I or MAT-110 Calc. I With Pre-Calc. Review	1
MAT-112	Calculus II	1
MAT-223	Elementary Linear Algebra	1
MAT-331	Abstract Algebra I	1
Track		
Select one of the following tracks:		5
Pure Mathematics		
Computational Mathematics		
Financial Mathematics		
Total Credits		9

Mathematics majors should complete the four core courses by the end of the sophomore year, if possible; they must be completed by the end of the junior year.

Incoming freshmen interested in pursuing mathematics at Wabash College will typically take MAT-111 Calculus I or MAT-112 Calculus II in the fall (depending on placement) and MAT-112 Calculus II or MAT-223 Elementary Linear Algebra in the spring. Course choices in the fall of the sophomore year will usually depend on the direction the student sees himself headed. Students should plan to take MAT-331 Abstract Algebra I in the spring of their sophomore year. Potential mathematics majors should discuss their plans with a member of the department and should read the brochure "How to Major in Mathematics at Wabash College (https://www.wabash.edu/academics/uploads/math/How_to_Be_a_Math_Major.pdf)" and the flow chart describing prerequisites among the courses for the major ([https://www.wabash.edu/academics/uploads/math/math_flow_chart_\(2010\).pdf](https://www.wabash.edu/academics/uploads/math/math_flow_chart_(2010).pdf)). Several courses are offered in alternate years; majors must plan accordingly.

Pure Mathematics Track

Code	Title	Credits
MAT-333	Funct Real Variable I or MAT-341 Topology	1
Mathematics Electives		4
Total Credits		5

Computational Mathematics Track

Code	Title	Credits
CSC-111	Intro to Programming ¹	1
MAT-337	Numerical Analysis or MAT-338 Topics Computational Math	1
Mathematics Electives		4
Total Credits		5

¹ This does not count toward the major, but it is a prerequisite for MAT-337 Numerical Analysis and MAT-338 Topics Computational Math, and should be taken by the sophomore year, if possible.

Financial Mathematics Track

Code	Title	Credits
MAT-251	Mathematical Finance	0.5
MAT-252	Math. Interest Theory	0.5
MAT-253	Probability Models	0.5
MAT-353	Probability Models II	0.5
MAT-254	Statistical Models	0.5
MAT-354	Mathematical Statistics	0.5
	or MAT-355 Regression Models	
Mathematics Electives		2
Total Credits		5

The requirements for the financial mathematics major are good preparation for the initial actuarial exams.

Electives may not include MAT-010 Pre-Calc. With Intro. to Calc., MAT-103 Probability, MAT-104 Statistics, MAT-106 Topics in Contemporary Math, or MAT-108 Intro to Discrete Structures.

Additional Courses

Additional courses to consider, especially for students who are considering graduate school:

Pure Mathematics

Code	Title	Credits
MAT-219	Combinatorics	1
MAT-221	Found of Geometry	1
MAT-222	Theory of Numbers	1
MAT-224	Elem Differential Equations	1
MAT-225	Multivariable Calculus	1
MAT-323	Topics in Linear Algebra	1
MAT-324	Topics in Differential Equations	1
MAT-332	Abstract Algebra II	1
MAT-334	Funct Real Variable II	1
MAT-344	Complex Analysis	1

Computational Mathematics

Code	Title	Credits
MAT-219	Combinatorics	1
MAT-222	Theory of Numbers	1
MAT-224	Elem Differential Equations	1
MAT-226	Operations Research	1
MAT-314	Modeling With Diff. Eq	1
MAT-323	Topics in Linear Algebra	1
MAT-332	Abstract Algebra II	1

Financial Mathematics

Code	Title	Credits
MAT-224	Elem Differential Equations	1
MAT-324	Topics in Differential Equations	1
MAT-333	Funct Real Variable I	1

Mathematics Minor

Code	Title	Credits
MAT-110	Calc. I With Pre-Calc. Review or MAT-111 Calculus I	1
MAT-112	Calculus II	1
MAT-223	Elementary Linear Algebra	1
Mathematics Electives ¹		2
Total Credits		5

¹ Excluding MAT-010 Pre-Calc. With Intro. to Calc., MAT-103 Probability, MAT-104 Statistics, MAT-106 Topics in Contemporary Math and MAT-108 Intro to Discrete Structures.

Potential mathematics minors should read the brochure "How to Minor in Mathematics or Computer Science at Wabash College (https://www.wabash.edu/academics/uploads/math/How_to_Minor_in_Mathematics_or_Computer_Science_at_Wabash_College.pdf)."

Mathematics (MAT)

MAT-003 Pre-Calculus

This course is intended solely for those students who wish to take calculus, but whose preparation makes a refresher course in pre-calculus advisable. Topics covered include a review of algebra (solving equations and inequalities, simplification of algebraic expressions) and properties of elementary functions (polynomial, rational, exponential, logarithmic, and trigonometric functions) with special emphasis on graphing these functions. MAT 003 cannot be used for any distribution credit or any area of concentration. (For students who desire a distribution credit in mathematics but do not wish to take calculus, MAT 103, 104, 106, and 108 are recommended.)

Prerequisites: none

Credits: 0.5

MAT-010 Pre-Calc. With Intro. to Calc.

This course is intended solely for those students who wish to take calculus, but whose preparation makes a slower-paced course in calculus advisable. Topics covered include a review of algebra (solving equations and inequalities, simplification of algebraic expressions), properties of polynomials and rational functions, limits, continuity, an introduction to derivatives via polynomials and rational functions, and applications of the derivative. MAT 010 cannot be used for any distribution credit or any area of concentration. (For students who desire a distribution credit in mathematics but do not wish to take calculus, MAT 103, 104, 106, and 108 are recommended.) This course is offered in the fall semester.

Prerequisites: none

Corequisites: MAT-010 placement

Credit: 1

MAT-103 Probability

Topics include a brief introduction to probability, conditional probability, and expected values as well as the application of probabilistic reasoning to interesting problems in the areas of medical testing, investing, insurance, retirement annuities, and the analysis of rare events. MAT 103 does not count toward the mathematics major or minor.

Prerequisites: none

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-104 Statistics

In this course, we present the classical approach to statistical reasoning, both the p-value argument to testing claims and the confidence interval approach to estimation. Other topics include correlation, prediction, and paradoxes involving averages. MAT 104 does not count toward the mathematics major or minor. (MAT 103 is not a prerequisite for MAT 104)

Prerequisites: none

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-106 Topics in Contemporary Math

A reflective examination of basic mathematical ideas. Through participation and discovery, students will consider an articulation of mathematics that focuses on patterns, abstraction, and inquiry. Topics will vary, but could include logic, Euclidean geometry, algorithms, etc. This course does not count toward the major or minor in mathematics.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-108 Intro to Discrete Structures

An introduction to discrete mathematics for students not planning to major in mathematics. Topics include sets and logic, proof methods, counting arguments, recurrence relations, graphs, and trees. This course may be used to meet the mathematics requirement for the computer science minor. However, it does not count toward the mathematics major or minor. Students may not present both MAT 108 and 219 for credit toward graduation. This course is offered in the fall semester.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-110 Calc. I With Pre-Calc. Review

This course is intended solely for those students who took and passed MAT 010 and desire to complete a course in calculus. Successful completion of this course is equivalent to completion of MAT 111. Topics covered include an introduction to integration via polynomials and rational functions, applications of the integral, Fundamental Theorem of Calculus, and introduction to exponential, logarithmic and trigonometric functions, and the application of the derivative and integral to these families of functions. The focus is on understanding basic concepts and gaining basic computational skills. This course counts as a distribution credit in mathematics. Credit cannot be given for both MAT 110 and MAT 111. This course is offered in the spring semester.

Prerequisites: MAT-010 with a grade of C- or better.

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: MAT-111

MAT-111 Calculus I

Basic calculus of one variable from an intuitive point of view. Topics include limits, continuity, derivatives and integrals of the elementary functions, Fundamental Theorem of Calculus, and applications. The focus is on understanding basic concepts and gaining basic computational skills.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: MAT-110

MAT-112 Calculus II

A continuation of MAT 111. Numerical and symbolic techniques of integration, applications of integration, an introduction to partial derivatives and multiple integrals, sequences and series, and Taylor's Theorem.

Prerequisites: MAT-110, 111 with a grade of C- or better or 112 placement
Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: APCR

MAT-178 Special Topics

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before advance registration for that semester. This course is offered irregularly.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-219 Combinatorics

This course is an introduction to combinatorial reasoning. Topics include graphs, circuits in graphs, graph coloring, trees, counting principles, generating functions, and recurrence relations. Students may not present both MAT 108 and 219 for credit towards graduation. This course is offered in the spring semester of even-numbered years.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-221 Found of Geometry

A development of Euclidean and non-Euclidean geometries from a modern viewpoint. This course is offered in the spring semester.

Prerequisites: MAT-112

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-222 Theory of Numbers

A study of elementary number theory. Topics include divisibility, congruences, properties of prime numbers, number theoretic functions, diophantine equations, and additional selected topics. This course is offered in the spring semester of odd-numbered years.

Prerequisites: MAT-112

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-223 Elementary Linear Algebra

An introduction to linear mathematics. Linear systems of equations, matrices, determinants, vector spaces, bases and dimension, function spaces, linear transformations, eigenvalues and eigenvectors, inner products, and applications. An important aspect of the course is to introduce the student to abstract thinking and proofs.

Prerequisites: MAT-112 with a minimum grade of C- or 223 placement.

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: CR

MAT-224 Elem Differential Equations

Introduction to ordinary differential equations. Special solution techniques and some theory for first-order and linear equations including integrating factors, constant coefficients, undetermined coefficients, variation of parameters, power series solutions, Laplace transforms, and systems of differential equations applications. This course is offered in the spring semester.

Prerequisites: Prereq MAT-112 with a minimum grade of C- and 223.

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: CR

MAT-225 Multivariable Calculus

Calculus in higher dimensions. Limits, continuity, differentiability, directional derivatives, constrained and unconstrained optimization, geometry of curves, multiple integrals, general coordinate systems, path and surface integrals, vector calculus, theorems of Green and Stokes applications. This course is offered in the fall semester.

Prerequisites: MAT-112 with a minimum grade of C- and 223.

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-226 Operations Research

Linear and nonlinear optimization, linear programming, integer programming, duality, combinatorics, the simplex method and related algorithms, game theory, Markov chains, queuing theory. This course is offered irregularly.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-235 Stochastic Simulation

Interesting real world phenomena often involve randomness at some level, and this course develops mathematical and computational tools for studying these systems. In particular, students will study and implement computer simulation models of continuous and discrete stochastic processes with potential applications in physics, economics, epidemiology, networks, sports, elections, and industrial engineering. Specific topics for study include: basic probability models, pseudo-random number generation, queueing models, discrete event simulations, Poisson processes, random walks, Markov chains, Monte Carlo methods, and statistical analysis of simulated data.

Prerequisites: Prereq of MAT 112 and CSC 111

Credit: 1

Distribution: Natural Science/Mathematics

MAT-251 Mathematical Finance

The course gives an overview of the mathematical reasoning behind the pricing of options. Topics include binomial models, put-call parity, a probabilistic derivation of the Black-Scholes pricing formula for call options, and delta hedging. We will also look at Asian, gap, and barrier options. This course is offered in the fall semester.

Prerequisites: MAT-112

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-252 Math. Interest Theory

This course will involve a thorough treatment of the mathematical theory of interest, with special attention paid to calculating present and accumulation values for annuities (series of payments made at regular time intervals). Some topics include nominal and effective rates of interest and discount, force of interest, amortization schedules, sinking funds, and bonds. This course is offered in the fall semester.

Prerequisites: MAT-112

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-253 Probability Models

This course is an introduction to discrete and continuous random variables. Distributions considered include the hypergeometric, binomial, geometric, Poisson, uniform, normal, gamma, chi-square, t and F. We will cover the Central Limit Theorem, multivariate distributions, and transformations of random variables. This course is offered in the fall semester.

Prerequisites: MAT-112

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-254 Statistical Models

This course gives an overview of confidence intervals, classical hypothesis testing procedures: z-tests, t-tests, F-tests, Chi-square tests, Latin square designs, and regression. An intuitive but mathematical treatment is given for all the distributions and procedures involved. This course is offered in the spring semester.

Prerequisites: MAT-112

Credits: 0.5

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-277 Special Topics

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before advance registration for that semester. This course is offered irregularly.

Prerequisites: none

Credit: 1

MAT-287 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

MAT-314 Modeling With Diff. Eq

A course to develop the basic skills of formulation, simplification, and analysis of mathematical models for describing and predicting phenomena in the natural and social sciences, with special emphasis in modeling with differential equations. Topics may be taken from fields such as physics, chemistry, biology, psychology, economics, and political science. This course is offered in the fall semester of even-numbered years.

Prerequisites: MAT-224

Credit: 1

Distribution: Natural Science/Mathematics

MAT-323 Topics in Linear Algebra

An in-depth study of some of the topics covered in MAT 223, including the theory of vector spaces, linear transformations, and Euclidean spaces, together with some additional topics, which may include isomorphisms, duality, canonical forms, and applications of linear algebra. This course is offered irregularly. Refer to the Course Descriptions document on the Registrar's webpage for Topics and Descriptions of current offerings.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-324 Topics in Differential Equations

A second course in differential equations offering study of special topics in more depth or beyond those covered in MAT 224. Topics may include existence and uniqueness theory, stability theory, Green's functions, dynamical systems, partial differential equations, and applications of differential equations. This course is offered in the fall semester of odd-numbered years. Refer to the Course Descriptions document on the Registrar's webpage for Topics and Descriptions of current offerings.

Prerequisites: MAT-224

Credit: 1

Distribution: Natural Science/Mathematics

MAT-331 Abstract Algebra I

A first course in higher abstract mathematics. Emphasis is placed on writing proofs. Topics include groups and rings. This course is offered in the spring semester.

Prerequisites: Prereq MAT-223 with a minimum grade of C-

Credit: 1

Distribution: Natural Science/Mathematics

MAT-332 Abstract Algebra II

A continuation of MAT 331. Topics will depend on the instructor but may include fields, modules, Galois theory, or advanced topics in groups and rings. This course is offered irregularly.

Prerequisites: MAT-331

Credit: 1

Distribution: Natural Science/Mathematics

MAT-333 Funct Real Variable I

A first course in the foundations of modern analysis. Topics include set theory, topology of the real numbers, sequences, series, differentiation, integration, and rigorous proofs of the major theorems of single-variable calculus. This course is offered in the fall semester.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-334 Funct Real Variable II

A continuation of MAT 333. Topics will depend on the instructor but may include sequences and series of functions, Fourier analysis, elementary functional analysis, advanced multivariable calculus or metric spaces. This course is offered irregularly.

Prerequisites: MAT-333

Credit: 1

Distribution: Natural Science/Mathematics

MAT-337 Numerical Analysis

This course will address topics such as numerical solution of non-linear equations in one variable, interpolation, approximation, differentiation, integration, difference equations, differential equations and their applications, boundary value problems, linear systems, matrices, and optimization. This course is offered in the fall semester of even-numbered years.

Prerequisites: CSC-111 and MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-338 Topics Computational Math

A course to develop mathematical and computational techniques in areas of mathematics or interdisciplinary study in which computation plays a central and essential role. Topics vary by semester but may include computational geometry, computer algebra, scientific computing, and symbolic computation. This course is offered in the fall semester of odd-numbered years. Refer to the Course Descriptions document on the Registrar's webpage for Topics and Descriptions of current offerings.

Prerequisites: CSC-111 and MAT-112

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

MAT-341 Topology

A study of elementary topology. Topics discussed will include topologies, separation axioms, connectedness, compactness, continuity, and metric spaces. This course is offered in the spring semester of even-numbered years.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-344 Complex Analysis

Analytic functions, mapping of elementary functions, integrals, residue theory, conformal mapping. This course is offered in the spring semester of odd-numbered years.

Prerequisites: MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

MAT-353 Probability Models II

This course is a continuation of MAT 253 (Probability Models). Topics include survival functions, hazard functions, order statistics, continuous and discrete distributions not considered in MAT 253, mixed random variables. Brownian motion and stochastic calculus. We will look at a wide variety of probability problems associated with insurance. This course is offered in the fall semester.

Prerequisites: MAT-253

Credits: 0.5

Distribution: Natural Science/Mathematics

MAT-354 Mathematical Statistics

This course takes a more theoretical look at estimation and hypothesis testing than MAT 254 (Statistical Models). Topics include maximum likelihood estimators (MLE's), the information inequality, asymptotic theory of MLE's, likelihood ratio tests, most powerful tests, uniformly most powerful tests, and Bayesian statistics. This course is offered in the spring semester of even years.

Prerequisites: MAT-253 and 254

Credits: 0.5

Distribution: Natural Science/Mathematics

MAT-355 Regression Models

This course takes a matrix-based look at regression (introduced in MAT 254, Statistical Models). We focus on the probabilistic reasoning behind regression, in particular the inferences we can make using linear combinations of normal random variables. We also look briefly at some time series models. This course is offered in the spring semester of odd years.

Prerequisites: MAT-223, 253, 254

Credits: 0.5

Distribution: Natural Science/Mathematics

MAT-377 Special Topics

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before advance registration for that semester. This course is offered irregularly. Refer to the Course Descriptions document on the Registrar's webpage for Topics and Descriptions of current offerings.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

MAT-378 Special Topics

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before advance registration for that semester. This course is offered irregularly.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

MAT-387 Independent Study

Directed reading and research on special topics for qualified students. May be repeated for credit. Level varies (intermediate or advanced); determined in consultation with instructor. Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

MAT-388 Independent Study

Directed reading and research on special topics for qualified students. May be repeated for credit. Level varies (intermediate or advanced); determined in consultation with instructor. Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

MAT-400 Seminar

Topics in the history and foundations of mathematics, the special emphasis varying from year to year. Every student will be expected to write a term paper. This course is offered irregularly.

Prerequisites: none

Credits: 0.5

Distribution: Natural Science/Mathematics

MAT-IND Independent Study

Students may enroll in independent study courses for 0.5 or 1 course credit(s), with the approval of a supervising faculty member, the appropriate department/program chair, and the student's advisor. Registration forms for independent study are available in the Registrar's Office. Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Computer Science (CSC)

CSC-101 Intro to Computer Science

An introduction to the field of computer science as the study of algorithmic process. Students will study the history of the field as well as issues currently confronting the computer science community including ethical issues raised by a rapidly changing technology. Students will learn fundamental concepts of computer science such as computer architecture, data representation, and the issues of computability. Students will engage in hands-on algorithm-building activities and some basic programming exercises. This course is offered in the fall semester. Distribution in Natural Science and Mathematics or Quantitative Skills.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

Equated Courses: APCR

CSC-111 Intro to Programming

An introduction to programming in a higher-level, general-purpose language (currently Java). Programming topics include primitive data types, simple data types such as arrays, program constructs such as conditionals, loops and procedures, in an object-oriented context. Applications are chosen from areas such as graphics, simulation, and file processing. This course is offered in the fall semester. Distribution in Natural Science and Mathematics or Quantitative skills. (Note: CSC 111 does not count as a laboratory science.)

Prerequisites: CSC-101 or MAT 112; or permission of the instructor

Credit: 1

Distribution: Natural Science/Mathematics, Quantitative Skills

CSC-112 Advanced Programming

A variety of topics that are important in developing large-scale software. Object oriented programming in a language such as C++. Dynamic data structures such as lists, queues, and stacks. An introduction to a rigorous analysis of the efficiency of an algorithm. Advanced algorithms such as Quicksort, mergesort, and the use of hash tables. An introduction to using the Unix operating system and Unix tools for software development such as Make. This course is offered is not typically.

Prerequisites: CSC-111

Credit: 1

Distribution: Natural Science/Mathematics

CSC-121 Intro to Add. Program Language

An introduction to one or more additional programming languages. Students will build on their previous knowledge of a programming language to learn one or more additional languages. Languages vary by semester but may include any programming paradigm. For a given semester the course content and other particulars will be announced before registration for that semester. This course may be taken multiple times, for credit for each different language.

Prerequisites: CSC-111 with a grade of C- or better.

Credits: 0.5

Distribution: Natural Science/Mathematics

CSC-171 Special Topics in Comp. Sci.

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before registration for that semester. This course is offered irregularly.

Prerequisites: none

Credit: 1

Distribution: Natural Science/Mathematics

CSC-187 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-188 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-211 Intro Data Structures

An introduction to more advanced abstract data types such as lists; sets; trees, including balanced trees; and graphs. Algorithms for traversing, searching, determining connectivity, and so forth. An in-depth study of, and analysis of, the algorithms used to implement these structures. This course is offered in the spring semester.

Prerequisites: Prereq CSC-111 with a grade of C- or better.

Credit: 1

Distribution: Natural Science/Mathematics

CSC-235 Stochastic Simulation

Interesting real world phenomena often involve randomness at some level, and this course develops mathematical and computational tools for studying these systems. In particular, students will study and implement computer simulation models of continuous and discrete stochastic processes with potential applications in physics, economics, epidemiology, networks, sports, elections, and industrial engineering. Specific topics for study include: basic probability models, pseudo-random number generation, queueing models, discrete event simulations, Poisson processes, random walks, Markov chains, Monte Carlo methods, and statistical analysis of simulated data.

Prerequisites: Prereq of MAT 112 and CSC 111

Credit: 1

Distribution: Natural Science/Mathematics

CSC-271 Special Topics in Comp.Sci.

This course is designed for the treatment of material outside the regular offerings of the department. For a given semester, the course content and other particulars will be announced before registration for that semester.

This course is offered irregularly. Refer to the Course Descriptions document on the Registrar's webpage for Topics and Descriptions of current offerings.

Prerequisites: CSC-111 or permission of the instructor.

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-287 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-288 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-311 Intro Machine Organ

A study of the various layers at which a machine can be studied, including higher-level languages, assembly language, machine language, and digital circuits. Data representation. A comparison of RISC and CISC architectures. Some programming in a representative assembly language. Issues of cross-language programming. This course is offered irregularly.

Prerequisites: CSC-211

Credit: 1

Distribution: Natural Science/Mathematics

CSC-321 Programming Lang

A study of the paradigms of programming languages, including procedural languages such as Pascal or 'C', object-oriented languages such as C++ or Smalltalk, functional languages such as ML or Scheme, logic-oriented languages such as Prolog, and concurrency such as in Ada. Consideration of how concepts are implemented, such as modules, parameter passing, function evaluation, data types and type checking, memory management, exception handling, and threads. This course is offered irregularly.

Prerequisites: CSC-121

Credit: 1

Distribution: Natural Science/Mathematics

CSC-331 Analysis Algorithms

Advanced topics and problems in analyzing algorithms. Algorithms involving structures such as sequences, sets, and graphs, and topics such as geometric and numeric algorithms. An introduction to the question of P=NP and NP-Complete problems. Parallel algorithms. This course is offered irregularly.

Prerequisites: CSC-211 and MAT-108 or 219

Credit: 1

Distribution: Natural Science/Mathematics

CSC-337 Intro. Numerical Analysis

Advanced-This course will address topics such as numerical solution of non-linear equations in one variable, interpolation, approximation, differentiation, integration, difference equations, differential equations and their applications, boundary value problems, linear systems, matrices, and optimization. This course is offered in the fall semester of even-numbered years.

Prerequisites: CSC-111 and MAT-223

Credit: 1

Distribution: Natural Science/Mathematics

CSC-338 Topics Computational Math

Advanced. A course to develop mathematical and computational techniques in areas of mathematics or interdisciplinary study in which computation plays a central and essential role. Topics vary by semester but may include computational geometry, computer algebra, scientific computing, and symbolic computation. This course is offered in the fall semesters of odd-numbered years.

Prerequisites: CSC-111 and MAT-112

Credit: 1

Distribution: Natural Science/Mathematics

CSC-341 Automata,Computability

An introduction to theoretical computer science. Finite state machines and regular expressions. Context-free languages and push-down automata. Turing machines, effective computability, and the Halting Problem. This course is offered irregularly.

Prerequisites: CSC-111 and MAT 108 or 219

Credit: 1

Distribution: Natural Science/Mathematics

CSC-387 Independent Study

Directed study on special topics for qualified students. May be repeated for credit.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-388 Independent Study

Directed study on special topics for qualified students. May be repeated for credit.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-487 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-488 Independent Study

Enrollment through Instructor and Department Chair approval.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

CSC-IND Independent Study

Students may enroll in independent study courses for 0.5 or 1 course credit(s), with the approval of a supervising faculty member, the appropriate department/program chair, and the student's advisor. Registration forms for independent study are available in the Registrar's Office.

Prerequisites: none

Credits: 0.5-1

Distribution: Natural Science/Mathematics

Kathleen Patricia Ansaldi

Joshua Cole

Zachary Gates

Colin B.P McKinney

Esteban I. Poffald

Peter Thompson, *Sabbatical*

William J Turner (chair)

Chad Westphal, *Sabbatical*