MATHEMATICS (MTH)

A major in mathematics can be achieved by satisfying the requirements listed for either the bachelor of arts or bachelor of science. Lower division students are urged to consult a member of the departmental faculty before enrolling in courses other than those satisfying Division V requirements.

In order to declare a major in the department a student must have earned a C or better, or AP credit in, two courses from the following list: MTH 111, MTH 112, MTH 113, MTH 117, MTH 121.

A minimum grade point average of 2.0 in courses which comprise a major or minor in the department is required for graduation with any major or minor which the department offers. Students may not major in the department and minor in mathematics or double-major within the department.

The department regularly schedules activities in mathematics for students that enhance the course offerings. Examples are:

- Participation in the annual Putnam examination
- The COMAP contest in mathematical modeling
- The American Statistical Association DataFest
- Local chapter of the AWM (American Women in Mathematics)
- Data science and hackathon events
- Meetings of the mathematics and statistics club
- Seminars and courses which build upon the regularly scheduled course offerings
- Student research with faculty
- The Math and Stats Center provides an opportunity for students to receive tutoring in all MTH and STA courses throughout the year. Opportunities to serve as a tutor are also available.

Students who are enrolled at Wake Forest may not take courses in mathematics at other institutions to satisfy divisional requirements.

Contact Information

Department of Mathematics (http://college.wfu.edu/math/)
Manchester Hall 127, Box 7388
Phone 336-758-5300

Programs

Majors

- Applied Mathematics, B.S. (https://bulletin.wfu.edu/undergraduate/departments-programs/mathematics/bs-applied-mathematics/)
- Mathematical Economics, B.S. (https://bulletin.wfu.edu/undergraduate/departments-programs/mathematics/bs-mathematical-economics/)
- Mathematics, B.A. (https://bulletin.wfu.edu/undergraduate/departments-programs/mathematics/ba-mathematics/)
- Mathematics, B.S. (https://bulletin.wfu.edu/undergraduate/departments-programs/mathematics/bs-mathematics/)

Minors

- Mathematics, Minor (https://bulletin.wfu.edu/undergraduate/departments-programs/mathematics/minor-mathematics/)

Courses

Mathematics (MTH)

MTH 104. Fundamentals of Algebra and Trigonometry. (2 h)
A review of the essentials of algebra and trigonometry in a guided laboratory setting. Admission by permission only. Not to be counted towards any major or minor offered by the department. Pass/Fail only.

MTH 105. Fundamentals of Algebra and Trigonometry. (1-3 h)
A review of the essentials of algebra and trigonometry. Admission by permission only (generally, a student must have taken fewer than three years of high school mathematics to be eligible for admission). Not to be counted towards any major or minor offered by the department.

MTH 105L. Precalculus Assessment Lab. (1 h)
A review of the essentials of algebra and trigonometry in a guided laboratory setting. Admission by permission only. Not to be counted towards any major or minor offered by the department. Pass/Fail only.

MTH 106. Calculus Foundations. (3 h)
Fall semester of a 2-semester sequence. Functions, limits, continuity, derivatives and their applications. Additional topics may vary by instructor. Calculus placement exam and permission of instructor are required. Intended for first-year students seeking additional support in precalculus integrated with calculus topics in preparation for majors/minors in Div. IV, Div. V, pre-health, or business. Course to be followed by MTH 111 in the spring. Course does not include credit toward a major in the department. P - POI. (QR)

MTH 107. Explorations in Mathematics. (4 h)
An introduction to mathematical reasoning and problem solving. Topics vary by instructor and may include one or more of the following: knot theory, Euclidean and non-Euclidean geometry, set theory, cryptography, discrete models, number theory, discrete mathematics, chaos theory, probability, and MAPLE programming. Lab. (D, QR)

MTH 111. Calculus with Analytic Geometry I. (4 h)
Functions of a real variable, trigonometric, exponential and logarithmic functions, limits, continuity, differentiation, applications of derivatives, indeterminate forms, introduction to integration, the fundamental theorem of calculus. Lab. (D, QR)

MTH 112. Calculus with Analytic Geometry II. (4 h)
Techniques of integration, applications of integration, improper integrals, sequences, Taylor's formula, and infinite series, including power series. Lab. P-MTH 111 or POI. (D, QR)

MTH 113. Multivariable Calculus. (4 h)
The calculus of vector functions, including geometry of Euclidean space, differentiation, extrema, line integrals, multiple integrals, and Green's, Stokes', and divergence theorems. Lab. P-MTH 112 or POI. (D, QR)

MTH 117. Discrete Mathematics. (4 h)
Introduction to various topics in discrete mathematics applicable to computer science including sets, relations, Boolean algebra, propositional logic, functions, computability, proof techniques, graph theory, and elementary combinatorics. Lab. (D, QR)

MTH 121. Linear Algebra I. (3 h)
Vectors, linear transformations and matrices, the invertible matrix theorem, determinants, eigenvalues and eigenvectors, and orthogonal projections. Credit not allowed for both MTH 121 and 205. (D, QR)

MTH 165. Problem-Solving Seminar. (1 h)
Weekly seminar designed for students who wish to participate in mathematical competition such as the annual Putnam examination. Not to be counted toward any major or minor offered by the department. May be repeated for credit. Pass/Fail only.

MTH 172. Mathematics and Social Justice. (1.5 h)
A survey of how mathematical tools relate to various social justice issues. Topics include fairly drawing electoral districts, determining income subsidies to combat evictions, and assessing the impacts of industrial agriculture. Also explores how certain applications reinforce existing systems of oppression and present new ethical dilemmas. Not to be counted toward any major or minor offered by the department. Pass/Fail only.

MTH 191. Research Exploration in Mathematics. (1-2 h)
A course for first- and second-year students interested in an early research experience in mathematics. Students will participate in introductory research projects while developing skills for success. Not to be counted toward any major or minor offered by the department. Pass/Fail only.

MTH 205. Introduction to Linear Algebra and Differential Equations. (4 h)
Specific topics covered include: vector algebra, solving linear systems of equations, rank, vector spaces, determinants, eigenvalues, linear transformations, first order differential equations, second order linear ordinary differential equations, and power series solutions to differential equations. Credit not allowed for both MTH 205 and MTH 251 or for both MTH 205 and MTH 121. P-MTH 112 or POI.

MTH 214. Multivariable Analysis. (3 h)
Functions between Euclidean spaces, multivariable limits, differentiation, change of variables, line and surface integrals, vector fields, integration theorems for vector fields, Implicit & Inverse Function Theorems, Contraction Mapping Theorem, applications, other selected topics from analysis in multiple dimensions. P-MTH 113, and MTH 121 or MTH 205.

MTH 215. Axiomatic Systems. (3 h)
The development of set theory, geometry, point set topology or other mathematical system from either an axiomatic or inquiry-based learning perspective. Problem solving, mathematical logic, and rigorous proof writing are emphasized. With prior departmental permission, this course may be repeated when topics differ substantially. (P- MTH 117 or POI) (D, QR)

MTH 225. Linear Algebra II. (3 h)
A continuation of the study of linear algebra and its applications over the real and complex numbers to include vector spaces, the spectral theorem, and the singular value decomposition. Additional topics may include quadratic forms, Gershgorin's circle theorem, analytic functions of matrices, pseudoinverses, and other topics chosen by the instructor. P-MTH 112 and (MTH 121 or MTH 205) or POI. C or P-MTH 117.

MTH 243. Codes and Cryptography. (3 h)
Essential concepts in coding theory and cryptography. Congruences, cryptosystems, public key, Huffman codes, information theory, and other coding methods. P - MTH 117 or POI. (D)

MTH 251. Ordinary Differential Equations. (3 h)
Linear equations with constant coefficients, linear equations with variable coefficients, and existence and uniqueness theorems for first order equations. Credit not allowed for both MTH 251 and MTH 205. P-MTH 112 or POI. (D, QR)

MTH 253. Operations Research. (3 h)
Mathematical models and optimization techniques. Studies in linear programming, simplex method, duality, sensitivity analysis, and other selected topics. P-P-(MTH 111 or MTH 112 or MTH 113) and (MTH 121 or MTH 205) or POI. (D, QR)

MTH 254. Optimization Theory. (3 h)
Unconstrained and constrained optimization problems; Lagrange multiplier methods; second-order sufficient conditions; inequality constraints; and Karush-Kuhn-Tucker conditions. P-MTH 113 and (MTH 121 or MTH 205) or POI.

MTH 283. Topics in Mathematics. (1-3 h)
Topics in mathematics not considered in regular courses or which continue study begun in regular courses. Content varies.

MTH 306. Advanced Mathematics for the Physical Sciences. (3 h)
Advanced topics in linear algebra, special functions, integral transforms and partial differential equations. Not to be counted toward any major offered by the department except for the major in mathematical business. P-MTH 205 or MTH 251 or POI.

MTH 311. Introductory Real Analysis I. (3 h)
Limits and continuity in metric spaces, sequences and series, differentiation and Riemann-Stieltjes integration, uniform convergence, power series and Fourier series, differentiation of vector functions, implicit and inverse function theorems. P-MTH 113 and MTH 117 or POI.

MTH 312. Introductory Real Analysis II. (3 h)
Limits and continuity in metric spaces, sequences and series, differentiation and Riemann-Stieltjes integration, uniform convergence, power series and Fourier series, differentiation of vector functions, implicit and inverse function theorems. P-MTH 311 or POI.

MTH 317. Complex Analysis I. (3 h)
Analytic functions, Cauchy's theorem and its consequences, power series, and residue calculus. P-MTH 113 and MTH 117 or POI. (D)

MTH 321. Modern Algebra I. (3 h)
Introduction to modern abstract algebra through the study of groups, rings, integral domains, and fields. P-MTH 117 and (MTH 121 or MTH 205) or POI. (D)

MTH 322. Modern Algebra II. (3 h)
A continuation of modern abstract algebra through the study of additional properties of groups, rings, and fields. P-MTH 321 or POI. (D)

MTH 324. Advanced Linear Algebra. (3 h)
Thorough treatment of vector spaces and linear transformations over an arbitrary field, canonical forms, inner product spaces, and linear groups. P-MTH 321 or POI. (D)

MTH 326. Numerical Linear Algebra. (3 h)
Numerical methods for solving matrix and related problems in science and engineering using a high-level matrix-oriented language such as MATLAB. Topics will include systems of linear equations, least squares methods, and eigenvalue computations. Special emphasis given to applications. Also listed as CSC 352. P-MTH 112 and MTH 121 or 205, or POI. (D)

MTH 331. Geometry. (3 h)
An introduction to axiomatic geometry including a comparison of Euclidean and non-Euclidean geometries. P - MTH 117 or POI. (D)

MTH 333. Introductory Topology. (3 h)
Topics vary and may include knot theory, topological spaces, homeomorphisms, classification of surfaces, manifolds, Euler characteristic, and the fundamental group. P - MTH 117 or POI.

MTH 334. Differential Geometry. (3 h)
Introduction to the theory of curves and surfaces in two and three dimensional space, including such topics as curvature, geodesics, and minimal surfaces. P-MTH 113 or POI. (D)

MTH 345. Elementary Number Theory. (3 h)
Properties of integers, congruences, and prime numbers, with additional topics chosen from arithmetic functions, primitive roots, quadratic residues, Pythagorean triples, and sums of squares. P-MTH 117. (D)

MTH 346. Modern Number Theory. (3 h)
A selection of number theory topics of recent interest. Some examples include elliptic curves, partitions, modular forms, the Riemann zeta function, and algebraic number theory. P-MTH 117. (D)

MTH 347. Graph Theory. (3 h)
Paths, circuits, trees, planar graphs, spanning trees, graph coloring, perfect graphs, Ramsey theory, directed graphs, enumeration of graphs, and graph theoretic algorithms. P-MTH 117 or POI. (D)

MTH 348. Combinatorial Analysis I. (3 h)
Enumeration techniques, generating functions, recurrence formulas, the principle of inclusion and exclusion, Polya theory, graph theory, combinatorial algorithms, partially ordered sets, designs, Ramsey theory, symmetric functions, and Schur functions. P-MTH 117 or POI. (D)

MTH 349. Combinatorial Analysis II. (3 h)
Enumeration techniques, generating functions, recurrence formulas, the principle of inclusion and exclusion, Polya theory, graph theory, combinatorial algorithms, partially ordered sets, designs, Ramsey theory, symmetric functions, and Schur functions. P-MTH 117 or POI. (D)

MTH 351. Introduction to Mathematical Modeling. (3 h)
Introduction to the mathematical modeling, analysis and simulation of continuous processes using MATLAB, Mathematica or Maple. Topics include dimensional analysis, stability analysis, bifurcation theory, one-dimensional flows, phase plane analysis, index theory, limit cycles, chaotic dynamics, hyperbolic conservation laws and traveling waves. P-(MTH 121 and 251) or MTH 205 or POI.

MTH 352. Partial Differential Equations. (3 h)
A detailed study of partial differential equations, including the heat, wave, and Laplace equations, using methods such as separation of variables, characteristics, Green's functions, and the maximum principle. P-MTH 113 and (MTH 205 or MTH 251) or POI. (D)

MTH 353. Probability Models. (3 h)
Introduction to probability models, Markov chains, Poisson processes and Markov decision processes. Applications will emphasize problems in business and management science. P-MTH 111 and MTH 121 or 205, or POI. (D)

MTH 354. Discrete Dynamical Systems. (3 h)
Introduction to the theory of discrete dynamical systems as applied to disciplines such as biology and economics. Includes methods for finding explicit solutions, equilibrium and stability analysis, phase plane analysis, analysis of Markov chains, and bifurcation theory. P-MTH 112 and 121 or POI. (D)

MTH 355. Introduction to Numerical Methods. (3 h)
Numerical computations on modern computer architectures; floating point arithmetic and round-off error. Programming in a scientific/engineering language such as MATLAB, C, or FORTRAN. Algorithms and computer techniques for the solution of problems such as roots of functions, approximation, integration, systems of linear equations and least squares methods. Also listed as CSC 355. P-MTH 112, MTH 121 or 205 or 206, or POI. (D)

MTH 357. Probability. (3 h)
Probability distributions, mathematical expectation, and sampling distributions. MTH 357 covers much of the material on the syllabus for the first actuarial exam. Also listed as STA 310. P-MTH 112 or 205 or POI. (D)

MTH 359. Multivariate Statistics. (3 h)
A course in fundamental network theory concepts, including measures of network structure, community detection, clustering, and network modelling and inference. Topics also draw from recent advances in the analysis of networks and network data, as well as applications in economics, sociology, biology, computer science, and other areas. Also listed as STA 352. P-MTH 117 or MTH 121 or MTH 205 and one course in STA at the 200 level or above. (D)

MTH 372. Math, Statistics, and Society. (1-3 h)
A survey of mathematical and statistical applications arising from problems in politics, social justice, or racial justice; and/or an examination of instances, present and historical, where mathematics and statistics function as a tool promoting inclusion or exclusion; and/or an exploration of mathematics and statistics as human endeavors and contributions from diverse populations. Topics vary by instructor. May not be counted toward any major or minor offered in the department. May be repeatable for credit with prior approval of the department. Pass/Fail only.

MTH 381. Individual Study. (1-3 h)
A course of independent study directed by a faculty advisor. By prearrangement. May be repeated for credit when covering new material.

MTH 383. Advanced Topics in Mathematics. (1-3 h)
Topics in mathematics not considered in regular courses or which continue study begun in regular courses. Content varies. May be repeated for credit when covering new material.

MTH 391. Senior Seminar Preparation. (1 h)
Independent study or research directed by a faculty advisor by prearrangement with the adviser.

MTH 392. Senior Seminar Presentation. (1 h)
Preparation of a paper, followed by a one-hour oral presentation based upon work in MTH 391.

MTH 605. Introduction to Linear Algebra and Differential Equations. (3 h)
Specific topics covered include: vector algebra, solving linear systems of equations, rank, vector spaces, determinants, eigenvalues, linear transformations, first order differential equations, second order linear ordinary differential equations, and power series solutions to differential equations. May not be used toward any graduate degree offered by the department.

MTH 606. Advanced Mathematics for the Physical Sciences. (3 h)
Advanced topics in linear algebra, special functions, integral transforms, and partial differential equations. May not be used toward any graduate degree offered by the department. P-MTH 605.

MTH 611. Introductory Real Analysis I. (3 h)
Limits and continuity in metric spaces, sequences and series, differentiation and Riemann-Stieltjes integration, uniform convergence, power series and Fourier series, differentiation of vector functions, implicit and inverse function theorems.

MTH 617. Complex Analysis I. (3 h)
Analytic functions, Caughy's theorem and its consequences, power series, and residue calculus.

MTH 624. Linear Algebra II. (3 h)
A thorough treatment of vector spaces and linear transformations over an arbitrary field, canonical forms. inner product spaces, and linear groups.

MTH 626. Numerical Linear Algebra. (3 h)
An introduction to numerical methods for solving matrix and related problems in science and engineering using a high-level matrix-oriented language such as MATLAB. Topics include systems of linear equations, least squares methods, and eigenvalue computations. Special emphasis is given to applications.

MTH 631. Geometry. (3 h)
An introduction to axiomatic geometry including a comparison of Euclidean and non-Euclidean geometries.

MTH 634. Differential Geometry. (3 h)
Introduction to the theory of curves and surfaces in two and three dimensional space including such topics as curvature, geodesics, and minimal surfaces.

MTH 645. Elementary Number Theory. (3 h)
Course topics include properties of integers, congruences, and prime numbers, with additional topics chosen from arithmetic functions, primitive roots, quadratic residues, Pythagorean triples, and sums of squares.

MTH 646. Modern Number Theory. (3 h)
Course topics include a selection of number-theory topics of recent interest. Some examples include elliptic curves, partitions, modular forms, the Riemann zeta function, and algebraic number theory.

MTH 647. Graph Theory. (3 h)
Paths, circuits, trees, planar graphs, spanning trees, graph coloring, perfect graphs, Ramsey theory, directed graphs, enumeration of graphs and graph theoretic algorithms.

MTH 648. Combinatorial Analysis I. (3 h)
Enumeration techniques, generating functions, recurrence formulas, the principle of inclusion and exclusion, Polya theory, graph theory, combinatorial algorithms, partially ordered sets, designs, Ramsey theory, symmetric functions, and Schur functions.

MTH 649. Combinatorial Analysis II. (3 h)
Enumeration techniques, generating functions, recurrence formulas, the principle of inclusion and exclusion, Polya theory, graph theory, combinatorial algorithms, partially ordered sets, designs, Ramsey theory, symmetric functions, and Schur functions.

MTH 651. Introduction to Mathematical Modeling. (3 h)
Introduction to the mathematical modeling, analysis and simulation of continuous processes using MATLAB, Mathematica or Maple. Topics include dimensional analysis, stability analysis, bifurcation theory, one-dimensional flows, phase plane analysis, index theory, limit cycles, chaotic dynamics, hyperbolic conservation laws and traveling waves.

MTH 652. Partial Differential Equations. (3 h)
A detailed study of partial differential equations, including the heat, wave, and Laplace equations, using methods such as separation of variables, characteristics, Green's functions, and the maximum principle.

MTH 654. Discrete Dynamical Systems. (3 h)
Introduction to the theory of discrete dynamical systems as applied to disciplines such as biology and economics. Includes methods for finding explicit solutions, equilibrium and stability analysis, phase plane analysis, analysis of Markov chains and bifurcation theory.

MTH 655. Introduction to Numerical Methods. (3 h)
An introduction to numerical computations on modern computer architectures; floating point arithmetic and round-off error including programming in a scientific/engineering language such as MATLAB, C, or Fortran. Topics include algorithms and computer techniques for the solution of problems such as roots of functions, approximations, integration, systems of linear equations and least squares methods. Also listed as CSC 655.

MTH 657. Probability. (3 h)
Distributions of discrete and continuous random variables, sampling distributions. Covers much of the material on the syllabus for the first actuarial exam. This course is cross-listed as STA 610.

MTH 658. Mathematical Statistics. (3 h)
This course will cover derivation of point estimators, hypothesis testing, and confidence intervals using both maximum likelihood and Bayesian approaches. P - MTH 657 or POI.

MTH 681. Individual Study. (1, 2 h)
A course of independent study directed by a faculty adviser. By prearrangement. May be repeated for credit.

MTH 682. Reading in Mathematics. (1-3 h)
Reading in mathematical topics to provide a foundational basis for more advanced study in a particular area. May not be used to satisfy any requirement in the MS degree with thesis. No more than three hours may be applied to the requirements for the MS degree without thesis. May be repeated for credit for a total of 3 hours.

MTH 683. Advanced Topics in Mathematics. (1-3 h)
Topics in mathematics that are not considered in regular courses. Content varies.

MTH 691. Research Exploration in Mathematics. (1-3 h)
Students will participate in introductory research projects while developing skills for success. May not be used towards any degree offered by the department. Pass/Fail only. POI only.

MTH 711. Real Analysis. (3 h)
An introduction to analysis on metric spaces and to calculus on Banach spaces with applications.

MTH 712. Real Analysis. (3 h)
Measure and integration theory, elementary functional analysis, selected advanced topics in analysis.

MTH 715. Seminar in Analysis. (1 h)

MTH 716. Seminar in Analysis. (1 h)

MTH 717. Optimization in Banach Spaces. (3 h)
Banach and Hilbert spaces, best approximations, linear operators and adjoints, Frechet derivatives and nonlinear optimization, fixed points and iterative methods. Applications to control theory, mathematical programming, and numerical analysis.

MTH 718. Topics in Analysis. (3 h)
Selected topics from functional analysis or analytic function theory.

MTH 721. Abstract Algebra. (3 h)
Groups, rings, fields, extensions, Euclidean domains, polynomials, vector spaces, Galois theory.

MTH 722. Abstract Algebra. (3 h)
Groups, rings, fields, extensions, Euclidean domains, polynomials, vector spaces, Galois theory.

MTH 724. Seminar on Theory of Matrices. (1 h)

MTH 725. Seminar in Algebra. (1 h)

MTH 726. Seminar in Algebra. (1 h)

MTH 728. Topics in Algebra. (3 h)
Topics vary and may include algebraic coding theory, algebraic number theory, matrix theory, representation theory, non-commutative ring theory.

MTH 731. Topology. (3 h)
Point-set topology including topological spaces, continuity, connectedness, compactness, and metric spaces. Additional topics in topology may include classification of surface, algebraic topology, and knot theory.

MTH 732. Topics in Topology and Geometry. (3 h)
Topics vary and may include knot theory, algebraic topology, differential topology, manifolds, and Riemannian geometry. May be repeated for credit. P - 731 or POI.

MTH 733. Topics in Topology and Geometry. (3 h)
Topics vary and may include knot theory, non-Euclidean geometry, combinatorial topology, differential topology, minimal surfaces and algebraic topology. Howard.

MTH 735. Seminar on Topology. (1 h)

MTH 736. Seminar on Topology. (1 h)

MTH 737. Seminar on Geometry. (1 h)

MTH 738. Seminar on Geometry. (1 h)

MTH 744. Topics in Number Theory. (3 h)
Topics vary and are chosen from the areas of analytic, algebraic, and elementary number theory. Topics may include Farey fractions, the theory of paritions, Waring's problem, prime number theorem, and Dirichlet's problem.

MTH 745. Seminar on Number Theory. (1 h)

MTH 746. Seminar on Number Theory. (1 h)

MTH 747. Topics in Discrete Mathematics. (3 h)
Topics vary and may include enumerative combinatorics, graph theory, algebraic combinatorics, combinatorial optimization, coding theory, experimental designs, Ramsey theory, Polya theory, representational theory, set theory and mathematical logic.

MTH 748. Seminar on Combinatorial Analysis. (1 h)

MTH 749. Seminar on Combinatorial Analysis. (1 h)

MTH 750. Dynamical Systems. (3 h)
Introduction to modern theory of dynamical systems. Linear and nonlinear autonomous differential equations, invariant sets, closed orbits, Poincare maps, structural stability, center manifolds, normal forms, local bifurcations of equilibria, linear and non-linear maps, hyperbolic sets, attractors, symbolic representation, fractal dimensions. P - MTH 611.

MTH 752. Topics in Applied Mathematics. (3 h)
Topics vary and may include computational methods in differential equations, optimization methods, approximation techniques, eigenvalue problems. May be repeated for credit.

MTH 753. Nonlinear Optimization. (3 h)
The problem of finding global minimums of functions is addressed in the context of problems in which many local minima exist. Numerical techniques are emphasized, including gradient descent and quasi-Newton methods. Current literature is examined and a comparison made of various techniques for both unconstrained and constrained optimization problems. Credit not allowed for both MTH 753 and CSC 753. P - MTH 655 or CSC 655.

MTH 754. Numerical Methods for Partial Differential Equations. (3 h)
Numerical techniques for solving partial differential equations (including elliptic, parabolic, and hyperbolic) are studied along with applications to science and engineering. Theoretical foundations are described and emphasis is placed on algorithm design and implementation using either C, FORTRAN, or MATLAB. Credit not allowed for both MTH 754 and CSC 754. P-MTH 655 or CSC 655.

MTH 757. Stochastic Processes and Applications. (3 h)
This course includes the axiomatic foundations of probability theory and an introduction to stochastic processes. Applications may include Markov chains, Markov Chain Monte Carlo with Metropolis-Hastings, Gibb sampling, Brownian motion, and related topics, with an emphasis on modern developments. This course is cross-listed as STA 710. P-MTH 657 or STA 610 and MTH 611 or POI.

MTH 791. Thesis Research I. (1-9 h)
May be repeated for credit. Satisfactory/Unsatisfactory.

MTH 792. Thesis Research II. (1-9 h)
May be repeated for credit. Satisfactory/Unsatisfactory.

Faculty

Chair Stephen Robinson
Wake Forest Taylor Professor Stephen Robinson
Clark Family Faculty Fellow and Professor Jennifer Erway Fey
Sterge Faculty Fellow and Professor Ellen Kirkman
Professors Edward Allen, Hugh Howards, Miaohua Jiang, Sarah Mason, Sarah Raynor, Jeremy Rouse
Associate Professors Abbey Bourdon, John Gemmer, W. Frank Moore, R. Jason Parsley
Associate Teaching Professor and Director of the Math and Stats Center Lynne Yengulalp
Associate Teaching Professor Justin Allman
Sterge Faculty Fellows and Assistant Professors Claudia Falcon and Leandro Lichtenfelz
Assistant Professor Fan Yang
Teacher-Scholar Postdoctoral FellowsJ. Dylan Bruney, Kyle Celano, Thomas Kindred, Jacob Mayle, and Tolulope Oke
Visiting Assistant Professors Katie Betancourt, C. Williams Chukwu, Peter Merkx, and Chee Han Tan