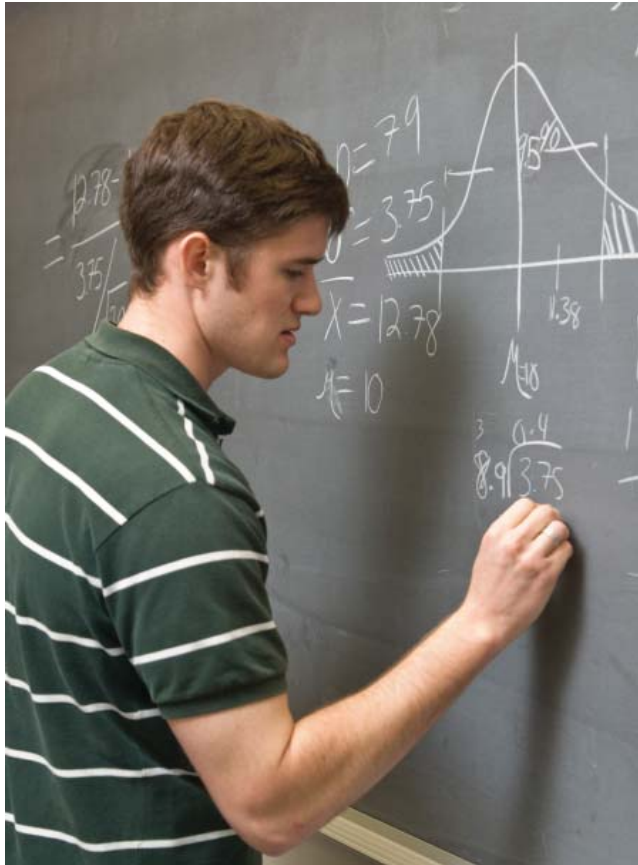


Department of

Mathematics

**Paul Cox, Department Chair**

Kent Bessey, David Brown, Greg Cameron, Paul Cox, Ryan Cromar, Brad Garner, Troy Goodsell, Shane Goodwin, Ann Marie Harmon, Daris Howard, Paul Johanson, Craig Johnson, Jackie Nygaard, Richard Pieper, Danae Romrell, Jason Rose, Wayne Startin, David Stowell, Elizabeth Toy, Heidi Turner, Ben Woodruff, Jennie Youngberg

Jennifer Gohr, Secretary (208) 496-1400

<http://www.byui.edu/math>

The Department of Mathematics offers two degree programs – a Bachelor of Science in Applied Mathematics and a Bachelor of Science in Mathematics Education.

Applied Mathematics

Majoring in applied mathematics at BYU-Idaho will help you enhance your problem-solving skills, sharpen your ability to reason logically, apply mathematics to problems which have real world implications, and improve your ability to communicate difficult ideas. Corporations, government agencies, research labs, and other employers, value the traits you will gain as a mathematics major, and employees in the jobs are typically well compensated. The demand for people with mathematics training is so great that many undergraduates are given extra funds (through the Smart Grant) to encourage them to complete their rigorous training. When you finish, your degree in applied mathematics could prepare you for a career as an educator, researcher, engineer, software developer, business manager, statistician, biostatistician, physicist, actuary, lawyer, etc. Government agencies such as the National Security Agency, Central Intelligence Agency, Treasury Department, and the Commerce Department hire mathematicians to do everything from break codes to detect who is cheating on their taxes.

Mathematics Education

The Math Education major is designed to help students become qualified mathematics instructors in secondary education programs. Qualified mathematics instructors greatly influence our children's success in becoming informed and capable members of society. Consequently, such instructors are a vital part of every secondary education program. As technology continues to advance and influence our daily lives, the demand for quality mathematics instruction has increased. This high demand has caused a shortage of qualified instructors. Hence, graduates skilled in secondary mathematics instruction have little difficulty finding careers in education.

In order to provide students with the experiences necessary to become exceptional teachers, the Mathematics Education program focuses on the following areas: a rigorous understanding of mathematical concepts, applying the principles of the BYU-Idaho Learning model to mathematics instruction, implementing a variety of teaching pedagogies, using technology appropriately for instruction, learning to communicate mathematical concepts well, and developing professional behaviors. Emphasis on becoming true disciples of Jesus Christ permeates and enhances all of these student experiences. Students that fully participate in and master these objectives will leave BYU-Idaho able to deliver high quality mathematics instruction at public or private secondary institutions.

Mission Statement

The Department of Mathematics fully supports the University's Mission Statement. The specific mission of the Department of Mathematics is to:

1. Prepare students to work confidently and competently with the quantitative elements of modern life.
2. Provide students studying Mathematics or related disciplines with the knowledge, skills, and experiences necessary to excel in their careers.
3. Foster a culture of personal and professional development among the department's faculty and staff.

To achieve this mission, the following outcomes will be measured:

All students will:

- Demonstrate knowledge of the mathematical principles underlying provident living practices.
- Use quantitative information to make logical decisions.
- Apply multiple tools to the solution of real world problems with quantitative elements.

Students majoring in disciplines related to Mathematics will:

- Appropriately apply mathematical concepts and techniques to problems in their discipline.

Students majoring in Mathematics will:

- Communicate technical information and ideas effectively.
- Solve real world problems by applying diverse problem solving approaches.

Prospective Mathematics teachers will:

- Conduct themselves professionally.
- Have a foundational understanding of the concepts they will teach.
- Use a variety of pedagogies and reflect on their application and effectiveness.
- Use a variety of technologies and reflect on their potential to improve learning.

Students majoring in Applied Mathematics will:

- Be prepared for professional opportunities or graduate studies.

Mathematics

Brigham Young University-Idaho 2009-2010

BS in Applied Mathematics (650)

Take required Foundations courses

Major Requirements

Students must maintain a minimum grade of C- in their major courses

<p><i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>CS 124</td><td style="text-align: right;">3</td></tr> <tr><td>FDMAT 224</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 113</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 214</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 301</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 341</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 371</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 411</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 441</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 461</td><td style="text-align: right;">3</td></tr> <tr><td>PH 121</td><td style="text-align: right;">3</td></tr> <tr><td>PH 150</td><td style="text-align: right;">1</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">34</td></tr> </table> <p><i>Take 12 credits:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>MATH 225</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 281</td><td style="text-align: right;">3</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">3</td></tr> </table>	CS 124	3	FDMAT 224	3	MATH 113	3	MATH 214	3	MATH 301	3	MATH 341	3	MATH 371	3	MATH 411	3	MATH 441	3	MATH 461	3	PH 121	3	PH 150	1		34	MATH 225	3	MATH 281	3		3	<p><i>Take 15 credits:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>MATH 324</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 412</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 442</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 462</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 463</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 472</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 495R</td><td style="text-align: right;">3</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">15</td></tr> </table> <p><i>Take 3 credits:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>MATH 498R</td><td style="text-align: right;">1-3</td></tr> <tr><td>MATH 499R</td><td style="text-align: right;">1-3</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">3</td></tr> </table>	MATH 324	3	MATH 412	3	MATH 442	3	MATH 462	3	MATH 463	3	MATH 472	3	MATH 495R	3		15	MATH 498R	1-3	MATH 499R	1-3		3	<p><i>Program Notes:</i></p>
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Total Major Credits=55

This major also requires a minor or 2 clusters

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- NO

Spring-Fall---- NO

BS in Mathematics Education (850)

Take required Foundations courses

Major Requirements

Students must maintain a minimum grade of C- in their major courses

<p>Education Core:</p> <p><i>Take these courses:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>ED 200</td><td style="text-align: right;">2</td></tr> <tr><td>ED 304</td><td style="text-align: right;">3</td></tr> <tr><td>ED 361</td><td style="text-align: right;">3</td></tr> <tr><td>ED 461</td><td style="text-align: right;">3</td></tr> <tr><td>ED 492</td><td style="text-align: right;">10</td></tr> <tr><td>SPED 360</td><td style="text-align: right;">2</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">23</td></tr> </table>	ED 200	2	ED 304	3	ED 361	3	ED 461	3	ED 492	10	SPED 360	2		23	<p><i>Take 37 credits:</i></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>FDMAT 112</td><td style="text-align: right;">4</td></tr> <tr><td>FDMAT 224</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 111</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 114</td><td style="text-align: right;">4</td></tr> <tr><td>MATH 190</td><td style="text-align: right;">1</td></tr> <tr><td>MATH 205</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 206</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 240</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 241</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 242</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 271</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 302</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 440</td><td style="text-align: right;">3</td></tr> <tr><td>MATH 450</td><td style="text-align: right;">2</td></tr> <tr><td>MATH 490</td><td style="text-align: right;">2</td></tr> <tr><td></td><td style="text-align: right; border-top: 1px solid black;">37</td></tr> </table>	FDMAT 112	4	FDMAT 224	3	MATH 111	2	MATH 114	4	MATH 190	1	MATH 205	3	MATH 206	2	MATH 240	2	MATH 241	2	MATH 242	2	MATH 271	2	MATH 302	3	MATH 440	3	MATH 450	2	MATH 490	2		37	<p><i>Program Notes:</i></p>
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Total Major Credits=37

Education Core Credits=23

Education Majors Require an Education Minor for Graduation

This major is available on the following tracks:

Fall-Winter---- YES

Winter-Spring---- YES

Spring-Fall---- YES

Course Descriptions

Credits*

Foundations Quantitative Reasoning Requirement

There are two ways to fulfill the Foundations Quantitative Reasoning graduation requirement: 1) Pass Math 108, or 2) Pass any math class which indicates that it “fulfills the Foundations math requirement” (FDMAT 109, FDMAT 110, FDMAT 112, FDMAT 221, FDMAT 222, FDMAT 223, FDMAT 224) and then complete the test-out procedure for Math 108. Detailed information on testing out of Math 108 is available online at <http://www.byui.edu/math/foundations/testout.htm> or you may contact the Department of Mathematics. Please note that passing a math class other than Math 108 will not fulfill the Foundations graduation requirement. You must also test-out of Math 108.

FDMAT 108 Mathematical Tools for the Real World (3.0:3:0)

Prerequisite: Math 100B with a grade of “B” or higher or one year of high school algebra. This class prepares students to understand, analyze, and solve real-life problems that require quantitative reasoning. Topics include the meaning of probabilities, how to read, critique, and apply statistical information found in news reports, public policy debates, consumer reports, and other daily life and professional situations; the use of mathematical models in describing, understanding, and making predictions about real world phenomena; and the mathematics of loans and investments. Other topics may be included as time permits. All topics will be illustrated by examples and applications from current events, daily life, business, and natural phenomena.
(Fall, Winter, Spring)

FDMAT 109 Precalculus (5.0:5:0)

Prerequisite: Two years of high school algebra or Math 101 with a grade of “B” or higher. You must also achieve a satisfactory score on the placement exam. The placement exam will cover topics from high school algebra II and will be offered during the first week of class. A practice exam is available on the web. Combination of College Algebra and Trigonometry. Intended to prepare students for Calculus or other math and science courses. Elementary analysis of functions having discrete or connected domains. Methods of solving equations. Systems of equations and matrices. Triangle relationships, graphs of periodic functions, trigonometric identities, inverse trigonometric functions, and applications of trigonometry.
(Fall, Winter, Spring)

FDMAT 110 College Algebra (3.0:3:0)

Prerequisite: Two years of high school algebra or Math 101 with grade of B or higher. Elementary analysis of functions having discrete or connected domains. Methods of solving equations. Systems of equations and matrices. Strong connections to real world applications of functions and matrices will be made. Students who will be going on to take Calculus are strongly encouraged to take Math 109 instead of Math 110.
(Fall, Winter, Spring)

FDMAT 112 Calculus I (4.0:4:1)

Limits, continuity, derivatives, integrals, and transcendental functions. Properties and applications of the above.
(Fall, Winter, Spring)

FDMAT 221 Business Statistics (3.0:3:0)

Prerequisite: At least 15 credits. Graphical representations of data; measures of center and spread; elementary probability; sampling distributions; correlation and regression; statistical inference involving means, proportions, and contingency tables.
(Fall, Winter, Spring)

FDMAT 222 Biostatistics (3.0:3:0)

Graphical representations of data; measures of center and spread; elementary probability; sampling distributions; correlation and regression; statistical inference involving means, proportions, and contingency tables; odds ratio and relative risk.
(Fall, Winter, Spring)

FDMAT 223 Social Sciences Statistics (3.0:3:0)

Graphical representations of data; measures of center and spread; elementary probability; sampling distributions; correlation and regression; statistical inference involving means, proportions, and contingency tables.
(Fall, Winter, Spring)

FDMAT 224 Intermediate Statistics (3.0:3:0)

Prerequisites: 15 credits
Graphical representation of data, principles of experimental design, confidence intervals, hypothesis testing, contingency tables, nonparametric tests, ANOVA, multiple comparisons, multiple regression, regression diagnostics, subset selection procedures, and some nonlinear regression models.
(Fall, Winter, Spring)

MATH 100A Arithmetic (1.0:0:3)

A study of arithmetic and applications using arithmetic. This course is only for those needing a review of elementary school arithmetic including signed numbers, fractions, decimals, and percents.

MATH 100B Beginning Algebra (2.0:0:3)

The arithmetic of integers and rational numbers as well as an introduction to algebra. This course is recommended for those needing basic algebra before taking progressively higher math courses.
(Fall, Winter, Spring)

MATH 111 Trigonometry (2.0:2:0)

Trigonometric functions, triangle relationships, graphs, identities, inverse trigonometric functions, complex numbers, and applications. Applications of trigonometry will be emphasized throughout the course.

MATH 113 Calculus II (3.0:3:1)

Prerequisite: Math 112 or the equivalent. Students entering Calculus II may be expected to know how to use those features of their graphing calculators that are typically used in first semester calculus courses. Techniques of integration, infinite sequences and series, polar coordinates, and parametric curves.
(Fall, Winter)

MATH 114 Calculus II for Education Majors (4.0:4:0)

Prerequisite: FDMAT 112
Techniques of integration, infinite sequences and series, polar coordinates, parametric curves, introduction to multi-variable and vector calculus.
(Fall, Spring)

MATH 119 Calculus for Business and Life Sciences (4.0:4:1)

Prerequisite: Math 110 or the equivalent
A one-semester terminal course of single and multi-variable calculus designed primarily for students in biology, agriculture, and business. Topics include derivatives, integrals, and applications.
(Fall, Winter, Spring)

MATH 190 Tutoring Mathematics (1.0:1:0)

Prerequisite: FDMAT 112
Work as a math department tutor.
(Fall, Winter, Spring)

MATH 205 Fundamentals of Number Theory (3.0:3:0)

Prerequisite: FDMAT 108 or concurrent enrollment in a higher numbered math class. This course is for Secondary Education Mathematics Majors and Minors and Elementary Education majors. Systems of numeration, operations on whole numbers, integers and rational numbers, the real number system, and other topics from number theory are included.
(Fall, Winter, Spring)

MATH 206 Elementary Geometry (2.0:2:0)

Prerequisite: FDMAT 108 or concurrent enrollment in a higher numbered math class. This course is for Secondary Education Mathematics majors and minors and Elementary Education majors. Concepts of geometry in two and three dimensions.
(Fall, Winter, Spring)

MATH 214 Multivariate Calculus (3.0:3:1)

Prerequisite: Math 113 or the equivalent. Techniques of integration, infinite sequences and series, polar coordinates, parametric curves, introduction to multi-variable and vector calculus.
(Fall, Winter)

Mathematics

Brigham Young University–Idaho 2009-2010

<p>MATH 215 Engineering Mathematics I (4.0:4:1) Prerequisite: Math 112 or the equivalent. Polar coordinates, parametric curves, vectors, vector geometry, vector-valued functions, partial derivatives, gradient, optimization, multiple integration, vector fields, and operations on scalar and vector fields. Emphasis on methods and applications. Math 215 and Math 214 cannot both be taken for credit. (Fall, Winter, Spring)</p>	<p>MATH 324 Probability and Statistics (3.0:3:0) Prerequisite: (FDMAT 221, 222, 223, or 224) and (Math 112 or 119) This course is intended for mathematics majors, economics majors, and statistics minors. This is an introduction to probability and mathematical statistics. Topics include: probability theory, random variables, multiple integration, discrete and continuous distributions, limit theorems, estimation, hypothesis testing, and power. (Fall, Winter, Spring)</p>
<p>MATH 225 Simulation (3.0:3:0) Prerequisite: FDMAT 221, 222, 223, or 224 This is an introductory course in simulation. Topics include: elementary probability; random variables; generating discrete and continuous random variables; statistical analysis of simulated data; variance reduction techniques; statistical validation techniques; MCMC methods. (Winter)</p>	<p>MATH 341 Linear Algebra (3.0:3:0) Prerequisite: Math 112 Systems of linear equations, matrices, determinants, eigenvalues and eigenvectors, vectors, vector spaces, linear transformations, and applications. (Fall, Winter, Spring)</p>
<p>MATH 240 Discrete Mathematics (2.0:2:0) Prerequisite: FDMAT 112 Topics on graph theory, combinatorics, logic, and mathematical induction. Training in how to communicate clearly and carefully about mathematical concepts. (Fall, Winter)</p>	<p>MATH 371 Introduction to Ordinary Differential Equations (3.0:3:1) Prerequisite: Math 214 and Math 341. Methods and theory of ordinary differential equations with applications. Differential operators, systems of linear ODEs, Laplace transforms and series methods. Math 371 and Math 316 cannot both be taken for credit. (Fall)</p>
<p>MATH 241 Linear Algebra I (2.0:2:0) Prerequisite: FDMAT 112 Introduces and explores some of the major concepts of matrix analysis through solving significant real world problems. (Winter, Spring)</p>	<p>MATH 411 Numerical Analysis (3.0:3:0) Prerequisite: CS 144 and either Math 341 or Math 316. Math 301 preferred. Basic error analysis, complexity of algorithms, roots, interpolation, least squares approximation, curve fitting, numerical differentiation and integration, and systems of linear equations. (Winter even years)</p>
<p>MATH 242 Linear Algebra II (2.0:2:0) Prerequisite: Math 241 Introduces and explores some of the major concepts of vector spaces and linear transformations through solving significant real world problems. (Winter, Spring)</p>	<p>MATH 412 Scientific Computing (3.0:3:0) Prerequisite: Math 411 and either Math 214 or Math 316 Methods of solving complex problems using numerical analysis and computer simulation. A variety of computing tools will be employed to study significant problems of current interest. Topics may include graph theory, cryptography, random number generation, queuing theory, discrete optimization, parameter fitting, finite element analysis, numerical PDE methods, etc. (Fall even years)</p>
<p>MATH 271 Elementary Differential Equations (2.0:2:0) Prerequisite: FDMAT 112 Introduces and explores some of the major concepts of differential equations and dynamical systems through solving significant real world problems. (Fall, Winter)</p>	<p>MATH 440 Modern Algebra (3.0:3:0) Prerequisite: Math 205 and Math 240 This course is for secondary education majors and minors. Number theory, division algorithm, primes, GCD, LCM, proofs, rings, integral domains, fields, polynomials, Fundamental Theorem of Algebra, groups, isomorphisms, and how these topics apply to the secondary school mathematics curriculum.</p>
<p>MATH 281 Introduction to Applied Mathematics (3.0:3:0) Prerequisite: Math 112 or Math 119 Mathematical modeling concepts applied to areas such as biology, physics, chemistry, game theory, and economics. May include guest lecture, field trips, and interdisciplinary projects. (Fall)</p>	<p>MATH 441 Abstract Algebra I (3.0:3:0) Prerequisite: Math 301 and Math 341 Introduction to groups, rings, fields, vector spaces, and applications. (Fall on odd years)</p>
<p>MATH 301 Foundations of Mathematics (3.0:3:0) Prerequisite: Math 113 Achieving maturity in mathematical communication. Topics include introduction to mathematical proof, analysis of proof, set theory, mathematical induction, logical reasoning, elementary number theory, and properties of relations and functions. (Winter)</p>	<p>MATH 442 Abstract Algebra II (3.0:3:0) Prerequisite: Math 441 Additional exposure to groups, rings, fields, vector spaces, and applications. (Winter even years)</p>
<p>MATH 302 Geometry (3.0:3:0) Prerequisite: Math 206 and Math 240 Axiomatic treatment of finite geometries, transformation geometry, Euclidean and non-Euclidean geometries with emphasis on the historical significance of the Parallel Postulate. (Winter, Spring)</p>	<p>MATH 450 History of Mathematics (2.0:2:0) Prerequisite: Math 302 and Math 440 Intended for those students majoring in Mathematics Education. Presents an overview of the development of mathematics and its interaction with society. (Fall, Spring)</p>
<p>MATH 316 Engineering Mathematics II (4.0:4:1) Prerequisite: Math 214 or 215 or the equivalent. Matrices, determinants, eigenvalues and eigenvectors, first and second order ordinary differential equations, power series and Fourier series methods, Laplace transforms, systems of linear ordinary differential equations. Emphasis on methods and applications. Math 316 and Math 371 cannot both be taken for credit. (Fall, Winter, Spring)</p>	<p>MATH 461 Real Analysis I (3.0:3:0) Prerequisite: (Math 214 or Math 215) and (Math 341 or Math 316) Rigorous treatment of the calculus. Limits, continuity, differentiation, integration, and metric properties of Euclidean spaces. (Fall even years)</p>
	<p>MATH 462 Real Analysis II (3.0:3:0) Prerequisite: Math 461 and either Math 316 or Math 341 Analysis in the context of metric spaces. Applications involving such tools as approximation, Fourier analysis, and multivariate optimization. (Winter odd years)</p>

MATH 463 Complex Analysis

(3.0:3:0)

Prerequisite: Math 214 or Math 215

Arithmetic, algebra and calculus operations and concepts applied to complex numbers and functions of a single complex variable.

(Winter odd years)

MATH 472 Introduction to Partial Differential Equations

(3.0:3:0)

Prerequisite: Either Math 316 or Math 371

Solving linear homogeneous and nonhomogeneous second-order partial differential equations with homogeneous and nonhomogeneous boundary conditions by separation of variables. Sturm-Liouville theory. Applications of partial differential equations to diffusion, wave, and other phenomena. Fourier series and their applications to solving partial differential equations. Solving first-order partial differential equations using the method of characteristics. Introduction to the finite-element and finite-difference methods.

(Winter)

MATH 490 Secondary Education Mathematics Teaching Methods

(2.0:2:0)

Prerequisite: Must student teach within two semesters after taking this course.

Math 490 must be taken the semester before student teaching. This course is designed to help preservice secondary mathematics teachers apply research-based teaching strategies that lead students to discover, create, appreciate, and utilize mathematics.

Students will have many opportunities to teach, prepare lesson plans, learn how to organize and manage classrooms, and gain a knowledge of state and professional standards for secondary mathematics teachers.

(Fall, Winter, Spring)

MATH 495R Topics in Mathematics

(3.0:3:0)

Prerequisite: Consent of instructor.

The content of this class will be determined by the department and the instructor, based on student need and interest. Some possible subjects are: Number Theory, Topology, Stochastic Processes, and Actuarial Science.

(Fall, odd years)

MATH 498R Internship

(1-3:0:0)

Prerequisite: Consent of Instructor

Practical experience working in a math intensive industry.

(As needed)

MATH 499R Senior Project in Mathematics

(1-3:0:0)

Prerequisite: Consent of Instructor

Content tailored to individual needs and interests of the students. Investigation and/or application of mathematical principles under the guidance of a faculty mentor.

(As needed)