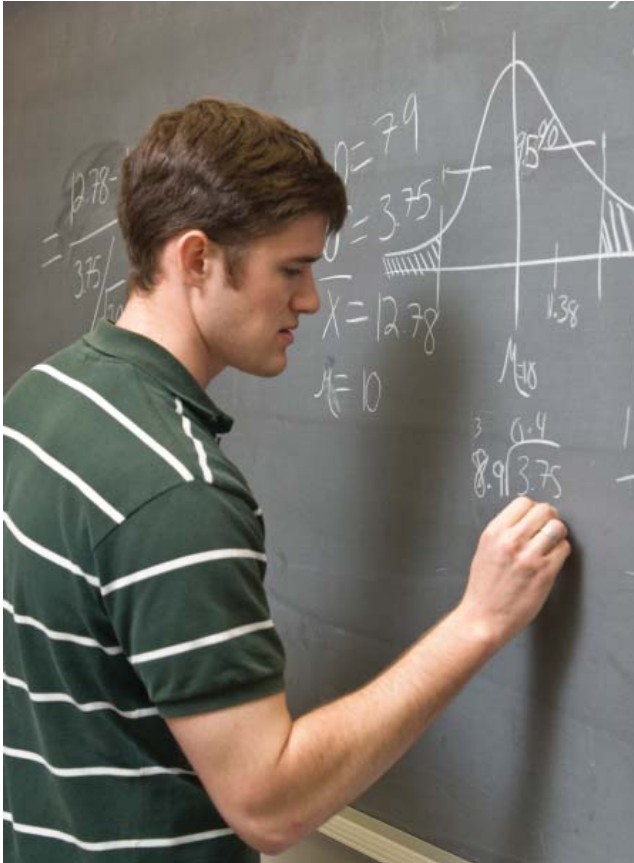


Department of

# Mathematics

**Paul Cox, Department Chair**

*Kent Bessey, David Brown, Greg Cameron, Paul Cox, Brad Garner, Troy Goodsell, Shane Goodwin, Ann Marie Harris, Danial Howard, Daris Howard, Paul Johanson, Craig Johnson, Jackie Nygaard, Richard Pieper, Danae Romrell, Wayne Startin, David Stowell, Elizabeth Toy, Ben Woodruff, Jennie Youngberg*  
 Jennifer Gobr, Secretary (208) 496-1400  
<http://www.byui.edu/math/>

The mathematics department fully supports the university's mission statement. The specific mission of the mathematics department 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.
- Argue, using relevant quantitative information, the advantages and disadvantages of proposals concerning a variety of social, economic, and personal problems.
- Apply appropriate technologies to the solution of real world problems with quantitative elements.

Students majoring in disciplines related to mathematics will:

- Appropriately apply mathematical concepts and techniques in courses subsequent to their mathematics courses.

Students majoring in mathematics will:

- Know and apply codes of professional conduct and discipleship.
- Communicate quantitative information and ideas effectively.
- Solve real world problems by applying diverse problem solving approaches.

Prospective mathematics teachers will:

- Have a foundational understanding of the concepts they will teach.
- See and learn to use a variety of pedagogies.
- Competently use appropriate technologies to facilitate teaching mathematics.

Students majoring in applied mathematics will:

- Be prepared for professional opportunities or graduate studies.

**BS in Applied Mathematics (650)**

Take required Foundations courses

**Major Requirements**

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

<i>Take these courses:</i>		<i>Take 12 credits:</i>	
CS 124	3	MATH 412	3
MATH 113	3	MATH 422	3
MATH 214	3	MATH 442	3
MATH 281	3	MATH 463	3
MATH 301	3	MATH 472	3
MATH 321	3	MATH 495R	<u>3</u>
MATH 341	3		12
MATH 371	3		
MATH 411	3	<i>Take 3 credits:</i>	
MATH 441	3	MATH 498R	1-3
MATH 461	3	MATH 499R	<u>1-3</u>
MATH 462	3		3
PH 121	3		
PH 150	<u>1</u>		
	40		

*Program Notes:*

**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*

<i>Education Core:</i>		<i>Take 37 credits:</i>	
<i>Take these courses:</i>		FDMAT 112	4
ED 200	2	MATH 111	2
ED 304	3	MATH 114	4
ED 361	3	MATH 190	1
ED 461	3	MATH 205	3
ED 492	10	MATH 206	2
SPED 360	<u>2</u>	MATH 240	2
	23	MATH 241	2
		MATH 242	2
		MATH 271	2
		MATH 302	3
		MATH 321	3
		MATH 440	3
		MATH 450	2
		MATH 490	<u>2</u>
			37

*Program Notes:*

**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*
<p><b>Foundations Quantitative Reasoning Requirement</b></p> <p>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) and then complete the test-out procedure for Math 108. Detailed information on testing out of Math 108 is available online at <a href="http://www.byui.edu/math/foundations/testout.htm">http://www.byui.edu/math/foundations/testout.htm</a> 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.</p>	
<p><b>FDMAT 108 Mathematical Tools for the Real World</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: Math 100B with a grade of “B” or higher or one year of high school algebra.</p> <p>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.</p> <p>(Fall, Winter Spring)</p>	<b>(3:3:0)</b>
<p><b>FDMAT 109 Precalculus</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: Two years of high school algebra or Math 101 with a grade of “B” or higher.</p> <p>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.</p> <p>(Fall Winter, Spring)</p>	<b>(5:5:0)</b>
<p><b>FDMAT 110 College Algebra</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: Two years of high school algebra or Math 101 with a grade of “B” or higher. .</p> <p>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 Math109 instead of Math 110.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>
<p><b>FDMAT 112 Calculus I</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: Math 109 or equivalent.</p> <p>Limits, continuity, derivatives, integrals, and transcendental functions. Properties and applications of the above.</p> <p>(Fall, Winter, Spring)</p>	<b>(4:4:1)</b>
<p><b>FDMAT 221 Business Statistics</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: At least 15 credits completed.</p> <p>Graphical representations of data; measures of center and spread; elementary probability; sampling distributions; correlation and regression; statistical inference involving means, proportions, and contingency tables.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>
<p><b>FDMAT 222 Biostatistics</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: At least 15 credits completed.</p> <p>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.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>
<p><b>FDMAT 223 Social Science Statistics</b></p> <p>Fulfills Foundations/GE Math requirement.</p> <p>Prerequisite: At least 15 credits completed.</p> <p>Graphical representations of data; measures of center and spread; elementary probability; sampling distributions; correlation and regression; statistical inference involving means and proportions.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>
<p><b>MATH 100A Arithmetic</b></p> <p>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.</p>	<b>(1:0:3)</b>
<p><b>MATH 100B Beginning Algebra</b></p> <p>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.</p> <p>(Fall, Winter, Spring)</p>	<b>(2:0:3)</b>
<p><b>MATH 101 Intermediate Algebra</b></p> <p>Prerequisite: Ability to demonstrate proficiency in first-year algebra or Math 100B with a grade of “B” or higher.</p> <p>Fundamental operations of algebra, properties of exponents, solving linear, fractional, radical and quadratic equations, graphing linear and quadratic functions. Math 101 may not be taken for credit if FDMAT 110 has been completed with a grade of “B” or higher.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>
<p><b>MATH 111 Trigonometry</b></p> <p>Fulfills GE Math requirement.</p> <p>Prerequisite: Math 101 or the equivalent</p> <p>Trigonometric functions, triangle relationships, graphs, identities, inverse trigonometric functions, complex numbers, and applications. Applications of trigonometry will be emphasized throughout the course.</p> <p>(Fall, Winter, Spring)</p>	<b>(2:2:0)</b>
<p><b>MATH 113 Calculus II</b></p> <p>Fulfills GE Math requirement.</p> <p>Prerequisite: FDMAT 112 or the equivalent.</p> <p>Techniques of integration, infinite sequences and series, polar coordinates, and parametric curves.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:4:0)</b>
<p><b>MATH 114 Calculus II for Education Majors</b></p> <p>Prerequisite: FDMAT 112</p> <p>Techniques of integration, infinite sequences and series, polar coordinates, parametric curves, introduction to multi-variable and vector calculus.</p> <p>(Fall, Spring)</p>	<b>(4:4:0)</b>
<p><b>MATH 119 Calculus for Business and Life Sciences</b></p> <p>Fulfills GE Math requirement.</p> <p>Prerequisite: FDMAT 110 or the equivalent</p> <p>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.</p> <p>(Fall, Winter)</p>	<b>(4:5:0)</b>
<p><b>MATH 190 Tutoring Mathematics</b></p> <p>Prerequisite: FDMAT 112</p> <p>Work as a Math Department tutor.</p> <p>(Fall, Winter, Spring)</p>	<b>(1:1:0)</b>
<p><b>MATH 205 Fundamentals of Number Theory</b></p> <p>Prerequisite: FDMAT 108 or concurrent enrollment in a math course numbered higher than 108.</p> <p>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.</p> <p>(Fall, Winter, Spring)</p>	<b>(3:3:0)</b>

# Mathematics

Brigham Young University–Idaho 2008-2009

<p><b>MATH 206 Elementary Geometry</b> (2:2:0)            Prerequisite: FDMAT 108 or concurrent enrollment in a math course numbered higher than 108.            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)</p>	<p><b>MATH 316 Engineering Mathematics II</b> (4:5:0)            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, 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><b>MATH 214 Multivariate Calculus</b> (3:4:0)            Fulfills GE Math requirement.            Prerequisite: Math 113 or the equivalent.            Vectors, vector geometry, quadric surfaces, alternative coordinate systems, vector-valued functions, partial derivatives, gradient, optimization, multiple integration, vector fields, integral theorems of vector calculus, and applications. Math 214 and Math 215 cannot both be taken for credit.            (Fall, Winter)</p>	<p><b>MATH 321 Intermediate Statistical Methods</b> (3:3:0)            Prerequisite: FDMAT 110            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)</p>
<p><b>MATH 215 Engineering Mathematics I</b> (4:5:0)            Prerequisite: FDMAT 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><b>MATH 341 Linear Algebra</b> (3:3:0)            Prerequisite: FDMAT 112            Systems of linear equations, matrices, determinants, eigenvalues and eigenvectors, vectors, vector spaces, linear transformations, and applications.            (Fall, Winter, Spring)</p>
<p><b>MATH 240 Discrete Mathematics</b> (2:2:0)            Prerequisite: FDMAT 112.            Topics from graph theory, combinatorics, logic, and mathematical induction. Training in how to communicate clearly and carefully about mathematical concepts.            (Fall, Spring)</p>	<p><b>MATH 371 Introduction to Ordinary Differential Equations</b> (3:3:0)            Prerequisite: Math 214, 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><b>MATH 241 Linear Algebra I</b> (2:2:0)            Prerequisite: FDMAT 112.            Introduces and explores some of the major concepts of matrix analysis through solving significant real world problems.            (Winter, Spring)</p>	<p><b>MATH 411 Numerical Analysis</b> (3:3:0)            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><b>MATH 242 Linear Algebra II</b> (2:2:0)            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><b>MATH 412 Scientific Computing</b> (3:3:0)            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><b>MATH 271 Elementary Differential Equations</b> (2:2:0)            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><b>MATH 422 Probability and Statistics</b> (3:3:0)            Prerequisite: Math 321 and either Math 214 or 215            Probability theory, random variables, discrete and continuous distributions, limit theorems, estimation, hypothesis testing and power.            (Winter)</p>
<p><b>MATH 281 Introduction to Applied Mathematics</b> (3:3:0)            Prerequisite: FDMAT 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><b>MATH 440 Modern Algebra</b> (3:3:0)            Prerequisite: Math 205, Math 240, Math 242            This course is for secondary education majors and minors. The course takes many of the topics taught in high school or junior high school math classes and treats those topics from a more advanced standpoint. In addition, topics from abstract algebra as they relate to teaching in the secondary schools will be addressed.            (Fall, Winter)</p>
<p><b>MATH 301 Foundations of Mathematics</b> (3:3:0)            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.            (Fall, Winter, Spring)</p>	<p><b>MATH 441 Abstract Algebra I</b> (3:3:0)            Prerequisite: Math 301 and Math 341            Introduction to groups, rings, fields, vector spaces, and applications.            (Fall on odd years)</p>
<p><b>MATH 302 Geometry</b> (3:3:0)            Prerequisite: Math 206 and either Math 240 or Math 301.            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><b>MATH 442 Abstract Algebra II</b> (3:3:0)            Prerequisite: Math 441            Additional exposure to groups, rings, fields, vector spaces, and applications.            (Winter even years)</p>
	<p><b>MATH 450 History of Mathematics</b> (2:2:0)            Prerequisites Math 302, Math 440 or concurrent enrollment.            Intended for those students majoring in Mathematics Education. Presents an overview of the development of mathematics and its interaction with society.            (Fall, Spring)</p>

**MATH 461 Real Analysis I (3:3:0)**

Prerequisite: Math 301 or Math 341 and either Math 214 or Math 316.

Rigorous treatment of the calculus. Limits, continuity, differentiation, integration, and metric properties of Euclidean spaces.

(Fall even years)

**MATH 462 Real Analysis II (3:3:0)**

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)

**MATH 463 Complex Analysis (3:3:0)**

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 (3:3:0)**

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 (2:2:0)**

Prerequisite: Math 302, Math 440, or concurrent enrollment.

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 (3:3:0)**

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 (1-3:2:0)**

Prerequisite: Consent of Instructor.

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

(As needed)