

# Mathematics Program

## Faculty/Staff

Gerald Springer, Chair; Jonathan Duarte, Ryan Loga

Adjunct: Jennifer Smith

## Aims of the Program

First, we aim to give each student an understanding of basic mathematics and its application to solving problems expressible by algebraic equations and inequalities. Second, we aim to train students to understand the fundamental concepts of mathematics so that they can teach the subject on the elementary or secondary level. Third, we aim to give a solid foundation in the area of mathematics which will prepare students to pursue further studies in mathematics, the physical sciences, economics, and the engineering sciences.

## Mathematics Degrees and Certificates

### B.A. Mathematics

#### Program:

Mathematics

#### Type:

B.A.

#### Required Courses

Item #	Title	Credits
MATH 141	Introduction to Probability and Statistics	3
MATH 181	Calculus I	4
MATH 182	Calculus II	4
MATH 283	Calculus III	4
MATH 311	Logic and Set Theory	3
MATH 321	Differential Equations	3
MATH 361	Introduction to Linear Algebra	3
MATH 431	Abstract Algebra	3
MATH 484	Mathematics Seminar	1
MATH 485	Portfolio	1
	Mathematics Upper Division Electives	3
	<b>Sub-Total Credits</b>	<b>32</b>

#### Required cognate: take one of the following courses:

Item #	Title	Credits
CSIS 110	Principles of Computer Programming I	3
CSIS 111	Principles of Computer Programming II	3
PHYS 121	General Physics I	4

PHYS 122	General Physics II	4
<b>Sub-Total Credits</b>		<b>3-4</b>
Total credits for degree:		35-36

## B.S. Mathematics

**Program:**  
Mathematics  
**Type:**  
B.S.

### Required Courses

Item #	Title	Credits
MATH 181	Calculus I	4
MATH 182	Calculus II	4
MATH 283	Calculus III	4
MATH 311	Logic and Set Theory	3
MATH 321	Differential Equations	3
MATH 361	Introduction to Linear Algebra	3
MATH 371	History of Mathematics	3
MATH 431	Abstract Algebra	3
MATH 441	Calculus-Based Probability Theory	4
MATH 471	Real Analysis	3
MATH 484	Mathematics Seminar	1
MATH 485	Portfolio	1
Mathematics 6 Hours Upper Division Electives		6
<b>Sub-Total Credits</b>		<b>42</b>

### Required cognate: take two of the following courses:

Item #	Title	Credits
CSIS 110	Principles of Computer Programming I	3
CSIS 111	Principles of Computer Programming II	3
PHYS 121	General Physics I	4
PHYS 122	General Physics II	4
<b>Sub-Total Credits</b>		<b>6-8</b>

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Total credits for degree:

48-50

## B.S. Mathematics Secondary Teaching Area

### Teaching Certification Program

The following mathematics major is for teaching certification only. Requirements for certification are listed in the Education section of this *Bulletin*.

*You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.*

**Program:**

Mathematics

**Type:**

B.S.

### Required Courses

Item #	Title	Credits
MATH 141	Introduction to Probability and Statistics	3
MATH 181	Calculus I	4
MATH 182	Calculus II	4
MATH 283	Calculus III	4
MATH 311	Logic and Set Theory	3
MATH 341	Geometry	3
MATH 361	Introduction to Linear Algebra	3
MATH 371	History of Mathematics	3
MATH 431	Abstract Algebra	3
MATH 484	Mathematics Seminar	1
MATH 485	Portfolio	1
	Mathematics 6 Hours Upper Division Electives	6
	<b>Sub-Total Credits</b>	<b>38</b>
	Total credits for degree:	38

## Minor in Mathematics

**Program:**

Mathematics

**Type:**

Minor

### Required Courses

Item #	Title	Credits
MATH 181	Calculus I	4
MATH 182	Calculus II	4
MATH 283	Calculus III	4
	Mathematics Minor Upper Division Electives	6
	<b>Sub-Total Credits</b>	<b>18</b>
	Total credits for degree:	18

### Minor in Mathematics - Secondary Certification

#### Teaching Certification Program

The following mathematics minor is for teaching certification only. Requirements for certification are listed in the Education section of this *Bulletin*.

*You must make formal application for admittance to the Teacher Education Program. Applications are available at the Education Department office.*

**Program:**

Mathematics

**Type:**

Minor

### Required Courses

Item #	Title	Credits
MATH 141	Introduction to Probability and Statistics	3
MATH 181	Calculus I	4
MATH 182	Calculus II	4
MATH 311	Logic and Set Theory	3
MATH 341	Geometry	3
MATH 361	Introduction to Linear Algebra	3
	Mathematics 6 Hours Upper Division Electives	6
	<b>Sub-Total Credits</b>	<b>26</b>
	Total credits for degree:	26

### Mathematics Classes

#### MATH 013: Algebra

This course provides the student with a basic understanding of addition, subtraction, multiplication, and division of fractions and rational expressions in addition to an understanding of quadratic equations, inequalities and graphing.

This course meets five days a week. This course does not apply toward general education or graduation requirements.

Credits: 3

Program: **Mathematics**

Semester Offered: Fall Spring

### **MATH 103: The Essentials of Mathematics**

This course covers the following topics: fraction, decimal, percent, conversion of units, dimensional analysis, measurements, linear relationships, exponential relationships, logarithmic relationships, simple interest, compounded and continuous interest, annuity, graphical representation of data, descriptive and inferential statistics, logic and sets, and proof writing.

Credits: 3

Program: **Mathematics**

Semester Offered: Summer

### **MATH 110: College Algebra**

A study of algebraic expressions, equations, inequalities, and functions. Includes function composition, inverse functions, and graphs of functions. Solutions of linear and quadratic functions are presented (including complex numbers) with extension to other polynomial functions. Topics also include properties and graphs of rational functions, and systems of linear equations and their solutions including matrix methods and determinants.

Credits: 3

Prerequisites: Aleks Placement Test Score of 46-60 or an SAT mathematics score of at least 530 or an ACT mathematics score of at least 21 or MATH 013 with a grade of C- or higher or permission of the department.

Program: **Mathematics**

Semester Offered: Fall Spring

### **MATH 121: Precalculus**

A review of basic properties of functions including their domain, range, graphs, and relationship to their inverse functions with an emphasis on exponential and logarithmic functions and their applications. An introduction to trigonometry including basic definitions of the trigonometric functions and their properties, identities, and specific trigonometric formulae such as addition and subtraction, double-angle, and half-angle. Applications to triangles are covered utilizing the laws of sines and cosines. Other topics such as polar coordinates and conic sections are presented. This course includes an introduction to sequences, series, limits, and aspects of calculus.

Credits: 3

Prerequisites: Aleks Placement Test Score of 61-75, or a high school Algebra II course with a grade of at least a B along with an SAT mathematics score of at least 530 or an ACT mathematics score of at least 21, or MATH 110 with a grade of C- or higher, or permission of the department.

Program: **Mathematics**

Semester Offered: Spring

### **MATH 131: Applied Mathematics**

This course covers topics from number concepts and operations, patterns and algebra, geometry and measurement, and probability and statistics with an emphasis on problem solving in the real world. The course covers fundamental aspects of mathematics as required by the Texas Department of Education.

Credits: 3

Prerequisites: Aleks Placement Test Score of 46-60 or an SAT mathematics score of at least 530 or an ACT mathematics score of at least 21 or MATH 013 with a grade of C- or higher or permission of the department.

Program: **Mathematics**

Semester Offered: Spring

### **MATH 141: Introduction to Probability and Statistics**

An introduction to the statistical processes of sampling, descriptive statistics, presentation of data, and inferential statistics. Included are elements of probability, discrete and continuous random variables, and the probability basis for hypothesis testing. Specific statistical techniques and concepts include use of the normal distribution, the t-distribution,  $\chi^2$  distribution, analysis of variance, correlation, and linear regression.

Credits: 3

Prerequisites: Aleks Placement Test Score of 46-60 or an SAT mathematics score of at least 530 or an ACT mathematics

score of at least 21 or MATH 013 with a grade of C- or higher or permission of the department.

Program: [Mathematics](#)

Semester Offered: Fall Spring

### **MATH 181: Calculus I**

A study of algebraic and transcendental functions of one variable, limits, continuity, differentiation, integration, and applications of derivatives and integrals.

Credits: 4

Prerequisites: Aleks Placement Test Score of 76-100 or MATH 121 with a grade of C- or higher or a high school precalculus with a grade of at least a B and permission of the instructor.

Program: [Mathematics](#)

Semester Offered: Fall

### **MATH 182: Calculus II**

A study of the calculus of transcendental functions, introduction to differential equations, applications of integration, techniques of integration, and infinite series.

Credits: 4

Prerequisites: MATH 181 with a grade of C- or higher

Program: [Mathematics](#)

Semester Offered: Spring

### **MATH 283: Calculus III**

A study of vectors in two and three dimensions, motion in space, polar, cylindrical and spherical coordinate systems, functions of several variables, partial derivatives, multiple integrals, and differentiation and integration in scalar and vector fields.

Credits: 4

Prerequisites: MATH 282 with a grade of C- or higher

Program: [Mathematics](#)

Semester Offered: Fall

### **MATH 298: Individual Study Topics**

Designed for the student who wishes to do independent study or research. Content and method of study must be arranged prior to registration. May be repeated for a total of 2 credits.

Credits: 1 - 2

Prerequisites: Approval by the department chair

Program: [Mathematics](#)

### **MATH 299: Directed Group Study Topics**

Provides academic departments an opportunity to offer courses in specialized or experimental areas, either lower or upper division, not listed in the undergraduate *Bulletin*. May be repeated for a total of 3 credits.

Credits: 1 - 3

Prerequisites: Approval by department chair

Program: [Mathematics](#)

### **MATH 311: Logic and Set Theory**

An introduction to mathematical proofs, elementary logic, sets, equivalence relations, and functions. The emphasis is on understanding and writing of proofs. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: Math 182 with a grade of C- or higher

Program: [Mathematics](#)

Semester Offered: Fall Spring

### **MATH 321: Differential Equations**

This is a study of ordinary differential equations with emphasis on the analytic methods for solving them. This course covers

first-order differential equations, higher-order differential equations, modeling with differential equations, system of linear differential equations, series solutions, and Laplace transforms. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: [MATH 182](#)

Program: [Mathematics](#)

Semester Offered: Spring

### **MATH 322: Partial Differential Equations**

Partial differential equations, Fourier series, boundary value problems, Bessel functions, Legendre polynomials. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: [MATH 321](#)

Program: [Mathematics](#)

Semester Offered: Fall, even years

### **MATH 341: Geometry**

This course is a study of Euclidean and non-Euclidean geometry. The course is taught within a historical context with a chronological introduction to the history of geometry. The mathematics from ancient times to calculus, together with selected topics from the history of modern mathematics. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: [MATH 311](#)

Program: [Mathematics](#)

Semester Offered: Fall, odd years

### **MATH 361: Introduction to Linear Algebra**

An introduction to vector spaces and matrix theory over the field of real numbers.

Credits: 3

Prerequisites: [MATH 283](#) [MATH 311](#) also recommended.

Program: [Mathematics](#)

Semester Offered: Spring odd years

### **MATH 371: History of Mathematics**

A survey of the development of classical mathematics from ancient times to calculus, together with selected topics from the history of modern mathematics. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: [MATH 182](#) [MATH 311](#) also recommended.

Program: [Mathematics](#)

Semester Offered: Fall, odd years

### **MATH 381: Complex Variables**

This course is a study of analytic functions, power series, calculus of residues, and conformal mappings. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: [MATH 283](#) [MATH 311](#)

Program: [Mathematics](#)

Semester Offered: Spring even years

### **MATH 411: Numerical Analysis with Application**

This is a course in numerical methods for solving mathematical problems. It covers solution of linear equations, roots of polynomial equations, interpolation and approximation, numerical differentiation and integration, solution of ordinary differential equations, and error analysis. The writing of computer programs for solving problems is a part of the course. Offered via Southwestern's virtual classroom from [Southern Adventist University](#).

Credits: 3

Prerequisites: **MATH 182 MATH 311** And knowledge of a computer programming language (CSIS 110 is recommended).

Program: **Mathematics**

Semester Offered: Spring odd years

### **MATH 431: Abstract Algebra**

A study of the abstract systems: groups, rings, fields, and integral domains. Offered fall odd years via Southwestern's virtual classroom from **Southern Adventist University**.

Credits: 3

Prerequisites: **MATH 311**

Program: **Mathematics**

Semester Offered: Fall, odd years

### **MATH 441: Calculus-Based Probability Theory**

A study of the basic ideas of probability theory, discrete and continuous random variables, and their distributions. Offered fall, even years via Southwestern's virtual classroom from **Southern Adventist University** and fall, odd years via Southwestern's virtual classroom from Union College, NE.

Credits: 4

Prerequisites: **MATH 182**

Program: **Mathematics**

Semester Offered: Fall

### **MATH 442: Actuarial Exam P Preparation**

This course prepares students to take Exam P from the Society of Actuaries. Offered via Southwestern's virtual classroom from Union College, NE.

Credits: 3

Prerequisites: **MATH 441**

Program: **Mathematics**

Semester Offered: Spring even years

### **MATH 461: Number Theory**

A study of topics including Diophantine equations, congruences, prime numbers, and applications. Emphasis is placed on proving theorems.

Credits: 3

Prerequisites: **MATH 182 MATH 311**

Program: **Mathematics**

Semester Offered: Spring, Even Years

### **MATH 471: Real Analysis**

This is a study of functions of one real variable, and the conditions for differentiability and for integrability of these functions. Emphasis is placed on proving theorems. Offered fall even years via Southwestern's virtual classroom from **Southern Adventist University**.

Credits: 3

Prerequisites: **MATH 283 MATH 311**

Program: **Mathematics**

Semester Offered: Fall, even years

### **MATH 484: Mathematics Seminar**

Oral presentation of research papers or articles from the variety of topics in mathematics.

Credits: 1

Prerequisites: Senior level standing

Program: **Mathematics**

Semester Offered: Fall

**MATH 485: Portfolio**

This course fulfills the requirement for a capstone/portfolio completion course.

Credits: 1

Prerequisites: **MATH 484**

Program: **Mathematics**

Semester Offered: Spring

**MATH 498: Individual Study Topics**

Designed for the student who wishes to do independent study or research as well as a mathematics lecture based course covering a topic not routinely offered. Content and method of study must be arranged prior to registration. May be repeated for a total of 3 credits.

Credits: 1 - 3

Prerequisites: Approval by the department chair

Program: **Mathematics**

**MATH 499: Directed Group Study Topics**

Provides academic departments an opportunity to offer courses in specialized or experimental areas, either lower or upper division, not listed in the undergraduate *Bulletin*. . May be repeated for a total of 3 credits.

Credits: 1 - 3

Prerequisites: Approval by department chair

Program: **Mathematics**