

Mathematics

Mathematics Degrees and Certificates

The Mathematics Major (BA)

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Mathematics is the language of nature, the Rosetta stone by which we come to understand the inner structure and form of our universe. It is also the language of computers and the key to the burgeoning Information Age. As a tool for understanding the world, it is perhaps the oldest and most enduring— and still, today, one of the most dynamic and exciting. Students in the mathematics major develop an understanding of mathematics as a vital tool of the mind.

The mathematics major is both rigorous and flexible. It provides students a foundation upon which to pursue graduate studies in mathematics or professional training in areas such as law or engineering while permitting them the flexibility to pursue minors in other liberal arts disciplines and to prepare themselves to teach in secondary school. Graduates receive a Bachelor of Arts degree in mathematics.

Students who wish to teach secondary school mathematics must satisfy admission requirements for the Liberal Arts Teacher Education Concentration (LATEC) and complete the general education core and education theory curriculum in the secondary education certification program. Additionally, prospective mathematics teachers must take MTH 400, which may be used as a general elective but not as a mathematics elective. We recommend that prospective mathematics teachers take MTH 360 and 380 as mathematics electives.

NOTES

MTH 210 may be used to satisfy core requirements.

MTH 400 may NOT be used to satisfy the Mathematics Elective requirement.

PHY 240, 241, 250, and 251 are recommended general electives.

NOTE: To graduate with a Bachelor of Arts or Bachelor of Science degree from Lyon College, students must successfully complete a minimum of 120 semester credit hours comprised of our required Core curriculum (44-48 hours), the requirements of at least one major (credit hours vary per major), and a selection of our Liberal Arts electives. They must also earn at least a 2.00 cumulative grade point average for all work taken at Lyon College and a 2.00 cumulative grade point average in their major, minor, and concentration

Program: Mathematics

Summary of Requirements for a Major in Mathematics

Item #	Title	Credits
MTH 210	Calculus I	4
MTH 220	Calculus II	4
MTH 230	Calculus III	4
MTH 290	Foundations of Modern Mathematics	3
MTH 300	Differential Equations	3
MTH 330	Linear Algebra	3
MTH 420	Abstract Algebra I	3
MTH 440	Advanced Calculus I	3
	Mathematics Major Electives (9 credits)	9
	CSC 100 or CSC 115	3

CORE CURRICULUM

Item #	Title	Credits
	Core Curriculum Requirements (In addition to Major hours)	44-48
	Total credits:	83-87

Category Descriptions

Mathematics Major Electives (9 credits)

Select three mathematics courses at the 300/400 level. MTH 400 may not be used for this requirement.

CSC 100 or CSC 115

Item #	Title	Credits
CSC 100	Introduction to Programming in C++	3
CSC 115	Introduction to Programming in Java	3

Core Curriculum Requirements (In addition to Major hours)

Developmental requirements (up to 6 credits):

Taken in the first semester, if placed into it:

- ENG 001 College English

Taken in the first year, if placed into it:

- MTH 001 Intermediate Algebra

Proficiency requirements (15 credits):

Taken in the first two years, if not placed out of it:

- MTH 101 College Algebra **or**
- MTH 103 College Algebra w/Lab **or**
- MTH 105 Mathematics for Liberal Arts

Taken in the first year (depending on placement):

- ENG 101 English Composition I (taken immediately if placed into it or immediately following completion of ENG 001 with a grade of 'C' or better)
- ENG 102 English Composition II (taken immediately following successful completion of ENG 101 with a grade of 'C' or better)

Recommended but not required in the first year:

- First year of a foreign language

Common Core requirements (13-14 credits):

Taken in the first year (or within one year of completing any pre-requisite coursework):

- COR 100 Year One
- COR 101 Strategies for College Success

Taken anytime in the first TWO years:

- ENG 105 World Literature
- POL 105 The American Experience

Taken anytime prior to graduation:

- HIS 110 World Civilization
- HIS 112 World Civilization II

Distribution requirements:

One fine arts course (3 credits)

Select from the following:

- ART 101 Introduction to Visual Arts
- ART 201, 202 World Art I and II
- MUS 105 Language of Music
- MUS 110 Music Theory
- THE 101 Introduction to Theatre

One social science course (3 credits)

Select from the following:

- ANT 101 Introduction to Cultural Anthropology
- ECO 101 Principles of Economics I
- PSY 101 Introduction to Psychology

One mathematics course (3-4 credits)

Select from the following:

- MTH 105 Mathematics for Liberal Arts
- MTH 110 Elementary Functions
- MTH 115 Discrete Mathematics **or** MTH 290 Foundations of Modern Mathematics
- ECO 208 Quantitative Methods in Business, Economics, and Decision Science
- MTH 210 Calculus I
- BUS 323 Statistical Applications to Business Decision Making

- PSY 235 Statistics for the Behavioral Sciences

One lab science course (4 credits)

Select from the following:

- BIO 100, 100L Biology in Context
- BIO 110, 110L Principles of Biology I
- CHM 105, 105L Introduction to Chemistry
- CHM 110, 110L General Chemistry I
- PHY 210, 211 General Physics
- PHY 240, 241 Fundamentals of Physics
- SCI 100, 100L Physical Science for Liberal Arts

One religion/philosophy course (3 credits)

Select from the following:

- RPH 110 Old Testament
- RPH 120 New Testament
- RPH 130 Introduction to Christian Theology
- RPH 140 Introduction to World Philosophies
- RPH 150 World Religions
- RPH 205 Introduction to Ethics

Two physical education courses (0-2 credits)

Select from the following:

- PED courses with designations from 101 to 130
- OLP courses with designations from 120 to 130

NOTE: Only one activity (specified PED/OLP) course can be taken per semester. Additionally, only seven activity credits can be counted toward the graduation requirement.

The Mathematics Minor

The mathematics minor is a course of study designed as a second field for students who wish to develop their understanding of mathematics as a tool of the mind.

NOTES

Students may use MTH 210 to satisfy core requirements.

MTH 400 may NOT be used to satisfy the Mathematics Elective

In the list of elective options, CSC 310 has MTH 115 or MTH 290 as a prerequisite.

Program: Mathematics

Summary of Requirements for a Minor in Mathematics

Item #	Title	Credits
MTH 210	Calculus I	4
MTH 220	Calculus II	4
	Mathematics Electives (9-10 credits)	9-10
	CSC 100 or CSC 115	3
	Total credits:	20-21

Category Descriptions

Mathematics Electives (9-10 credits)

Three of the following:

Item #	Title	Credits
MTH 230	Calculus III	4
MTH 290	Foundations of Modern Mathematics	3
MTH 300	Differential Equations	3
MTH 330	Linear Algebra	3
MTH 360	Probability and Statistics	3
MTH 380	Modern Geometry	3
MTH 415	Numerical Analysis	3
MTH 420	Abstract Algebra I	3
MTH 440	Advanced Calculus I	3
MTH 445	Special Topics	3
CSC 310	Mathematical Foundations of Computer Science	3

CSC 100 or CSC 115

Item #	Title	Credits
CSC 100	Introduction to Programming in C++	3
CSC 115	Introduction to Programming in Java	3

Mathematics (MTH) Classes

MTH 001: Intermediate Algebra

This course prepares students for College Algebra. Coverage will include basic algebraic operations, polynomials, rational expressions, exponents and radicals, linear equations, quadratic equations, radical equations, absolute value equations, solving inequalities, functions, and graphing. This course may NOT be used to satisfy mathematics proficiency at Lyon College and it does NOT count toward the 120 hours necessary to graduate. It DOES count in a student's course load and DOES count toward a student's GPA. Students who earn less than a 'C' grade in this course must repeat it.

Credits: 3

Prerequisites:

Math ACT of 17 or above.

MTH 101: College Algebra

A review of algebra and the study of functions, including the polynomial, rational, exponential, and logarithmic functions and their graphs.

Credits: 3

Prerequisites:

MTH 001

or Math ACT of 22 or above.

MTH 103: College Algebra with Lab

An extended review of algebra and the study of functions, including polynomial, rational, exponential, and logarithmic functions and their graphs.

Credits: 3

Prerequisites:

MTH 001

Or Math ACT of 19 or above.

MTH 105: Math for Liberal Arts

Exponential growth and decay, simple interest, compound interest, inflation, loans, combinations, permutations, probability, odds, expectation, frequency distributions, descriptive statistics, and the normal distribution.

Credits: 3

Prerequisites:

MTH 101

Or Math ACT of 19 or above.

MTH 110: Elementary Functions

Exponential, logarithmic, and trigonometric functions and elementary matrix theory including determinants and systems of equations in preparation for calculus.

Credits: 3

Prerequisites:

MTH 101

Or MTH 103

MTH 115: Discrete Mathematics

Sets and set operations, combinatorics, and elements of graph theory.

Credits: 3

Prerequisites:

MTH 101

Or MTH 103

MTH 210: Calculus I

Limits, differentiation, and integration of algebraic, trigonometric, logarithmic, and exponential functions with their applications.

Credits: 4

Prerequisites:

MTH 110 or permission of instructor.

MTH 220: Calculus II

Applications and techniques of integration, sequences, infinite series, and transcendental functions.

Credits: 4

Prerequisites:

MTH 210 or permission of instructor.

MTH 230: Calculus III

Vectors and polar coordinates, functions of several variables, partial differentiation, multiple integration, and line integrals, as well as Green's Theorem, Stokes' Theorem, and Gauss' Theorem.

Credits: 4

Prerequisites:

MTH 220 or permission of instructor.

MTH 290: Foundations of Modern Mathematics

An introduction to the method of formal proof. Topics include logic, set theory, relations, functions and cardinality.

Credits: 3

Prerequisites:

MTH 210 or permission of instructor.

MTH 300: Differential Equations

Ordinary differential equations and Laplace transforms.

Credits: 3

Prerequisites:

MTH 220

MTH 330: Linear Algebra

Algebra of finite dimensional linear spaces, linear transformations and matrices, eigenvalues, and eigenvectors.

Credits: 3

Prerequisites:

MTH 220

MTH 360: Probability and Statistics

Elementary probability, distribution functions, sampling, and testing statistical hypothesis.

Credits: 3

Prerequisites:

MTH 220

MTH 380: Modern Geometry

Euclidean and non-Euclidean geometries.

Credits: 3

Prerequisites:

MTH 290

MTH 400: Secondary Methods in Mathematics

Preparation of mathematics students for their roles as secondary mathematics teachers.

Credits: 3

MTH 415: Numerical Analysis

Error analysis, interpolation, approximate differentiation, approximate integration, solutions to differential equations, matrix manipulation, and solutions to systems of linear equations. (Same as CSC 415)

Credits: 3

Prerequisites:

MTH 300 and CSC 100 or CSC 115

MTH 420: Abstract Algebra I

An introduction to the algebraic structure of the integers and groups, including equivalence relations, subgroups, normal subgroups, homomorphisms, Lagrange's theorem, and Sylow's theorem.

Credits: 3

Prerequisites:

MTH 290 and 330 or permission of instructor.

MTH 421: Abstract Algebra II

A continuation of MTH 420, including rings, fields, Galois theory, and solvability by radicals.

Credits: 3

Prerequisites:

MTH 420

MTH 440: Advanced Calculus I

The real numbers; series; continuous, uniformly continuous, differentiable, and integrable functions; sequences; compact sets; the Heine-Borel theorem; the Bolzano-Weierstrass theorem; limits; and the fundamental theorem of calculus.

Credits: 3

Prerequisites:

MTH 220 and 290

MTH 441: Advanced Calculus II

A continuation of MTH 440 to multivariate calculus, including sequences and series of functions, uniform convergence and power series, partial derivatives, the Inverse and Implicit Function Theorems, and multiple integrals.

Credits: 3

Prerequisites:

MTH 440

MTH 445: Special Topics

An exploration of one or more advanced undergraduate topics in mathematics not included in the list of courses in the catalog. The course name and appropriate prerequisites will be announced well in advance.

Credits: 3

MTH 447: Mathematics Seminar

Taken in the senior year, resulting in a paper to be presented to the faculty.

Credits: 1-4

MTH 450: Independent Study

Individual work on special topics in mathematics.

Credits: 1-4