Mathematics

Mathematics

Mathematics Degrees

Math Major: Actuarial Science Track [BA]

Associate Professors: Jeremy Chapman and Tharanga Wijetunge
Assistant Professor: Wesley Perkins
Director of Developmental Mathematics: Meredith Wright

Actuaries use mathematics, statistics, and financial theory to assess the risk of potential events, and they help businesses and clients develop policies that minimize the cost of that risk.

Individuals with this degree can find stable employment in private corporations, investment firms, banks, consulting agencies, insurance carriers, and government offices. Typically employed as an Actuary, folks with a bachelor's in Actuarial Science can also pursue careers as Data Analysts or other related occupations.

According to the Bureau of Labor Statistics (BLS), the median salary for an Actuary in 2020 was $111,030, and the number of jobs in Actuarial Science is expected to grow 18% from 2019 to 2029 - driven by the changing needs of the insurance industry.

* Students may use ECO 101 and MTH 210 to satisfy core requirements.

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.

Summary of Requirements for a Major in Math: Actuarial Science Track

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
	CSC Elective Group: Actuarial Science Track	3
MTH 225	Mathematical Theory of Interest	3
	Math Elective Group: Actuarial Science Track	3
MTH 425	Actuarial Science and Risk Management with R	3
DSC 105	Introduction to Data Science	3
DSC 205	Introduction to Advanced Data Science	4
ECO 101	Principles of Economics I	3
ECO 102	Principles of Economics II	3
ACC 210	Financial Accounting	3

CORE CURRICULUM

Item #	Title	Credits
	Core Curriculum Requirements (In addition to Major hours)	44-48
	Total Credits	**99-103**

CSC Elective Group: Actuarial Science Track

Choose one of the following:

Item #	Title	Credits
CSC 100	Introduction to Programming in C++	3
CSC 109	Introduction to Programming in Python	3
CSC 115	Introduction to Programming in Java	3

Math Elective Group: Actuarial Science Track

Choose one of the following:

Item #	Title	Credits
MTH 325	Probability for Actuaries	3
MTH 360	Probability and Statistics	3

Mathematics Major (BA)

Associate Professors: Jeremy Chapman and Tharanga Wijetunge
Assistant Professor: Wesley Perkins
Director of Developmental Mathematics: Meredith Wright

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.

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, CSC 109, or CSC 115	3

CORE CURRICULUM

Item #	Title	Credits
	Core Curriculum Requirements (In addition to Major hours)	44–48
	Total Credits	**83–87**

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, CSC 109, or CSC 115

One of the following:

Item #	Title	Credits
CSC 100	Introduction to Programming in C++	3
CSC 109	Introduction to Programming in Python	3
CSC 115	Introduction to Programming in Java	3

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.

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, CSC 109, or CSC 115	3
	Total Credits	**20-21**

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, CSC 109, or CSC 115

One of the following:

Item #	Title	Credits
CSC 100	Introduction to Programming in C++	3
CSC 109	Introduction to Programming in Python	3
CSC 115	Introduction to Programming in Java	3

Mathematics (MTH) Courses

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 001
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 225: Mathematical Theory of Interest

Actuaries focus on using math and statistics to evaluate risk and make strategic decisions. This course covers a range of topics relevant to actuaries, including measurement of interest rates, interest theory, and the pricing of bonds, mortgages, annuities, and other financial instruments. This course will also fully cover all content required by the Society of Actuaries Financial Mathematics (FM) Exam and its equivalents. This online class has optional live sessions.
Credits 3
Prerequisites
MTH 210

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 325: Probability for Actuaries

Actuaries and quantitative professionals deal primarily in probabilities. This course will cover a wide range of topics and introduce you to core probability concepts needed for actuarial and quantitative work. You will be able to apply to concepts of probability to real-world scenarios. This course will also fully cover all content required by the Society of Actuaries P Exam and its equivalents. This online class has optional live sessions.

Credits 3
Prerequisites
MTH 210
MTH 220
MTH 230

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

CSC 100, CSC 109, or CSC 115 and MTH 300

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 425: Actuarial Science and Risk Management with R

This course focuses on team-based problem solving in actuarial science & risk management. Students will learn the fundamentals of the R programming language, RStudio and R Markdown, and use these tools to complete a range of projects. Projects vary, but may include bond and loan amortization, analysis of the efficient frontier and the capital asset pricing method, insurance liability & estimates of expected loss. This course culminates in a capstone project that ties together skills from throughout the Actuarial Sciences program.
Credits 3
Prerequisites
MTH 210, MTH 225, and either CSC 100, CSC 109, or CSC 115

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