
Mathematics (major and minor)

Department of Mathematics and Computer Science:

Richard A. Jacobson, chair

Faculty: Kristin A. Camenga, Wei Hu, Richard A. Jacobson, Jill E. Jordan, Rebekah B. Yates

Web site: www.houghton.edu/academics/programs/math-computer-science/default.htm

Phone: 585.567.9280

Major: (36 hours*)

**If a student takes a Mayterm course worth only 3 credit hours, s/he may complete the major with only 35 hours rather than the normal 36 hours.*

Required courses

MATH 180 Calculus and Its Origins <i>or</i>	
MATH 181 Calculus I.....	4
MATH 182 Calculus II <i>or</i>	
MATH 183 Science Honors Calculus.....	4
MATH 210 Introduction to Proofs	2
MATH 261 Linear Algebra.....	4
MATH 482 Senior Capstone: Mathematics Seminar	4
Choose one course from:.....	4
MATH 422 Real Analysis	
MATH 462 Algebra I	
Choose one course from:.....	2 or 4
MATH 214 Discrete Math (2 hours)	
MATH 231 Probability	
MATH 251 Modern Geometries	
Choose electives from any MATH 200 or above course or CSCI 211 for a total of 36 hours.....	10-12

It is highly recommended that teachers of math choose

- MATH 251 Modern Geometries
- MATH 281 History of Mathematics
- MATH 422 Real Analysis
- MATH 462 Algebra I

Very often, math majors will take more math courses than the preceding minimum requirement. This is especially true for those planning to go to graduate school.

Teaching Mathematics – Inclusive Childhood (Elementary) or Adolescence (Secondary): See Education.

Minor: (16 hours numbered 180 or above)

General Information

Many of our graduates enter the teaching profession. However, math majors are also well prepared to pursue graduate work in engineering, computer science, law, theology, and the medical profession, as well as mathematics. Most of our students who complete a PhD program in mathematics are now college professors. Those who do not pursue an advanced degree find employment in a multitude of fields, ranging from the banking profession to Bible translators with Wycliffe. A number of our math majors find careers in the computer field.

Course Descriptions

MATH 115 Introduction to Calculus (4, F&S)
A contemporary approach to the basic ideas of calculus, beginning with a discussion of topics that precede calculus, including linear, polynomial, and exponential functions. The calculus portion discusses velocity, tangent lines, and areas. Incorporates peer group work with a strong emphasis on graphing technology. With this course, students will become acquainted with calculus, the math that helped create the industrial revolution and is the driving force behind modern technology. Enrollment by permission only. Math IS.

MATH 180 Calculus and Its Origins (4, OD)
Covers content of Calculus I from a historical perspective. A survey of the line of mathematical thought that began in ancient Greece and culminated with the discovery of calculus in Europe in the late 1600's, including investigations into: number theory, induction, proportion, logic, curvature, area and volumes, motion, limits, and the infinite. Prerequisite: MATH 115 or equivalent proficiency. Math IS.

MATH 181 Calculus I (4, F&S)
Single variable calculus of algebraic and trigonometric functions. Applications involving maximum, minimum, and related rates. Intensive use of graphing calculators and computer software. Prerequisite: MATH 115 or equivalent proficiency. Math IS.

MATH 182 Calculus II (4, F&S)
Areas, volumes, centroids, integration techniques, calculus of transcendental functions, polar coordinates, parametric equations, infinite series. Prerequisite: MATH 180 or 181. Math IS.

MATH 183 Science Honors Calculus (4, F)
An accelerated study of calculus using a historical perspective. Investigates problems of motion, curvature, area and volumes, and the infinite that were first posed by the ancient Greeks. Explores the tools of limits, derivatives, integrals, and the infinite series that mathematicians developed to solve these problems in the late 1600s and 1700s. Reserved for first-year Science Honors students. Math IS.

MATH 210 Introduction to Proofs (2, F&S)
Introduces the central idea of proof in mathematics and some standard proof formats that are used throughout the math major. The course includes propositional logic, an introduction to predicate logic, direct proof, proof by contradiction, and mathematical induction.

MATH/CSCI 214 Discrete Mathematics (2, F09, F11)
Topics include: sets, functions, relations (incl. Partial order), methods of propositional logic, introduction to predicate logic, counting, recurrence relations, asymptotic analysis, proof (incl. Induction), introduction to probability, graphs.

MATH 231 Probability (4, F09, F11)
Combinatorics, independence, conditional probability, discrete and continuous random variables, expected value and variance. Prerequisite: MATH 182.

MATH 232 Mathematical Statistics (4, S11)
Probability theory, random variables, sampling, estimation, hypothesis testing and linear regression. This course emphasizes the mathematical rather than the applied features of statistics. Prerequisite: MATH 182.

MATH 241 Differential Equations (4, F)
Methods of solution and applications of principle types of differential equations. Prerequisite: MATH 182.

MATH 251 Modern Geometries (4, S11, S13)
A survey of geometry including advanced Euclidean geometry and an introduction to non-Euclidean geometries. Prerequisite: MATH 182.

MATH 261 Linear Algebra (4, F&S)
Linear algebra: vector spaces, linear mappings, inner products and matrices. Prerequisite: MATH 180 or 181.

MATH 281 History of Mathematics (3, M)
A contextual study of the history of mathematics and some of the classical problems. Prerequisite: MATH 182.

MATH 321 Multivariate Calculus (4, F09, F11)
Infinite series, space geometry, vectors, vector function, function of several variables, partial differentiation, multiple integration. Prerequisite: MATH 182.

MATH 331 Numerical Analysis (3, S11, S13)
Representation of numeric data. Error analysis, mathematical basis, and limitations of techniques relating to selection of method. Topics: linear and nonlinear systems, curve fitting, numerical calculus, programming in MatLab. Prerequisite: MATH 181, 182, 261, CSCI 211.

MATH 393 Summer Collaborative Research in Mathematics (1-4, summer)
Summer research in collaboration with a mathematics faculty member, focusing on a current area of mathematical research. Students work intensively with a faculty member over the course of four weeks during the summer. Prerequisites will be according to the chosen area of research.

MATH 422 Real Analysis (4, S10, S12)
Structure of the real number system, theory of limit, continuity, differentiation, Riemann integration, and infinite series. Prerequisites: MATH 321 and MATH 261, or permission.

MATH 452 Point Set Topology (4, OD)
Open and closed sets. Connected, compact, and metric topological spaces. Prerequisite: MATH 261.

MATH 462 Algebra I (4, S11)
Groups, Sylow theorems, rings and fields. Prerequisite: MATH 261.

MATH 471 Complex Analysis (4, S11)
Complex number system, limits, differentiation and integration in the complex plane, complex series. Prerequisites: MATH 321 and MATH 261, or permission.

MATH 482 Senior Capstone: Mathematics Seminar (4, S)
A capstone course which draws on many other courses. Emphases on formulating, solving, and explaining challenging problems in both verbal and written form. For seniors, except by permission.

MATH 391, -2; 491, -2 Independent Study (1, 2, 3 or 4)

MATH 295, -6; 395, -6; 495 Special Topics in Mathematics (1, 2, 3 or 4)
A survey of topics not covered in other mathematics classes, including graph theory, computation theory, infinite cardinalities, and Galois theory. Phi, pi, e and i; mathematical modeling; math and programming.

MATH 496 Honors in Mathematics (4)

Medical Technology - with a major in Biology (BS)

Department of Biology: Matthew K. Pelletier, chair

Faculty: As determined by chair.

Adjunct Faculty: Joseph T. King, Brian Spezialetti

Web site: www.houghton.edu/academics/programs/biology/med_tech2.htm

Phone: 585.567.9280

The program in medical technology which leads to a BS in biology requires that the student complete 94 hours of course work at Houghton College and then transfer to Robert Packer Hospital (Sayre, PA) or another approved program to complete a major in biology and a minor in chemistry.

The following courses must be taken at Houghton:

All integrative studies requirements

BIOL 151, 152 General Biology	8
BIOL 242 Microbiology	4
BIOL 251 Genetics	4
BIOL 365 Immunology	4
CHEM 151, 152 General Chemistry	4,4
CHEM 241 Organic Chemistry I	4
CHEM 277 Analytical Chemistry.....	4
MATH 115 Intro to Calculus.....	4

Or

MATH 180 Calculus and Its Origins or	
MATH 181 Calculus I.....	4

If a student plans to attend a non-affiliated medical technology program, s/he must petition for approval of the program during his/her junior year. Enrollment in hospital programs is limited by small class