

# Mathematics

## Learning Goals

### Analytical skills

1. To understand the role of axioms and assumptions in the formulation of mathematical definitions and theorems.
2. To understand the basic rules of logic and to acquire the ability to follow the logical flow of proofs.
3. To understand how to distinguish a coherent mathematical argument from a fallacious one.
4. To understand the core concepts of analysis and algebra (for graduates in the mathematical options), or key techniques of applied mathematics and the ability to analyze mathematical models (for graduates in mathematical sciences option).

### Problem-solving and modeling skills (important for all, but especially for majors in mathematical sciences)

1. To be able to recognize which real-world problems are subject to mathematical reasoning.
2. To be able to make vague ideas precise by representing them in mathematical notation, when appropriate.
3. To be able to use a variety of techniques for solving problems expressed in mathematical notation.

## About the major

The goal of the Department of Mathematics is to instill within our students a deep appreciation of the beauty and usefulness of mathematical reasoning and its myriad contributions to our understanding of the natural and intellectual world.

Through the study of formal mathematical theories, our students strengthen their critical reasoning skills and deepen their mathematical knowledge. While working on a variety of projects and problems, students develop a broad set of quantitative and qualitative problem-solving skills. Toward this end we offer a wide variety of courses touching all the main areas of modern pure and applied mathematics. Courses such as real and complex analysis, linear and abstract algebra, geometry and topology, graph theory and combinatorics, probability and statistics, mathematical modeling, and operations research, among others, provide a rich mathematical experience.

We are always happy to support

students' mathematical learning and to help them choose the right set of courses to meet their academic and career goals.

The Department of Mathematics offers courses in a variety of areas within the mathematical sciences. These areas include analysis, algebra and number theory, topology, geometry, applied mathematics, probability and statistics, graph theory and combinatorics, and mathematical modeling.

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*“As I find myself analyzing innumerable problems that come in a variety of forms, my math major has provided me the versatile ability to break down complex questions, consider multiple angles, and develop rigorous answers.”*

—David Chen '14  
MBA/MPH Candidate,  
Yale University

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## Reasons you might choose this major

- You are interested in patterns and the abstract structures that make everything go; whether these structures involve numbers, motion, interaction, or shape, they play a key role in the physical and human world that surrounds us.
- As you progress through the major, you'll be able to encounter different sorts of mathematical structures and work to precisely define and reason with them—not merely to sort out or argue about what's true and what's false, but to explicitly prove your statements at the level of mathematical rigor (the common phrases “mathematically eliminated” or “mathematically possible” paint the right picture).
- The skills you learn will help to hone your analytical skills in preparation for whatever you encounter in the future. Mathematics majors go on to graduate school, law school, or medical school; they go on to teach or to work in the financial or consulting industry; or they might do something completely different, equipped with a unique set of skills to attack whatever problem comes their way.



## Translating Learning into Professional Competencies

Throughout your time at Middlebury, you will develop and enhance the following core professional competencies, skills, and dispositions highly valued by employers that will prepare you for leadership and success in any given field:

**Critical Thinking:** Exercise sound reasoning to analyze issues, make decisions, and overcome problems.

**Oral/Written Communications:** Articulate thoughts and ideas clearly and effectively in written and oral forms.

**Teamwork/Collaboration:** Build collaborative relationships with colleagues and customers from diverse backgrounds.

**Leadership:** Leverage the strengths of others to achieve common goals, and use interpersonal skills to coach and develop others.

**Professionalism/Work Ethic:** Demonstrate personal accountability and effective work habits.

**Global/Intercultural Fluency:** Value, respect, and learn from diverse cultures, races, ages, genders, sexual orientations, and religions.

**Digital Technology:** Leverage existing digital technologies ethically and efficiently to solve problems, complete tasks, and accomplish goals.

**Career Management:** Identify and articulate one's skills, strengths, knowledge, and experiences relevant to career goals, and identify areas necessary for professional development.

## Where mathematics majors go

### Applying your learning through internships . . .

Students pursue internships and research in a variety of fields, enabling them to apply their liberal arts learning in real-world settings. Internships, research, and self-directed projects enrich your academic experience and help prepare you for life after Middlebury. Students have interned or done research at the following:

Quibbl

interConnect

Mathematics Department, UCLA

Analysis Group

Fudan University

NOAA-Modeling Climate Change Effects on Threatened Coral Species

The Data Mining Group at the Institute of Computer Science, Johannes Gutenberg Universitat

Nomura Securities

Morgan Stanley

Public Interest Law Center of Philadelphia

Basketball Prospectus

Moody's

Ecolé Polytechnique

Booz Allen Hamilton

Xactly Corporation

EuroConsult, Inc.

Oleet & Co.

Networkers North-South

Vision Finance Group

The Boston Red Sox

Colleges of Nanoscale Science and Engineering (SUNY Polytechnic Institute)

Breckenridge Capital Advisors

### . . . leading to meaningful, dynamic, and engaging career paths.

See just some of the many interesting ways our graduates have applied their liberal arts learning to engage the world. If you want to see what other Middlebury alumni are doing now, log into Midd2Midd and search by major. [go/midd2midd](#)

CBS Money, *Director*

Boston Scientific, *Senior Product Manager*

San Francisco Planning Department, *Urban Designer*

Microsoft Corporation, *Program Manager, Customer Engagement*

Capgemini, *MyLearning and University Information Systems Director*

U. S. Defense Department, *Computer Scientist*

The Hartford, *Regional Pricing Director, Personal Lines Actuarial*

Bandwidth.com, *Director, Solutions Planning*

The Carlyle Group, *Managing Director, Head of Asian Buyouts*

HighRes Biosolutions, *CEO*

Fred Hutchinson Cancer Research Center, *Staff Scientist (Biostatistician), Vaccine and Infectious*

National Renewable Energy Laboratory, *Senior Engineer*

Rady Children's Hospital, *Neonatal-Prenatal Physician*

CEEK Women's Health, *Founder and Managing Partner*

Acustrategy, *President*

U.S. Dept of the Treasury, *Research Economist*

Republic of Lithuania, *Advisor to the Minister of Economy*

A Little Tech, LLC, *Head of Engineering*

JP Morgan Chase & Co., *Applications Developer Lead, Vice President*

Committee Encouraging Corporate Philanthropy (CECP), *Manager, Standards and Measurement*

Datalogix, *Senior Analyst*

NERA Economic Consulting, *Economic Analyst-Securities and Finance*