Beyond the Curriculum

- Departmental Responsibilities
- Math as a Liberal Art
- Recruitment and Retention
- Articulation and Placement
- Assessment
- Technology and the Curriculum
- Undergraduate Research

Program Areas

- Biomathematics
- Actuarial Science
- Financial Mathematics
- Environmental Science
- Statistics
- Teacher Education
- Applied Mathematics
- Chemistry
- Physics
- Engineering
- Computing and Computational Science
- Social and Behavioral Sciences

Course Areas

- Abstract Algebra
- Linear Algebra
- Calculus
- Transitions to Proof
- Differential Equations (ordinary and partial)
- Probability and Stochastic Processes
- Statistics
- Real Analysis
- Complex Analysis
- Numerical Analysis
- Number Theory
- Geometry
- Topology
- Modeling
- Discrete Mathematics
- History of Mathematics

The *2015 CUPM Curriculum Guide* is prepared by the MAA's Committee on the Undergraduate Program in Mathematics with the support of the Mathematical Association of America, the National Science Foundation DUE-1228636, the Educational Advancement Foundation, and the professional advice of more than 250 mathematicians and scientists in the community.

The cognitive and content recommendations were approved by the MAA Board of Governors in August 2014. In addition, the Board re-affirmed the 2004 CUPM Principles.

Photo by Joseph Petrilo

CUPM Guide Steering Committee

Co-chairs: Carol Schumacher and Martha Siegel

Members: Betsy Yanik, David Bressoud, Jenna Carpenter, Michael Starbird, Alan Tucker

Editors: Paul Zorn and Harriet Pollatsek

This brochure is funded by NSF DUE-1228636.

MAA 100
MATHEMATICAL ASSOCIATION OF AMERICA
CELEBRATING A CENTURY OF ADVANCING MATHEMATICS

Designing a Major in the Mathematical Sciences

Photo by Dave Wagner

Introducing the

2015 CUPM Curriculum Guide to Majors in the Mathematical Sciences

MAA's Committee on the Undergraduate Program in Mathematics (CUPM) presents this *Guide* to the undergraduate mathematics curriculum. The *2015 Guide* has a special focus:

> How can this *CUPM Curriculum Guide* help departments design and maintain robust major programs? Individual course design and overall program structure must be considered together. We offer a general set of cognitive and content goals to aid this consideration. A successful major offers a program of courses that gradually and intentionally leads students from basic to advanced levels of critical and analytical thinking, while encouraging creativity and excitement about mathematics.

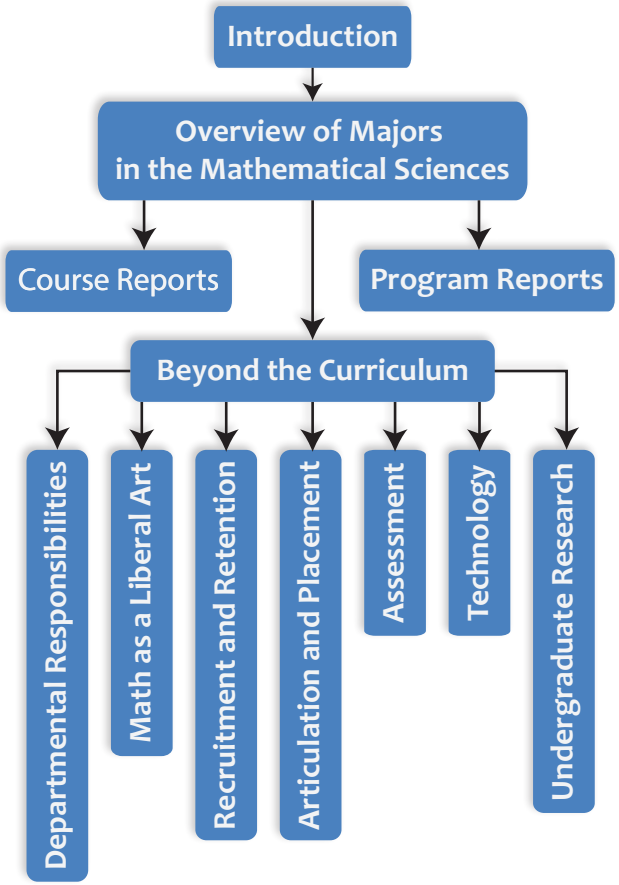
Now available at www.maa.org/cupm

General Principles

Major programs in the mathematical sciences should ensure that all students come to see mathematics as an engaging field, rich in beauty, with powerful applications to other subjects and to contemporary open questions.

Each department should create and maintain a community that welcomes and supports all students, including those from groups that have been traditionally underrepresented in mathematics.

The Guide consists of several parts as shown in the diagram. The entire Guide can be found online at www.maa.org/cupm. A printed short version is also available.



Program Recommendations

- A healthy mathematical sciences program should incorporate intentional evolution and continual improvement.
- Every mathematical sciences department should have and follow a strategic plan that acknowledges local conditions and resources, but is also informed by recommendations from the larger mathematical community.
- Planning and renewal should be guided by consultation both within the department and with outside stakeholders.
- Departments should assess their progress in meeting cognitive and content goals through systematic collection and evaluation of evidence.

Cognitive Recommendations

1. Students should develop effective thinking and communication skills.
2. Students should learn to link applications and theory.
3. Students should learn to use technological tools.
4. Students should develop mathematical independence and experience open-ended inquiry.

Content Recommendations

1. Mathematical sciences major programs should include concepts and methods from calculus and linear algebra.
2. Students majoring in the mathematical sciences should learn to read, understand, analyze, and produce proofs, at increasing depth as they progress through a major.
3. Mathematical sciences major programs should include concepts and methods from data analysis, computing, and mathematical modeling.
4. Mathematical sciences major programs should present key ideas and concepts from a variety of perspectives to demonstrate the breadth of mathematics.
5. All students majoring in the mathematical sciences should experience mathematics from the perspective of another discipline.
6. Mathematical sciences major programs should present key ideas from complementary points of view: continuous and discrete; algebraic and geometric; deterministic and stochastic; exact and approximate.
7. Mathematical sciences major programs should require the study of at least one mathematical area in depth, with a sequence of upper-level courses.
8. Students majoring in the mathematical sciences should work, independently or in a small group, on a substantial mathematical project that involves techniques and concepts beyond the typical content of a single course.
9. Mathematical sciences major programs should offer their students an orientation to careers in mathematics.