University at Buffalo
The State University of New York
Department of Mathematics
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Learning Objectives for Mathematics Majors

By the time of graduation, students majoring in mathematics should have acquired the following knowledge and skills:

1. Computational skills

a) Proficiency in basic computational methods in calculus, algebra, and differential equations.
b) Facility with computer-aided computations.

2. Analytical skills

a) An understanding of the basic rules of logic and proficiency in using them.
b) The ability to distinguish a coherent argument from a fallacious one.
c) The ability to derive general principles from examples.
d) The ability to formulate mathematical conjectures and to test them.
e) The ability to complete mathematical proofs.

3. Practical problem solving and mathematical modeling skills

a) The ability to relate mathematical concepts to problems arising in other disciplines.
b) The ability to represent problems and ideas precisely in mathematical terms.
c) The ability to identify facts and techniques relevant to a given problem, and proficiency in using them to solve the problem.

4. Research Skills

a) Comprehension of the general framework of mathematical research; an understanding of the role of axioms, assumptions, theorems, proofs, and conjectures.
b) A basic understanding of methods and the subject matter of various mathematical disciplines (analysis, algebra, applied mathematics, geometry and topology).
c) The ability to read mathematical texts independently.

5. Communication skills

a) The ability to present clearly mathematical concepts, statements, and arguments both in written and oral form.
b) Knowledge of standard mathematical terminology and notation and the ability to use them properly.

Updated: *2013.07.30 BB*

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Undergraduate Curriculum Mapping

The table below lists all courses offered to Mathematics Majors. Ratings assigned to a course indicate the extent to which its content reflects each of the learning objectives on the following scale:

1	little or not at all	2	moderately	3	extensively

Outcomes	1.Computational skills	2. Analytical skills	3. Practical problem solving and mathematical modeling skills	4. Research Skills	5.Communication skills
MTH 141 Calculus I	3	1	2	1	1
MTH 142 Calculus II	3	1	2	1	1
MTH 153 Hon Calculus I	3	2	2	2	2
MTH 154 Hon Calculus II	3	2	2	2	2
MTH 172 Princip. Math Comp	3	2	3	1	2
MTH 191 Intro Disc Math I	3	2	3	1	1
MTH 192 Intro Disc Math II	3	2	3	1	1
MTH 241 Calculus III	3	1	2	1	1
MTH 251 Hon Calculus III	3	2	2	2	2
MTH 272 Math of Data Manip	3	2	2	1	1
MTH 306 Intro Diff Equations	3	1	3	1	2
MTH 309 Intro Lin Algebra	3	2	2	1	2
MTH 310 App Lin Algebra	3	2	3	2	2
MTH 311 Intro Higher Math	1	3	1	3	3
MTH 313 Elements of Set Theory	1	3	1	3	3
MTH 314 Logic for Comp Sci	1	3	2	2	2
MTH 335 Elements of Geometry	1	3	1	2	3

Outcomes	1.Computational skills	2. Analytical skills	3. Practical problem solving and mathematical modeling skills	4. Research Skills	5.Communication skills
MTH 336 Projective Geometry	1	3	1	2	3
MTH 337 Intro Sci Computing	2	2	2	2	1
MTH 343 Codes	2	2	3	2	2
MTH 353 Intro Combinatorics I	3	3	2	2	2
MTH 354 Intro Combinatorics II	3	3	2	2	2
MTH 411 Probability Theory	2	2	3	2	2
MTH 412 Intro Stat Inference	2	2	3	2	2
MTH 413 Intro Math Logic I	1	3	1	3	3
MTH 414 Intro Math Logic II	1	3	1	3	3
MTH 417 Surv Multivar Calculus	2	3	2	2	2
MTH 418 Surv Partial Diff Eq	3	2	2	2	2
MTH 419 Intro Abstract Algebra	2	3	1	3	3
MTH 420 Advanced Lin Algebra	2	3	1	3	3
MTH 424 Surv Fourier Series	3	2	2	2	2
MTH 425 Intro Complex Var I	2	3	2	2	2
MTH 426 Intro Complex Var II	2	3	2	2	2
MTH 427 Intro Topology I	1	3	1	3	3
MTH 428 Intro Topology II	1	3	1	3	3
MTH 429 Intro Number Th I	1	3	1	3	3
MTH 430 Intro Number Th II	1	3	1	3	3
"MTH 431 Intro Real Variables I	2	3	1	3	3
MTH 432 Intro Real Variables II	2	3	1	3	3
MTH 434 Basic Measure Theory	1	3	1	3	3
MTH 435 Intro Cryptography	2	2	3	2	2
MTH 437 Intro Num Analysis I	3	2	3	2	2
MTH 437 Intro Num Analysis II	3	2	3	2	2

Outcomes	1.Computational skills	2. Analytical skills	3. Practical problem solving and mathematical modeling skills	4. Research Skills	5.Communication skills
MTH 443 Fund App Math I	3	2	3	2	2
MTH 444 Fund App Math II	3	2	3	2	2
MTH 445 Ordinary Diff Eq	3	2	2	3	2
MTH 449 Intro Partial Diff Eq	3	2	2	3	2
MTH 455 Math Modeling	2	2	3	2	3
MTH 456 Math of Voting	1	3	3	2	2
MTH 457 Problem Solving Sem	2	3	1	3	3
MTH 458 Math Finance I	2	2	3	2	1
MTH 459 Math Finance II	2	2	3	2	1
MTH 460 Theory of Games	2	3	3	2	2