

Standards for Intellectual Development

Crossroads in Mathematics (AMATYC, 2023)

Standard I-1: Problem Solving

Students will engage in relevant, authentic problem solving and mathematical and statistical thinking.

Standard I-2: Modeling

Students will learn mathematics and statistics through modeling real-world situations.

Standard I-3: Reasoning

Students will expand their mathematical and statistical reasoning skills as they develop convincing mathematical, statistical, and data-based arguments.

Standard I-4: Connecting with Other Disciplines

Students will develop the view that mathematics, statistics, and data science are growing disciplines, are interrelated with human culture, and understand their connections to other disciplines.

Standard I-5: Communicating

Students will develop the ability to read, write, listen to, and speak the languages of mathematics, statistics, and data science.

Standard I-6: Using Technology

Students will use appropriate technology to enhance their thinking and conceptual understanding and to solve problems.

Standard I-7: Developing Mathematical Prowess

Students will engage in rich experiences in the study of mathematics, statistics, data science, and related fields that encourage independent, nontrivial exploration and will develop and reinforce tenacity and confidence in their abilities and inspire them to further their studies in these fields.

Standard I-8: Linking Multiple Representations

Students will select, use, and translate among mathematical and statistical representations—numerical, graphical, symbolic, and verbal—to organize information and solve problems using a variety of techniques.

Standards for Content

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Standard C-1: Numeracy

Students will accurately process, interpret, and communicate numerical information.

Standard C-2: Symbolism and Algebra

Students will be able to interpret algebraic symbols, translate problems into appropriate symbolic representations, and use those representations to effectively answer questions and make predictions.

Standard C-3: Geometry and Measurement

Students will develop a spatial and measurement sense, learn to visualize, and use geometric models, recognize measurable attributes, and use and convert units of measure.

Standard C-4: Function

Students will demonstrate understanding of the concept of function by several means - numerically, graphically, symbolically, and verbally - and incorporate it as a central theme into their use of mathematics.

Standard C-5: Discrete Mathematics

Students will be able to recognize and use discrete mathematical algorithms and develop combinatorial abilities in order to solve problems of finite character and enumerate sets without direct counting.

Standard C-6: Statistics and Probability

Students will use data to inform decisions and understand the world around them.

Standard C-7: Deductive Proof

Students will appreciate the deductive nature of mathematics as an identifying characteristic of the discipline; recognize the roles of definitions, axioms, and theorems; and identify and construct valid deductive arguments.

Standards for Pedagogy

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Standard P-1: Active Learning

Faculty will facilitate active learning that promotes increased and deeper mathematical and statistical reasoning abilities in students. Widespread implementation of high-quality active learning can help reduce or eliminate achievement gaps in STEM courses and promote equity in higher education.

Standard P-2: Making Mathematical Connections

Faculty will actively involve students in meaningful mathematics work that connects to students' experiences and focuses on broad mathematical and statistical themes that build connections within branches of mathematics, and with other disciplines. Students will view mathematics and statistics as relevant to their lives. Making mathematics and statistics relevant and meaningful is the collective responsibility of faculty, administrators, and producers of instructional materials.

Standard P-3 Multiple Problem-Solving Strategies

Faculty should help students become flexible problem solvers by allowing students to discover multiple problem-solving strategies and to identify efficient strategies.

Standard P-4 Multiple Representations of Mathematical Concepts

Faculty will provide opportunities for students to use, share, and make sense of multiple representations of mathematical and statistical ideas. These multiple representations may include words, equations, different algebraic notations, graphs, diagrams, models, manipulatives, and computer code.

Standard P-5: Teaching with Technology

Faculty will use [appropriate technology](#) to promote deeper student learning and will model the use of technology.

Standard P-6: Experiencing Mathematics and Statistics

Faculty will provide learning activities beyond the scope of the classroom that promote independent thinking and challenge students to persistently pursue efforts over an extended time period.

Standard P-7: Assessment of Student Learning

Faculty will incorporate multiple strategies for formative and summative assessments to inform future pedagogical practices and to help students recognize their current understanding.

Standards for Implementation

Beyond Crossroads in Mathematics (AMATYC, 2006, p. 13-14)

Implementation Standard: Student Learning and the Learning Environment

Mathematics faculty and their institutions will create an environment that optimizes the learning of mathematics for all students.

Implementation Standard: Assessment of Student Learning

Mathematics faculty will use the results from the ongoing assessment of student learning of mathematics to improve curricula, materials, and teaching methods.

Implementation Standard: Curriculum and Program Development

Mathematics departments will develop, implement, evaluate, assess, and revise courses, course sequences, and programs to enable students to attain a higher level of quantitative literacy and achieve their academic and career goals.

Implementation Standard: Instruction

Mathematics faculty will use a variety of instructional strategies that reflect the results of research to enhance student learning.

Implementation Standard: Professionalism

Institutions will hire qualified mathematics faculty, and these faculty will engage in ongoing professional development and service.

References

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- American Mathematical Association of Two-Year Colleges. (2023). Standards for Introductory college Mathematics. *Crossroads in mathematics: Standards for introductory college mathematics before calculus*. <https://my.amatyc.org/viewdocument/impact-originally-published>
- American Mathematical Association of Two-Year Colleges. (2006). *Beyond crossroads: Implementing mathematics standards in the first two years of college*. Blair, R. (Ed.). Memphis, TN: Author.