UW System Math Initiative
Alice Pulvermacher, project manager
608-262-5499 | apulvermacher@uwsa.edu
1668 Van Hise Hall, 1220 Linden Drive
Madison, WI 53706

University of Wisconsin System Math Initiative

Gateway College Algebra

Course description:

The study of the properties of elementary functions, such as polynomial, absolute value, piecewise, radical, rational, exponential, and logarithmic functions. Topics include equations, inequalities, functions, and their graphs. Students will formulate, analyze, solve, and interpret mathematical and real-world problems. This course is intended to provide the algebra skills required for calculus.

Learning outcomes:

1. Identify and interpret properties of elementary functions given in analytic or graphical form. Features include, but are not limited to, domain, range, intercepts, real and complex zeros, end behavior, and asymptotes.
2. For functions presented analytically, use the features identified above to produce the graph of the function.
3. Solve equations and inequalities involving elementary functions, both graphically and analytically.
4. Analyze, construct, and solve equations and inequalities arising from applied problems that can be modeled by elementary functions and interpret the results.
5. Use function operations, including transformations, compositions and inverses, to create new functions. Students will analyze the relationships between the original and the resulting functions using analytic and graphical techniques.

Assumed prior knowledge (based on the Math Fundamental Blueprint from the UW System Placement Exam):

1. Evaluate polynomial, absolute value, and rational expressions and expressions involving integer exponents.
2. Perform operations on polynomial, rational and radical expressions, and expressions involving integer exponents.
3. Solve linear equations and inequalities in one or two variables with integer and rational coefficients.
4. Solve literal equations.
5. Find equations of lines and interpret the slope and intercepts.
6. Factor algebraic expressions including common monomial factors, quadratic trinomials in one or two variables, difference of two squares, and factor by grouping.

7. Find the real solutions of quadratic equations by factoring or applying the quadratic formula.
8. Solve rational equations that lead to linear equations.
9. Solve radical equations of the form $\sqrt[n]{x} = k$, where n is a positive integer and k is a rational number.
10. Evaluate functions, express the domain and range of functions, and recognize graphs of linear, quadratic, and exponential functions.

Guidelines for College Algebra:

1. The course is a first credit bearing, college mathematics course that provides greater breadth, depth or application of mathematical knowledge, skills and abilities required in State of Wisconsin-approved high school mathematics curriculum.
2. The prior knowledge and prerequisite knowledge—based on the Math Fundamental Blueprint from the UW System Placement Exam—are the skills found in a traditional intermediate algebra class at UW System institutions.
3. The common cut score for placement into college algebra is 470 (MFUND section). Institutions either require this score or use multiple measures for placing students into college algebra. Institutions could also place a student scoring below 470 into college algebra with co-requisite remediation, supplemental instruction, or some other support.
4. The course typically would not be terminal for students, as it is designed for STEM students who require additional math for their majors. The material in this course is sufficient as the algebra prerequisite for Calculus I.
5. The core learning outcomes were vetted by math faculty systemwide in spring 2018 and serve as a mechanism to ensure consistency for purposes of transfer and applicability of gateway mathematics courses across the UW System. Individual institutions and faculty will continue to enjoy the freedom to utilize the modality and instructional strategies they deem most appropriate for the delivery of these courses.
6. The core learning outcomes typically reflect the content of a three- to four-credit course. The intent of the learning outcomes is that if a student successfully completes this course at one UW institution and transfers the course to another, the receiving institution will accept this course, regardless of the number of credits being transferred, as 1) satisfying the algebra component of the prerequisites for calculus and 2) meeting an existing mathematics-related graduation requirement, unless a student's choice of degree or academic program requires another specific mathematics course(s).
7. The Math Steering Committee will develop a process to periodically review and update the gateway course descriptions and learning outcomes that honors the autonomy of each department and continues to support the intent of the Math Initiative.

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