

Program Learning Objectives

College:	Liberal Arts and Sciences
Department:	Mathematics and Economics
Program Name/Degree Type:	Mathematics/Math Ed Undergraduate

List Program Level Learning Objectives

Objective Number	Program Learning Objective Description (precise)
1	Students will demonstrate competence in fundamental mathematics content
2	Students will demonstrate the ability to understand and develop mathematical proofs
3	Students will demonstrate the ability to communicate mathematics
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Curriculum Mapping: Aligning Program Learning Objectives with Course Level Student Learning Outcomes

College	Liberal Arts and Sciences
Department	Mathematics and Economics
Program	Mathematics/Math Ed Undergraduate

List of All Courses included in Major Degree Program					
	Course Prefix and Number	Course Title	1 (Competence)	2 (Proofs)	3 (Communication)
Degree	MA 125	Introduction to Mathematics	XX		
BA/BS/BSE		Be aware of the many facets of mathematics	X		
BS/BSE	MA 130	Problem Solving with Computers	XX		XX
		Design simple Visual Basic programs to investigate some basic mathematics ideas.	X		
		Use the Integrated Development Environment (IDE) to create, run, and debug apps written in Visual Basic.	X		
		Use graphical user interface (GUI) to interact visually with their programs.	X		
		Understand how modular arithmetic is used in programming.	X		
		Use program structure to produce and debug effective programs.	X		
		Develop programs that rely on pseudo-random numbers.	X		
		Write methods to solve some simple mathematics problems.			X
BA/BS/BSE	MA 161	Calculus I	XX		XX
		Define and compute limits of functions	X		
		Motivate the definition of a derivative as the instantaneous rate of change	X		
		Compute derivatives of functions by applying many techniques	X		
		Solve applications by using methods of differentiation	X		X
BA/BS/BSE	MA 240	Discrete Mathematics	XX	XX	XX
		Write logical, complete mathematical proofs using direct, indirect, and inductive proof methods	X	X	
		Be able to effectively and efficiently communicate mathematics to peers			X
		Construct valid arguments and recognize invalid arguments		X	
		Use definitions of sets, set operations, functions and relations to prove new results	X	X	
BA/BS/BSE	MA 262	Calculus II	XX		XX
		Demonstrate an understanding of the concept of integration and the Fundamental Theorem of Calculus.	X		X
		Use a variety of techniques to evaluate integrals.	X		
		Use numerical techniques to approximate the values of definite integrals.	X		
		Be familiar with several examples of applications using integration	X		X
		Determine whether or not a given sequence or series converges or diverges.	X		
BS/BSE	MA 291	Mathematical Modeling	XX		XX
		Model and approximate change with difference equations	X		
		Find solutions to simple dynamical systems	X		
		Construct models using proportionality and geometric similarity	X		
		Understand and apply the least-square criterion	X		
		Construct high-order and low-order polynomial models	X		X
		Construct cubic spline models	X		X
BA/BS/BSE	MA 322	Introduction to Linear Algebra	XX	XX	XX
		Solve linear systems using matrices and Gaussian elimination, understand the different types of solutions that are possible, and use these ideas in applied problems.	X	X	
		Perform the common operations of matrix algebra and use them to solve applied problems.	X	X	X
		Compute the determinant of a square matrix and understand its properties.	X	X	
		Understand the ideas of linear independence, spanning set, basis, the coordinate fo a vector with respect to a basis, change of basis of a linear transformation, rank fo a matrix, vector space, subspace, and their application to applied problems.	X	X	
BA/BS/BSE	MA 363	Calculus III	XX		XX
		To understand the meaning of and perform computations with vectors in Euclidean space, including the use of vector addition and scalar multiplication, dot products and cross-products.	X		
		To be able to differentiate and integrate vector-valued functions, and to apply these concepts to simple physics problems dealing with position, velocity and acceleration.	X		X
		To understand the meaning of and be able to perform computations dealing with the differential calculus of multivariate functions. This includes partial derivatives, tangent planes, the chain rule, gradient vectors, directional derivatives, and finding local extrema of two-variable functions.	X		
		To compute double and triple integrals. This includes correct setting up of the integral and also the appropriate use of the Jacobian to change coordinates (with an emphasis on polar, cylindrical or spherical coordinates).	X		
BA/BS/BSE	MA 380	Probability and Statistics	XX		XX
		Organize, present, and interpret statistical data	X		X
		Use various methods to compute the probabilities of events	X		
		Solve statistical problems using appropriate probability distributions	X		
		Understand the role of a sampling distribution in forming statistical inferences	X		
		Construct and interpret confidence intervals to estimate means and proportions	X		X
		Construct and interpret hypothesis tests for means and proportions	X		X
BSE	MA 421	College Geometry	XX	XX	XX
		Prove theorems of neutral geometry using appropriate axioms, theorems, and definitions.		X	

	Prove theorems of Euclidean geometry using appropriate axioms, theorems, and definitions		X	
	Prove theorems of hyperbolic geometry using appropriate axioms, theorems, and definitions		X	
BA/BS/BSE	MA 425 Abstract Algebra	XX	XX	XX
	Comprehend and use abstract mathematical definitions, create relevant examples and counterexamples, and prove and disprove conjectures.	X	X	
	Understand the conditions which are satisfied by an algebraic structure.	X		
	Demonstrate a working knowledge of diverse examples of algebraic structures.	X		X
BSE	MA 460 History of Mathematics			XX
	This course is designed to give you background and insight into the history of mathematics.			X
BSE	MA 470 Teaching Mathematics in the Middle/High School	XX		XX
	Candidates will demonstrate the ability to organize and present mathematical ideas in various teaching styles.			X
	Candidates will demonstrate the ability to identify and construct evaluation instruments appropriate for assessing student learning of skills, concepts, facts, and problem solving.	X		
	Candidates will become familiar with a variety of alternative assessment techniques including performance assessment, writing, portfolios, questioning, and observation.	X		
	Candidates will demonstrate the ability to diagnose problem areas and prescribe remedial activities in mathematics for students at all levels of ability.			X
	Candidates will demonstrate the ability to identify instructional materials used in the teaching of mathematics. Specific attention will be given to manipulatives and materials that will enhance learning for all.			X
	Candidates will recognize the significance of the multicultural society in which he or she will teach and the importance of teaching so that all students, regardless of ethnicity or gender, will have equal opportunities for success.	X		
	Candidates will demonstrate the ability to identify professional mathematics organizations and describe their contributions to the teaching of mathematics.	X		
	Candidates will demonstrate the ability to identify and apply current and emerging trends in secondary mathematics education.			X
	Candidates will use new and emerging technologies both to learn and teach.			X
	Candidates will evaluate and adapt technology for use in the mathematics curriculum.			X
	Candidates will understand what is meant by inclusion and possess skills to deal with special education as it impacts the mathematics classroom.			X
	Candidates will differentiate instruction, write parallel tasks and prepare questions that clarify and extend their students' learning.			X
	Candidates will write lesson plans that include high level thinking tasks, relevant CCSS mathematics practices, alignment with CCSS common core content standard and a focus on what the learners will be doing.			X
BS/BSE	MA 731 Statistics using SAS	XX		
	Use the SAS software to analyze data from a wide variety of biological experiments.	X		
	Demonstrate an understanding of the SAS data and proc steps.	X		
	Read the SAS output and draw appropriate conclusion about the research hypothesis	X		
	Use the SAS log output to debug programs.	X		
	Demonstrate an understanding of some of the important concepts associated with statistical inference.	X		
BA/BS	MA 735 Advanced Calculus I	XX	XX	XX
	Prove results related to the real number system	X	X	X
	Prove results related to sequences in R	X	X	X
	Prove results related to functions on R	X	X	X
	Prove results related to differentiability on R	X	X	X
	Prove results related to integrability on R	X	X	X