Mathematics

BA Mathematics Program Mission

The mission of the Mathematics BA program is to equip students with knowledge in, skills of, and values of mathematics and the ability to apply and advance the knowledge, skills, and values of mathematics.

BA Mathematics Program Goals and Outcomes

Student Learning Goals	Student Learning Outcomes
SLG 1: Students will learn a foundation in principles of mathematics.	SLO 1: Students will demonstrate competence in differential and integral calculus.
	SLO 2: Students will demonstrate competence in vector and matrix algebra.
	SLO 3: Students will understand vector spaces and linear transformations.
	SLO 4: Students will solve differential equations and apply them to problems in natural and social science.
	SLO 5: Students will demonstrate competence in set theory, logic, functions, and other foundations of mathematics.
	SLO 6: Students will do advanced study in at least two of the core areas of analysis, algebra, differential equations, and probability and statistics.
SLG 2: Students will learn to communicate mathematical ideas, so the student can read, write, listen, and speak effectively about mathematics.	SLO 1: Students will write proofs of theorems.
	SLO 2: Students will write papers about mathematics and its applications.
	SLO 3: Students will give oral presentations to classes and professional organizations.
	SLO 4: Students will read research and expository articles on current developments in mathematics.
	SLO 5: Students will qualify to be CETL math tutors.
SLG 3: Students will use calculators and other technologies in appropriate mathematical contexts.	SLO 1: Students demonstrate competence in TI-83/84 and TI-89 calculators for graphic, numeric, and symbolic calculation.
	SLO 2: Students demonstrate competence in Minitab or other statistical software for data analysis.
	SLO 3: Students demonstrate competence in mathematical software such as Matlab and Mathematica for graphic, numeric, and symbolic calculation.
	SLO 4: Students demonstrate competence in basic Computer Science and programming.
	SLO 5: Students demonstrate competence in writing programs to solve mathematical problems.
SLG 4: Students will develop higher order and critical thinking skills through the mathematical reasoning process.	SLO 1: Students can formulate mathematical theorems and write rigorous proofs.
	SLO 2: Students will use statistics to analyze data and draw conclusions.
	SLO 3: Students use technology to solve mathematical and real-world problems.
SLG 5: Students will relate mathematics to the real world through problem solving situations.	SLO 1: Students will apply mathematics to solve problems in the natural and social sciences.
	SLO 2: Students will build mathematical models to describe real world phenomena.
	SLO 3: Students will use statistics to analyze data and draw conclusions.
SLG 6: Students will appreciate the beauty, elegance, utility, and power of mathematics.	SLO 1: Students will study the history of mathematics from ancient to modern times.
	SLO 2: Students can articulate the value of mathematics in their lives and in society.
SLG 7: Students will be prepared to successfully pursue further study in mathematics or other disciplines.	SLO 1: Students apply to graduate schools and get accepted.
	SLO 2: Students engage in undergraduate research.
	SLO 3: Students apply to summer REU programs.

SLG 8: Students will be prepared for employment in government, business, and industry where a strong mathematics foundation is needed	SLO 1: Students apply for jobs and get hired.
	SLO 2: Students apply for internships.

BSEd Mathematics Education Program Mission

The mission of the program is to graduate prepared pre-service secondary mathematics teachers. Prepared pre-service teachers demonstrate high-tech skills, appropriate dispositions, content knowledge, and instructional practices to teach all their students.

BSEd Mathematics Education Program Goals and Outcomes

Student Learning Goals	Student Learning Outcomes
TEU SLG 1: The teacher candidate demonstrates knowledge of how learners grow and develop; and designs and implements developmentally appropriate and challenging learning experiences.	TEU SLO 1.1: The teacher candidate demonstrates knowledge of how learners grow and develop.
	TEU SLO 1.2: The teacher candidate responds respectfully to developmental needs in the design and implementation of appropriate and challenging learning experiences.
TEU SLG 2: The teacher candidate uses professional knowledge of individual differences and diversity to ensure inclusive, successful learning environments.	TEU SLO 2.1: The teacher candidate demonstrates respectful, professional knowledge of individual differences and diversity.
	TEU SLO 2.2: The teacher candidate uses understanding of learners' commonalities and individual differences to design inclusive learning experiences that empower success.
TEU SLG 3: The teacher candidate works with others to create environments that support individual and collaborative learning.	TEU SLO 3.1: The teacher candidate collaborates and communicates with others to build a positive learning climate marked by respect, rigor, and responsibility.
	TEU SLO 3.2: The teacher candidate manages the learning environment to engage learners actively in individual and collaborative learning.
SLG 4: The secondary mathematics candidate demonstrates and applies core mathematics content knowledge applicable to its instruction.	SLO 4.1: The secondary mathematics candidate solves problems that require applying their knowledge of algebra, geometry, probability and statistics, mathematical systems, and calculus.
	SLO 4.2: The secondary mathematics candidate articulates mathematical concepts and effectively communicates them to students using appropriate mathematical vocabulary and terminology.
SLG 5: The secondary mathematics candidate demonstrates the interconnectedness of mathematical ideas and how they build on one another.	SLO 5.1: The teacher candidate demonstrates connections between mathematical ideas and connections across content areas, including how ideas build on one another and apply to authentic contexts.
	TEU SLO 5.2: The teacher candidate engages learners with higher-order thinking about the content (i.e. critical thinking, perspective-taking, creativity, collaborative work, and communication).
	SLO 5.3: The teacher candidate demonstrates how contributions of historically significant figures and contributions of diverse cultures were involved in shaping the perspective and development of mathematics.
TEU SLG 6: The teacher candidate can articulate and use multiple methods of assessment.	TEU SLO 6.1: The teacher candidate can articulate and use multiple methods of assessment to fairly demonstrate the full extent of student learning.
	TEU SLO 6.2: The teacher candidate uses, and engages learners in using, assessments aligned with learning expectations to monitor, support, and document growth.
TEU SLG 7: The teacher candidate plans instruction that supports every student in meeting rigorous learning goals.	TEU SLO 7.1: The teacher candidate selects, creates, plans, and sequences varied instructional activities to support the growth of all students toward rigorous curriculum goals.
	TEU SLO 7.2: The teacher candidate uses formative and summative assessment information to systematically adjust instruction to assist varied students' learning needs.
	TEU SLO 7.3: The teacher candidate collaborates and communicates (i.e. with colleagues, specialists, community resources, families, and learners) to meet individual learning needs.
TEU SLG 8: The teacher candidate plans and uses a variety of instructional strategies to encourage learners to develop deep comprehension and apply knowledge in meaningful ways.	TEU SLO 8.1: The teacher candidate can reflectively select and use a variety of instructional strategies, including appropriate, current instructional technologies, to make learning accessible to all learners.

	TEU SLO 8.2: The teacher candidate applies instructional strategies which encourage learners to develop deep comprehension and apply knowledge in meaningful ways (including students' digital literacy).
TEU SLG 9: The teacher candidate engages in ongoing professional learning and uses evidence to continually evaluate their practice.	TEU SLO 9.1: The teacher candidate takes responsibility for evidence-based strengths and weaknesses in their practices, engaging in ongoing professional learning.
	TEU SLO 9.2: The teacher candidate practices the profession in an ethical manner, considering the effects of their decisions and actions on others.
TEU SLG 10: The teacher candidate seeks appropriate leadership roles and opportunities to take responsibility for student learning.	TEU SLO 10.1: The teacher candidate seeks appropriate leadership roles and opportunities to advance the profession.
	TEU SLO 10.2: The teacher candidate takes responsibility to communicate and collaborate in positive ways that will benefit students and the learning community.

Bachelor of Arts with a Major in Mathematics

General Education		
General Education Courses		38
Required Core		**27**
MATH 165	Calculus I	
MATH 166	Calculus II	
MATH 205	Math Proof and Problem Solving	
MATH 265	Calculus III	
MATH 266	Differential Equations	
MATH 305	Linear Algebra	
MATH 315	Mathematical Programming and Modeling	
Elect from the following (Including at least 12 credits of 400 level coursework)		**14**
MATH 294	Intro to Research in Math	
MATH 320	Number Theory	
MATH 380	History of Mathematics	
MATH 420	Abstract Algebra	
MATH 445	Probability and Statistics I	
MATH 446	Probability and Statistics II	
MATH 450	Real Analysis	
MATH 460	Complex Analysis	
MATH 466	Partial Differential Equations	
MATH 470	Numerical Analysis	
MATH 494	Directed Research in Math [**]	
*No more than 2 credits of MATH 294 can be used as an elective.		
**No more than 4 credits of MATH 494 can be used as an elective.		
Required Support Course		**4**
CSCI 112	Introduction to Visual Programming	
CSCI 160	Computer Science I	
Electives		**35**
Including a second major, or a minor, or two areas of concentration.		
Total Hours		**118**

Bachelor of Science in Education with a Major in Mathematics

General Education		
General Education Courses [*1]		36
Required Core		**41**
MATH 165	Calculus I	
MATH 166	Calculus II	
MATH 205	Math Proof and Problem Solving	

MATH 305	Linear Algebra	
MATH 315	Mathematical Programming and Modeling	
MATH 320	Number Theory	
MATH 325	Algebra for Secondary Teachers	
MATH 330	College Geometry	
MATH 380	History of Mathematics	
MATH 385	Directed Project in Mathematics Education	
MATH 445	Probability and Statistics I	
MATH 446	Probability and Statistics II	
Required Support Course		**4**
Select one of the following:		
CSCI 111	Introductory Programming and Big Data	
CSCI 112	Introduction to Visual Programming	
CSCI 160	Computer Science I	
Professional Education Sequence		**39**
May be taken prior to admission to Teacher Education		
ED 260	Educational Psychology	
ED 260L	Clinical I	
ED 282	Managing the Learning Environment	
ED 282L	Clinical II	
ED 284	Teaching Diverse Learners	
ED 284L	Clinical III	
ED 287	Early-Level Transition Point Conference	0
ED 320	Curriculum, Planning, and Assessment I	
ED 321L	Clinical IV	
ED 323L	Clinical V	
ED 324L	Fall Experience	
ED 380	Technology in Teaching	
ED 407	Mid-Level Transition Point Conference	0
SPED 110	Introduction to Exceptional Children	
HIST 283	Diversity in America	
May be taken only after admission to Teacher Education		
ED 322	Data Driven Integrated Instruction	
The following courses are taken at the same time within a semester:		
Group 1		
MATH 381	Secondary Math Practicum	
MATH 391	Secondary Mathematics Teaching Methods	
MATH 392	Praxis Subject Area Exam Preparation	
Group 2		
ED 483	Student Teaching Seminar: Secondary	
or ED 484	Student Teaching Seminar: K12	
or ED 482	Student Teaching Seminar: Elementary	
ED 493	Student Teaching, Secondary	
Total Hours		**120**

[1]   Math 165 is required for the math general education requirement

Additional Program Requirement: take the PRAXIS II Subject Area exam and the PRAXIS II Principles of Learning and Teaching: Grades 7-12 exam before completing the program

Mathematics Minor (Non-Teaching)

Required Core

MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 205	Math Proof and Problem Solving	3
or MATH 208	Discrete Mathematics I	
MATH 305	Linear Algebra	4
Select two Math Electives from 200, 300, or 400 level courses or DATA 211 [1]		**6-8**
Total Hours		**21-23**

[1] **Excluding:** MATH 277 Mathematics for Elementary Teachers I, MATH 377 Mathematics for Elementary Teachers II, MATH 378 Mathematics for Elementary Teachers III, MATH 381 Secondary Math Practicum, MATH 385 Directed Project in Mathematics Education, MATH 391 Secondary Mathematics Teaching Methods, and MATH 392 Praxis Subject Area Exam Preparation

Mathematics Minor (Teaching)

Required Core

MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 205	Math Proof and Problem Solving	3
MATH 210	Elementary Statistics	4
or DATA 211	Applied Statistics and Data Visualization	
MATH 305	Linear Algebra	4
MATH 320	Number Theory	3
MATH 330	College Geometry	4
MATH 381	Secondary Math Practicum	1
MATH 391	Secondary Mathematics Teaching Methods	3
Required Support Course		
Select one of the following:		4
CSCI 111	Introductory Programming and Big Data	
CSCI 112	Introduction to Visual Programming	
CSCI 160	Computer Science I	
Optional Support Courses		
MATH 385	Directed Project in Mathematics Education	*0.5
MATH 392	Praxis Subject Area Exam Preparation	*0.5
Total Hours		**34**

* credits excluded from Total Hours

Additional Program Requirement: take the PRAXIS II Subject Area exam and the PRAXIS II Principles of Learning and Teaching: Grades 7-12 exam before completing the program

Applied Statistics Minor

Required Core

MATH 146	Applied Calculus	3
or MATH 147	Applied Calculus II	
or MATH 166	Calculus II	
MATH 210	Elementary Statistics	4
or DATA 211	Applied Statistics and Data Visualization	
MATH 305	Linear Algebra	4
Select three of the following courses:		**12**
MATH 345	Linear Models	

MATH 346	Experimental Design	
MATH 445	Probability and Statistics I	
MATH 446	Probability and Statistics II	
Total Hours		**23**

Mathematics Concentration

Select 12 credits from the following: [1]		**12**
DATA 211	Applied Statistics and Data Visualization	
MATH 105	College Trigonometry	
or higher-numbered MATH courses		
Total Hours		**12**

[1] **Excluding: MATH 201H Environmental Mathematics, MATH 277 Mathematics for Elementary Teachers I, MATH 377 Mathematics for Elementary Teachers II, MATH 378 Mathematics for Elementary Teachers III, MATH 381 Secondary Math Practicum, MATH 391 Secondary Mathematics Teaching Methods, and MATH 392 Praxis Subject Area Exam Preparation**

Applied Statistics Concentration

Select three of the following courses:		**12**
MATH 210	Elementary Statistics	
or DATA 211	Applied Statistics and Data Visualization	
MATH 345	Linear Models	
MATH 346	Experimental Design	
MATH 445	Probability and Statistics I	
MATH 446	Probability and Statistics II	
Total Hours		**12**