

# Math Education (Secondary) (MAES)

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## Courses

### **MAES 2189. Classroom Interactions. 3 Credit Hours.**

This course continues the process of preparing students to teach mathematics and science in upper elementary and secondary settings. The specific objectives of this course are to: 1) demonstrate to students how learning theories (from the "Knowing and Learning" course) manifest themselves in instructional settings (usually classrooms), allow students to design and implement instructional activities from their own understanding of knowing and learning mathematics and science, and evaluate the outcomes of those activities based on evidence from student artifacts, and 2) provide students with frameworks for thinking about equity issues in the classroom and larger school setting and their effects on learning and provide students with strategies for teaching diverse students equitably. The culminating activities of the course are the opportunities for students to teach in a high school and to learn whether they enjoy and are good at it. While in "Knowing and Learning" students study the meaning behind understanding a particular content area from an individual perspective, in "Classroom Interactions" the perspective shifts to studying how classroom events might promote or discourage learning mathematics and science and student equity. A major component of the "Classroom Interactions" course is the opportunity for students to reflect on and evaluate their own work as teachers.

**Repeatability:** This course may be repeated for additional credit.

#### **Pre-requisites:**

(EDUC 2179|Minimum Grade of C-|May be taken concurrently)  
AND (SCTC 1289|Minimum Grade of C-|May not be taken concurrently)  
OR SCTC 1389|Minimum Grade of C-|May not be taken concurrently)

### **MAES 3145. Teaching and Learning Mathematics in the Middle Grades. 3 Credit Hours.**

This course examines methods of teaching and assessing mathematics in the middle grades. Special attention is paid to understanding the conceptual difficulties students have in moving from whole numbers to rational numbers, additive thinking to multiplicative thinking, and arithmetic to algebra. Problem-solving, connections, and concrete models are emphasized.

**College Restrictions:** Must be enrolled in one of the following Colleges: Education.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: Clearance for Education.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: EDCNDCY.

**Co-requisites:** EDUC 4389.

**Repeatability:** This course may not be repeated for additional credits.

### **MAES 3146. Methods and Materials in Secondary Mathematics. 3 Credit Hours.**

This course will explore problems in algebra, trigonometry, analytic geometry, calculus, Euclidean geometry, probability, statistics, and discrete mathematics. This course is intended as a capstone study for prospective secondary mathematics teachers. The objectives of this course are as follows: (1) connect ideas within and between mathematical concepts, (2) develop mathematical thinking and reasoning, and (3) develop problem solving skills. Technology will be a vital part of this course. Technology will be used to demonstrate and encourage conjecturing and problem solving with an emphasis on applications. The goals of this course are to help you as prospective or beginning secondary mathematics teachers to: (1) develop a deep understanding of the mathematics you will be teaching by connecting mathematical concepts to instruction and (2) acquire the skills, knowledge, and reflective practice necessary for successful teaching.

**College Restrictions:** Must be enrolled in one of the following Colleges: Education.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: Clearance for Education.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: EDCNDCY.

**Repeatability:** This course may not be repeated for additional credits.

### **MAES 3147. Geometry and its Classroom Implications. 3 Credit Hours.**

The class stresses the topics found in a standard high school geometry course from an advanced point of view. In addition, important plane geometry theorems such as Ceva's Theorem, and Menelaus' Theorem are examined. Special attention is paid to the concept of proof, and different kinds of proofs are examined. Non-Euclidean geometry is investigated, as are the constructions of college geometry.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: TUteach.

**Repeatability:** This course may not be repeated for additional credits.

**MAES 3278. Professional Subject Matter: Statistics. 1 to 3 Credit Hour.**

This course addresses the statistics curriculum found in most high school advanced placement courses. In addition, students will test hypotheses using appropriate sampling strategies, and interpret the results in terms of confidence intervals and significance. The course will also examine interpreting the results of statistical tests, (including z-test, t-test, paired t-test, matched t-test). In addition, special consideration will be given to developing strategies for modeling data, making predictions from these models, and considering issues relating to population, random samples, and proportions.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: TUteach.

**Repeatability:** This course may not be repeated for additional credits.

**MAES 4146. Teaching and Learning Mathematics in High School. 3 Credit Hours.**

This course will explore problems in algebra, trigonometry, analytic geometry, calculus, Euclidean geometry, probability, statistics, and discrete mathematics. This course is intended as a capstone study for prospective secondary mathematics teachers. The objectives of this course are as follows: (1) connect ideas within and between mathematical concepts, (2) develop mathematical thinking and reasoning, and (3) develop problem solving skills. Technology will be a vital part of this course. Technology will be used to demonstrate and encourage conjecturing and problem solving with an emphasis on applications. The goals of this course are to help you as prospective or beginning secondary mathematics teachers to: (1) develop a deep understanding of the mathematics you will be teaching by connecting mathematical concepts to instruction and (2) acquire the skills, knowledge, and reflective practice necessary for successful teaching.

**College Restrictions:** Must be enrolled in one of the following Colleges: Education.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: Clearance for Education.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: EDCNDCY.

**Co-requisites:** EDUC 4389.

**Repeatability:** This course may not be repeated for additional credits.

**MAES 4189. Project-Based Instruction. 3 Credit Hours.**

"Project-Based Instruction" (PBI) is the capstone course in the sequence of required education courses and is required before TUteach students take Education 4688: "Student Teaching in Secondary Education." PBI is the course in which the major themes of the TUteach program - integrated content of mathematics and science learning, infusion of technology in representation, analysis, modeling, assessment and contextualization of the content, field-based experiences, and equity - converge into an exciting and intellectually challenging culminating experience. When students complete PBI, they are fully prepared for Student Teaching. Whereas in "Classroom Interactions," students gain experience designing a sequence of several lessons that they teach to a high school class, in PBI, students design full units of connected lessons - a skill that is required in Student Teaching. PBI also provides students with the experience of managing lessons and students outside a classroom, in a field setting. Despite its name, PBI emphasizes choosing from a variety of appropriate teaching styles, depending on the type of material and the learning objective, with project-based instruction being just one possible alternative. In addition, PBI requires students to incorporate various technologies into the units they plan.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: TUteach.

**Repeatability:** This course may be repeated for additional credit.

**Pre-requisites:**

(MAES 2189|Minimum Grade of C-|May not be taken concurrently  
AND PRAX 100999|May not be taken concurrently)

**MAES 4366. The Teaching of Problem Solving. 3 Credit Hours.**

This course is designed for the in-service as well as the pre-service teacher. Topics to be discussed will be the role of problem solving and reasoning in the mathematics curriculum, developing techniques for improving problem solving and reasoning abilities of students on mathematics. Emphasis will be on how to teach problem solving as opposed to merely solving problems.

**College Restrictions:** Must be enrolled in one of the following Colleges: Education.

**Student Attribute Restrictions:** Must be enrolled in one of the following Student Attributes: Clearance for Education.

**Cohort Restrictions:** Must be enrolled in one of the following Cohorts: EDCNDCY.

**Co-requisites:** MAES 2189.

**Repeatability:** This course may not be repeated for additional credits.

**Pre-requisites:**

MAES 2189|Minimum Grade of C-|May be taken concurrently.

**MAES 4371. History of Mathematics. 3 Credit Hours.**

The course will consider the mathematical ideas of particular significance in elementary and secondary school curricula: the development and introduction of Hindu-Arabic numerals, early computing devices, Euclidean and non-Euclidean geometries, etc. Ways in which the history of mathematics may be used to enhance the learning of mathematical concepts by students in the schools will also be examined.

**Repeatability:** This course may not be repeated for additional credits.

**MAES 5469. Spec Proj Math Ed. 1 to 6 Credit Hour.**

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.

**MAES 5471. Teaching of Mathematics. 3 Credit Hours.**

Methods and models of teaching and assessing mathematics in secondary schools. Key ideas include rigorous instruction for all students, teaching for understanding, eliciting and extending students' mathematical thinking, selecting and using high-quality classroom tasks, and developing effective classroom discourse. Focus on teaching and learning the important secondary content areas of algebra and data analysis, including mathematics modeling and the use of technology in learning these subjects. Problem solving, communication, and mathematical representations and connections are emphasized.

**Level Registration Restrictions:** Must be enrolled in one of the following Levels: Graduate.

**Repeatability:** This course may not be repeated for additional credits.