

STEM Education (STEM)

Courses

STEM 12001. Introduction to Teaching STEM Subjects. 1 Hour.

This course previews what it is like to teach STEM subjects. Engaging activities that model effective teaching practices, discussions of STEM education issues, and optional school observations will help STEM majors or others clarify interest in teaching as a career or as an additional skill as a STEM professional. Note: Fulfills UNIV 10051 requirement for Fulbright majors. (Typically offered: Fall and Spring)

STEM 12102. Inquiry Approach to Teaching STEM Subjects. 2 Hours.

Along with learning classroom strategies for engaging students and organizing a lesson, student pairs plan and teach three inquiry-based lessons (choice of math, science, or computer science) in a local school classroom. For STEM majors, but open to all who are interested in exploring teaching as an additional career option. Note: Class will meet twice a week for the first four weeks and for the last week. In between, class will meet only once a week (Tuesdays) to compensate for time spent at schools. Students without transportation will be paired with students who can drive to schools. (Typically offered: Fall and Spring)

STEM 20003. The Art of STEM Communication. 3 Hours.

It is widely known that breakdown of communication contributes to mistrust and misunderstanding of the scientific enterprise. In this dynamic, interdisciplinary course including guest lectures, socio-scientific issues, and theatre-style methods, students will learn to communicate complex STEM topics clearly and effectively using research-based practices from the field of education. (Typically offered: Fall and Spring)

STEM 30303. Project-based Learning and Teaching. 3 Hours.

This course is designed to introduce students to the fundamental concepts of project-based learning (PBL). Students will explore the principles and practices of PBL, examine the role of PBL in student-centered learning, and learn how to develop, implement, and assess PBL projects. Corequisite: Lab component. (Typically offered: Spring)

STEM 31003. Knowing and Learning in Science and Mathematics. 3 Hours.

This course examines theories of learning to provide a firm foundation for teaching, learning, and communicating within STEM disciplines. Drawing from scholarship in educational psychology and other disciplines, students explore implications for designing effective learning environments, the relationship between communication and learning, and how learning is influenced by culture. (Typically offered: Fall)

STEM 31403. Teaching Science in the Elementary Grades. 3 Hours.

Study of the methods and materials in teaching science. Classroom applications of teaching strategies with analysis of teacher effectiveness in seminar settings are emphasized. Field experience required. Prerequisite: (CHEDBS or EELBS majors), (BIOL 10103, BIOL 10101, GEOL 11103, and GEOL 11101), and ((ASTR 20003 and ASTR 20001) or (STEM 41004 (Offered in fall only)) or (GEOL 11203 and GEOL 11201) or (PHYS 10304 (offered in spring only))). (Typically offered: Fall and Spring)

STEM 32003. Classroom Interactions. 3 Hours.

This course examines the interaction between teachers, students, and content, and how effective communication and pedagogical knowledge contribute to development of conceptual understanding of STEM subjects. Students learn a variety of instructional strategies to engage students of diverse backgrounds to implement in a secondary setting. Prerequisite: STEM 31003. (Typically offered: Spring)

STEM 34003. STEM Teaching Experiences. 3 Hours.

This course examines the interaction between teachers, students, and content, and how effective communication and pedagogical knowledge contribute to developing deep conceptual understanding of STEM subjects. Students learn a variety of instructional activities and strategies that will engage students of diverse backgrounds in various educational settings. Students will actively participate in the K-12 outreach program summer camps in conjunction with the college of engineering. Summer camps for rising 2nd through 12 grades offer hands-on learning experiences and exploration of engineering and sustainability topics. Prerequisite: Department consent. (Typically offered: Summer)

STEM 40003. Teaching Secondary Science. 3 Hours.

Study of the methods and materials for teaching science. Includes philosophical, cognitive, and psychological dimensions of teaching science. The planning of instruction, microteaching, safety and liability issues, and the development of instructional materials are included. Prerequisite: STEM 32003. (Typically offered: Fall)

STEM 40303. Introduction to STEM Education. 3 Hours.

This course provides an introduction to the foundations of STEM education disciplines and the strategies used to deliver integrative STEM education in the elementary and secondary school setting. The nature of STEM education disciplines, STEM pedagogy, teaching strategies, integrative STEM learning, STEM careers, and problem-centered instruction are addressed. (Typically offered: Spring and Summer)

STEM 40403. Creativity and Innovation in STEM Education. 3 Hours.

This course in technology and engineering education focuses on the development and introduction of technology and engineering-based activities to support science and mathematics instruction in the elementary and middle level classroom. Through hands-on, problem based learning challenges, students will develop an understanding of the design process and the integration of science, technology, engineering, and mathematics (STEM) often used to solve real-world problems. Prerequisite: STEM 40303. (Typically offered: Spring)

STEM 40703. Teaching Programming in the Secondary Schools. 3 Hours.

This course provides an introduction to the foundations of teaching methods for computer programming in the secondary schools. Methods of computer programming instruction will include teaching strategies in coding, developing computational thinking, problem-solving skills, and applying key programming concepts. (Typically offered: Irregular)

STEM 41004. Astronomy for Educators. 4 Hours.

Astronomy for Educators splits evenly between the basics of astronomy and practical methods for teaching astronomy effectively to all grade levels. The class is appropriate and effective for elementary, middle school, and secondary educators. Pedagogy focuses on the use of low-cost models that help all students grasp astronomy fundamentals such as phases of the Moon and how our solar system works. Lab activities include building and working with scientific models, evening lab activities give students the opportunity to use telescopes and binoculars to observe the Moon, planets, constellations and more. No prior experience or astronomy knowledge is assumed for this course. (Typically offered: Fall and Spring)

STEM 4280V. STEM Secondary Teacher Residency. 3-6 Hour.

The STEM Ed Secondary Teacher Residency I experience is the first of two teaching internships for STEM Ed students preparing for careers as secondary mathematics, science, and computer science teachers. The fall residency is designed to prepare teacher candidates (TCs) for their full-time teaching internship in the spring. TCs will be assigned a mentor teacher for each of two placements, junior high and high school, for which they will observe, assist, co-plan, co-teach, and teach for a minimum of 18 hours per week throughout the semester. Course meetings, assignments, and teaching observations are designed to support students as they develop their knowledge base and skills as a teacher. Corequisite: MATH 43003 or STEM 40003. (Typically offered: Spring)

STEM 43003. Teaching Secondary Mathematics I. 3 Hours.

Study of the theories that have influenced teaching and learning of mathematics. Specific frameworks of secondary students' mathematical thinking and learning trajectories will be examined. Implications for instruction will be explored.

Prerequisite: STEM 32003. (Typically offered: Fall)

STEM 43103. Teaching Secondary Mathematics II. 3 Hours.

Framed by current literature in mathematics education, teacher candidates will deepen their knowledge of effective practices for teaching mathematics and their understanding of the essential elements of school mathematics programs such as access and equity, curriculum, and assessment. The course will focus on pedagogy for teaching high school mathematics content. Pre- or Corequisite: STEM 32003.

(Typically offered: Spring)

STEM 43303. History and Philosophy of Science for Science Teachers. 3 Hours.

The History and Philosophy of Science for Science Teachers explores knowledge generation in the sciences by referencing the history and philosophy of the sciences. The course prepares future teachers with the background, rationales and strategies necessary to enhance student knowledge and interest in these important foundation areas. (Typically offered: Spring)

STEM 44003. Teaching Seminar. 3 Hours.

This weekly seminar is designed to help mathematics, science, and computer science teacher interns address complex issues related to novice teaching experiences, including assessment and evaluation of student learning and teaching practice, classroom management challenges, and career readiness. Corequisite: STEM 45006. (Typically offered: Spring)

STEM 45006. Teaching Internship. 6 Hours.

The teaching internship is the apprenticeship experience for students preparing for mathematics, science, or computer science teacher licensure. Interns will teach full-time in secondary schools with mentoring and support provided by university supervisors and experienced classroom educators. Licensure program requirements should be completed before the internship semester. Corequisite: STEM 44003. (Typically offered: Spring)

STEM 50003. Introduction to Teaching Secondary Science. 3 Hours.

Study of the methods and materials for teaching science. Includes philosophical, cognitive, and psychological dimensions of teaching science. The planning of instruction, microteaching, safety and liability issues, and the development of instructional materials are included. Prerequisite: Admission to Teacher Education (EDUCMA) M.A.T. program. (Typically offered: Fall)

STEM 50203. Creativity and Innovation in STEM. 3 Hours.

This introductory course in technology and engineering education (TEED) focuses on the development and introduction of TEED activities to support science and mathematics instruction in the elementary classroom. Through hands-on, problem-based learning challenges, students will develop and understanding of the engineering design process and the integration of STEM often used to solve real-world problems. Prerequisite: STEM 40303 or STEM 50303. (Typically offered: Fall and Summer)

STEM 50303. Introduction to STEM Education. 3 Hours.

This course provides an introduction to the foundations of STEM education disciplines and the strategies used to deliver integrative STEM education in the elementary and secondary school setting. The nature of STEM education disciplines, STEM pedagogy, teaching strategies, integrative STEM learning, STEM careers, and problem-centered instruction are addressed. Graduate degree credit will not be given for both STEM 40303 and STEM 50303. (Typically offered: Spring and Summer)

STEM 50703. Teaching Programming in the Secondary Schools. 3 Hours.

This course provides an introduction to the foundations of teaching methods for computer programming in the secondary schools. Methods of computer programming instruction will include teaching strategies in coding, developing computational thinking, problem-solving skills, and applying key programming concepts. (Typically offered: Irregular)

STEM 51004. Astronomy for Educators. 4 Hours.

Astronomy for Educators splits evenly between the basics of astronomy and practical methods for teaching astronomy effectively to all grade levels. The class is appropriate and effective for elementary, middle school, and secondary educators. Pedagogy focuses on the use of low-cost models that help all students grasp astronomy fundamentals such as phases of the Moon and how our solar system works. Lab activities include building and working with scientific models, evening lab activities give students the opportunity to use telescopes and binoculars to observe the Moon, planets, constellations and more. No prior experience or astronomy knowledge is assumed for this course. Graduate degree credit will not be given for both STEM 41004 and STEM 51004. (Typically offered: Fall and Spring)

STEM 52003. Problem-Based Mathematics. 3 Hours.

This graduate level course focuses on sharing, modeling and practicing strategies to support the meaningful integration of science, technology, engineering and mathematics (STEM) with the emphasis on mathematics in the K-4 classroom. A strong foundation for integrating the STEM disciplines through a problems-based approach within the elementary curriculum will be developed by providing students with theoretical frameworks, research, resources, and methods related to appropriate and effective classroom practice. Prerequisite: CIED 31203. (Typically offered: Irregular)

STEM 52103. Teaching Problem-Based Science in the Elementary Grades. 3 Hours.

This graduate level course focuses on sharing, modeling and practicing strategies to support the meaningful integration of science, technology, engineering and mathematics (STEM) with the emphasis on science in the K-4 classroom. A strong foundation for integrating the STEM disciplines through a problems-based approach within the elementary curriculum will be developed by providing students with theoretical frameworks, research, resources, and methods related to appropriate and effective classroom practice. Prerequisite: STEM 31403 and admission to either Elementary Education (ELEDMA) or Curriculum and Instruction (CIEDME) program. (Typically offered: Spring)

STEM 53003. Teaching Secondary Mathematics. 3 Hours.

Study of the methods and materials in teaching middle, junior high, and high school mathematics. Philosophical, cognitive, and psychological dimensions of teaching secondary topics including, but not limited to algebra, geometry, and statistics. The planning of instruction, microteaching, and the development of instructional materials are included. Prerequisite: Admission to Teacher Education (EDUCMA) M.A.T. program. (Typically offered: Summer)

STEM 53103. Teaching Secondary Mathematics II. 3 Hours.

Framed by current literature in mathematics education, teacher candidates will deepen their knowledge of effective practices for teaching mathematics, and essential elements of school mathematics programs such as access and equity, curriculum, and assessment. The course will focus on pedagogy for teaching high school mathematics content. Prerequisite: STEM 53003. (Typically offered: Spring)

STEM 53303. Nature of Science: Philosophy of Science for Science Educators. 3 Hours.

The Nature of Science is a hybrid discipline drawing from philosophy, history and sociology of science and the psychology of scientific observation to provide a complete view of how science functions. This understanding is particularly important for science teachers. Prerequisite: Graduate standing. (Typically offered: Spring)