STEM Education (STEM)

Courses

STEM 2003. 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 2103. 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 3143. 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 ELELBS majors), (BIOL 1543, BIOL 1541L, GEOS 1113, and GEOS 1111L), and ((ASTR 2003 and ASTR 2001L) or (STEM 4104 (offered in fall only)) or (GEOS 1133 and GEOS 1131L) or (PHYS 1034 (offered in spring only))). (Typically offered: Fall and Spring)

STEM 3203. 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 2103. (Typically offered: Spring)

STEM 4033. 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 4043. 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 4033. (Typically offered: Spring)

STEM 4104. 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 4303. 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 3203. (Typically offered: Fall)

STEM 4313. 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 3203. (Typically offered: Spring)

STEM 4333. 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 4403. 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 4506. (Typically offered: Spring)

STEM 4506. 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 4403. (Typically offered: Spring)

STEM 5023. 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 4033 or STEM 5033 (formerly STEM 4033). (Typically offered: Fall and Summer)

STEM 5104. 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 4104 and STEM 5104. (Typically offered: Fall and Spring)
STEM 5203. 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 3123. (Typically offered: Irregular)

STEM 5213. 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: CIED 3143 and admission to either Elementary Education (ELEDMA) or Curriculum and Instruction (CIEDME) program. (Typically offered: Spring)

STEM 5303. 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 5313. 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 5303. (Typically offered: Spring)

STEM 5333. 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)