

# SCIENCE EDUCATION (SCIED)

## SCIED 550: Science Education Curriculum

3 Credits

History, analysis, and evaluation of precollege science curricula. SCIED 550 Science Education Curriculum (3) The course examines the precollege science curriculum: its history in the United States, the sociocultural influences that shaped it, the impact of recent state and national science standards documents, the evolution of changing theoretical and practical aspects of curriculum design, and the influence of science education research on curriculum. Participants investigate and apply methods for analyzing and evaluating curricula, and review research on the impacts of curriculum and instruction on student learning and other outcomes. Broader questions concerning economics, ethnicity, language, gender, and class will inform this work.

## SCIED 551: History, Philosophy, & Sociology of Science and Science Teaching

3 Credits

Examination of the implications of history, philosophy, and sociology of science for science teaching. SCIED 551 History, Philosophy, & Sociology of Science and Science Teaching (3) This course explores science and school science studies from a sociocultural perspective. Topics draw from scholarship in the sociology, philosophy, and discourse of science. Among the central topics for discussion will be the social context of disciplinary knowledge, problems of experimentation, ideological bias in research, feminist critiques of science, the discourse of school science, multicultural issues in science, and knowledge access issues. The focus will remain on curriculum, instruction, and learning throughout the course. The course goals include learning about the history, philosophy, and sociology (HPS) of science as related to science education, learning about educational research and scholarship, applying ideas from HPS to the field of science education research. Students are expected to examine and interpret contemporary research in science education and related fields.

**Prerequisite:** graduate standing

## SCIED 552: Science Teaching and Learning

3 Credits

Exploration of the theoretical and empirical foundations of the teaching and learning of science. SCIED 552 Science Teaching and Learning (3) This course is an exploration of the foundational empirical and theoretical research in the teaching and learning of science. The first part of the course includes a core of learning theory based in the literature of education and science education. In addition to this theoretical work students will read empirical studies based on different theoretical foundations allowing for the critical examination of the relationship between theory and empirical based on theory. The readings and discussions in this course will be centered on the questions of "Is there a science of education that allows us to make instructional decisions in science teaching based on research?" and "What is the theoretical basis of standards-based science education reforms such as inquiry-based science?" The goal of this course is to help students develop a core foundational knowledge in the science education literature as well as an articulated theoretical framework for teaching and learning they can use to develop their own research projects.

## SCIED 558: Research Problems in Science Teaching

3 Credits

Problems and research dealing with curriculum, materials, evaluation, and supervision of science teaching and learning.

**Prerequisite:** SCIED412 or SCIED458 ; teaching experience

## SCIED 559: Analysis of Instruction in Elementary Science Education

3 Credits

Analysis of the history, issues, trends, and research in elementary science education.

**Prerequisite:** teaching experience, 3 credits in elementary science methods, and 18 credits of science courses

## SCIED 583: Survey of Research in Learning Sciences and Technology

3 Credits

Analysis and evaluation of research in domains of learning sciences and technology. This course reviews the empirical research literature from the Learning Sciences and Technology fields. Students will gain experiences reading and understanding research papers to understand modern perspectives on the theories, models, methods, and tools used in the learning sciences.

Cross-listed with: LDT 583

## SCIED 590: Colloquium

1-3 Credits/Maximum of 3

continuing seminars that consist of a series of individual lectures by faculty, students, or outside speakers.

## SCIED 596: Individual Studies

1-9 Credits/Maximum of 9

Creative projects, including nonthesis research, which are supervised on an individual basis and which fall outside the scope of formal courses.

## SCIED 597: Special Topics

1-9 Credits/Maximum of 9

Formal courses given on a topical or special interest subject which may be offered infrequently.

## SCIED 855: Precollege Engineering Education

3 Credits

This course is intended to help experienced educators to critically understand the "E" in "STEM education." Engineering has only recently roared into state and national curriculum standards, venturing out of its traditional lair in higher education. We explore the reasons for this development, as well as the opportunities and challenges that the change presents for students and teachers. As we proceed, we draw upon the varied experiences of participants, including teachers from elementary, middle, and secondary schools, as well as informal settings such as science museums. Because few precollege STEM teachers have studied engineering formally, we review the history and nature of engineering, and work through a number of activities that model aspects

of engineering work. Throughout the course, an emphasis is placed on the epistemic practices of engineering, which make the subject unique among school subjects. Contemporary relevant school curricula and informal educational programs are reviewed, and students carry out an actual design project. This course is intended for teachers, and prior formal training in design, modeling, and physics is not required.