Science

SCI 5310 Perspectives in Science and Math (3 semester credit hours) Journey through science and mathematics as a human endeavor through historical context. Science and mathematics have advanced by the struggles of diverse people, on the basis of often-conflicting criteria and interests. In this graduate-level survey course, future science and mathematics teachers will explore their disciplines through the broader perspective of discovery, individual and community struggles, social influences, and societal impacts. The course is designed for science, technology, engineering, and mathematics (STEM) content degree holders seeking UTeach Dallas secondary science and/or mathematics teacher certification preparation. UTeach Dallas/MAT advisor approval required. (3-0) Y

SCI 5322 (BIOL 5322) Basis of Evolution (3 semester credit hours) From Assembling the Tree of Life to new drug developments, evolution theory is at the core of biology advancements. The concept of evolution is discussed for its relevance as a basic understanding for a scientifically literate society and processes and mechanisms of natural selection are examined. Topics include pertinent history, the fossil record, extinction, emergent species, the human experience, and applied evolution technologies. Students will explore the origins of evolution theory, public misconceptions, teaching, and evolution education research. An intensive scientific argumentation component (rather than debate) through discourse, advanced readings, presentations, panel discussions, and formal writing is required. Viewpoints examined include those of evolutionary biologists and research scientists. (3-0) T

SCI 5324 (BIOL 5324) Ecology (3 semester credit hours) This course will examine interrelationships between organisms and their environments in both theoretical and field-based contexts. Students will examine general ecological principles and their applications. Communities considered will be as small as the roadside and as vast as interconnected global systems. Topics analyzed by students in the context of ecological studies will include the flow of energy and matter through systems, predator/prey relationships, genetic diversity, evolution, population dynamics, interactions between microscopic and macroscopic organisms, and human impacts. Fieldwork examining North Texas ecosystems may be required. Critical thinking, metacognition, and reflections on the relevance of ecology in the teaching and learning of life and environmental sciences will be emphasized throughout the course. (3-0) T

SCI 5326 (PHYS 5319) Astronomy: Our Place in Space (3 semester credit hours) Focus is on developing student understanding of how our planet fits within a larger astronomical context. Topics include common misconceptions in astronomy, scale in the Solar System and beyond, phases of the Moon, seasons, navigating the night sky, our Sun as a star, space weather, properties and lifecycles of stars, galaxies, and cosmology. (3-0) T

SCI 5327 (PHYS 5327) Comparative Planetology (3 semester credit hours) Every world in the solar system is unique, but none more so than our own planet Earth. The course is an exploration of the astrophysical, chemical, and geological processes that have shaped each planet, moons and the myriad of rocky and icy bodies in our solar system with a special emphasis on what each tells us about Earth, and what discoveries of worlds orbiting other stars may tell us about our planetary system and home world. (3-0) T

SCI 5328 Marine Science (3 semester credit hours) Acquaint STEM teachers with basic principles of marine
science and with issues surrounding our use of the oceans and their resources. Students will also gain experience in conducting research, presenting results, and developing lessons for their students. (3-0) R

**SCI 5329** Bioethics (3 semester credit hours) Bioethics incorporates philosophy and values that are at the heart of emerging technology, research, public understanding, and government policy. Focus on issues related to biotechnology in health care, ecology, agriculture and environmental disciplines including genetic transference, applied evolution technologies, assisted suicide, and new reproductive technologies. Students explore hypothetical and actual cases of bioethical dilemmas. Intensive writing component and discussion of teaching and policy development. Viewpoints examined include those of scientists, health professionals, theologians, policymakers and laypeople. (3-0) T

**SCI 5330 (BIOL 5330)** Emerging Topics in Biology (3 semester credit hours) The media frequently announce biology advancements and research that affect human health, basic living needs, and biology education without critical analysis, often resulting in confusing the public and curtailing scientific literacy. Examination of resources and methods to critically evaluate biological information and scientific articles for sound theory development, research methods, and practical application. Topics include recent discoveries in the life sciences that meet the needs of society, health, and environmental issues. Although the topics build on emerging issues, they may include content areas such as cell and molecular biology, agriculture, epidemiology, and global warming. Students will examine effective ways to bring in new curricula into established course settings. Advanced curriculum writing component focused on science literacy. Viewpoints include those of biological research scientists, health professionals, and science education researchers. (3-0) T

**SCI 5331 (PHYS 5331)** Conceptual Physics I: Force and Motion (3 semester credit hours) Focus is on deepening the participants' conceptual understanding of physics, emphasizing its applicability to the pre-college and undergraduate classroom. Uses inquiry-based approaches including examples of physics in the everyday world and connections to other fields of science. Topics include foundational concepts of forces, Newton's laws, energy, and momentum. Instructor consent required. (3-0) T

**SCI 5332 (PHYS 5332)** Conceptual Physics II: Particles and Systems (3 semester credit hours) Focus is on deepening the participants' conceptual understanding of physics emphasizing its applicability to the pre-college and undergraduate classroom. Uses an inquiry-based approach including examples of physics in the everyday world and connections to other fields of science. This second class in the Conceptual Physics series builds on concepts from **SCI 5331** to explore transfers of energy and forces within and between systems of particles. Topics include states of matter, fluids, waves and sound, and thermodynamics. Instructor consent required. (3-0) T

**SCI 5333 (PHYS 5333)** Conceptual Physics III: Atoms, Charges, and Interactions (3 semester credit hours) Focus is on deepening the participants' conceptual understanding of physics, emphasizing critical thinking and applications to the pre-college and undergraduate classroom. Uses inquiry-based approaches including examples of physics in the everyday world and connections to other fields of science. This third class in the Conceptual Physics series builds on concepts from **SCI 5331** and **SCI 5332** to explore interactions between particles of matter. Topics include inter- and intra-molecular forces, light, electricity and magnetism, and the nature of the atom. (3-0) T

**SCI 5337** Rockin' Around Texas (3 semester credit hours) Provides greater familiarity with earth science and a bank of resources and instructional materials needed to lead geology field trips anywhere in Texas.

https://catalog.utdallas.edu/2019/graduate/courses/sci
Teachers will participate in extensive field, laboratory, and class work mostly conducted in a problem-based learning format. (3-0) T

**SCI 5338** Conceptual Chemistry: The Atom and the Bridge from Physics to Biology (3 semester credit hours)
This class will focus on deepening participants' conceptual understanding of chemistry through laboratory demonstrations and activities as well as inquiry-based approaches. Students will prepare their own demonstrations and lab activities, with an emphasis on both presentation skills and conceptual content with applications to pre-college and undergraduate students. The class will use real world examples to explore topics such as element properties, behaviors of gases, and solutions. (3-0) T

**SCI 5339** Practical Approaches in Genetics (3 semester credit hours)
This graduate course is designed to cover key concepts and laboratory techniques in the field of Genetics. Students will analyze genetic model systems, such as Planaria, Drosophila, Caenorhabditis elegans, and Zebrafish, and their applications in the context of constructing understanding of essential biological processes that are not only interesting, but also often relevant to human health and welfare issues. The experiments conducted in the course will examine basic principles of genetic model systems, transmission genetics, cytological genetics, and molecular genetics. This exploratory experience will focus on both concepts in genetics and the basic culturing, genetic manipulation, and phenotypic analysis techniques necessary to utilize genetic model organisms in investigations of stem cells, cell division, modes of inheritance, genetic mutations, and much more. Throughout this inquiry-based course participants will be given "Discussion Questions" to ponder in which there may not be right or wrong answers for the purpose of examining the creative and discovery aspect of science. Critical thinking, metacognition, and reflections on the relevance of practical experience with model organisms in the teaching and learning of genetics will be emphasized throughout the course. Department consent required. (3-0) T

**SCI 5340** Statistics for Science/Mathematics Education (3 semester credit hours)
Understanding and application of statistical techniques needed in design and interpretation of research in Science/Mathematics Education. Includes descriptive and inferential statistics, computer-based tools, and other appropriate topics. (3-0) T

**SCI 5341 (PHYS 5341)** Astrobiology (3 semester credit hours)
The ultimate integrated science, astrobiology brings together cutting-edge research from the fields of astrophysics, planetary science, terrestrial geosciences, and biology, to build understanding of how the history and diversity of life on our own planet relates to the possibilities for life on other worlds. This graduate-level survey course is designed to challenge participants of all backgrounds in a thoughtful and scientifically-based exploration of the young and dynamic multidisciplinary field of astrobiology. Instructor consent required. (3-0) T

**SCI 5342** Research Methods in STEM (3 semester credit hours)
An introduction research process used by faculty in STEM disciplines. Through examples and/or projects, students will see the STEM research process, including conception, design, experimentation, analysis of results, and writing/publication. Instructor consent required. (3-0) T

**SCI 5V06** Special Topics in Science (1-3 semester credit hours)
This course will cover selected topics in Science. May be repeated for credit as topic vary (6 semester credit hours maximum). Department consent required. ([1-3]-0) S

**SCI 5V08** Independent Study in Science (1-3 semester credit hours)
Faculty-supervised independent study
in science content areas. May be repeated for credit as topics vary (6 semester credit hours maximum). Instructor consent required. ([1-3]-0) S