Science

SCI 5322 Basis of Evolution (3 semester 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 5323 Laboratories and Demonstrations for Middle School Science Teachers (3 semester hours) This course will emphasize ways that laboratory work and demonstrations help pre-high school students to acquire lasting understanding of concepts in chemistry and physics. Through a variety of laboratory exercises and demonstrations, teachers will be encouraged to select appropriate materials for their curriculum. Development of laboratory and demonstration presentation skills as well as new modules will be included in the course work. (2-3) Y

SCI 5324 Ecology (3 semester hours) Ecology is the study of the interrelationships and patterns of organisms and their environments. Students will examine general ecological principles as related to productivity, population diversity, communities and ecosystem functions. Hands-on activities explore plant/insect interactions through traditional research and digital field sampling methods. This inquiry-based introductory course is aligned with instructional technology and ecology science teaching standards in the context of real-world constructivist practices. Participants will conduct student designed scientific investigations, including research question development, field collections, data analysis methods, and scientific writing. Students will prepare and submit a scientific journal manuscript. Includes a major field study component with daily and overnight off-campus field trips. Viewpoints examined include those of ecologists, entomologists, environmental scientists, and teachers. (2-3) T

SCI 5326 (PHYS 5319) Astronomy: Our Place in Space (3 semester 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 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 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. (2-3) Y

**SCI 5329** Bioethics (3 semester 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** Emerging Topics in Biology (3 semester 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 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. (3-0) T

**SCI 5332 (PHYS 5332)** Conceptual Physics II: Particles and Systems (3 semester 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. (3-0) T

**SCI 5333 (PHYS 5333)** Conceptual Physics III: Atoms, Charges, and Interactions (3 semester 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. (3-1) T

**SCI 5337** Rockin' Around Texas (3 semester hours) Provides greater familiarity with earth science and a bank of resources and instructional materials needed to lead geology field trips anywhere in Texas. Teachers will participate in extensive field, laboratory, and class work mostly conducted in a problem-based learning format. (2-3) T
Course Descriptions

SCl 5340 Statistics for Science/Mathematics Education (3 semester 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) Y

SCl 5341 (PHYS 5341) Astrobiology (3 semester 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. (3-0) T

SCl 5342 Research Methods in STEM (3 semester 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. (3-0) T

SCl 5v06 Special Topics in Science (1-3 semester hours) May be repeated for credit to a maximum of 9 hours. ([1-3]-1) S

SCl 5v08 Independent Study in Science (1-6 semester hours) Faculty-supervised independent study in science content areas. May be repeated for credit regardless of topics (12 hours maximum). ([1-6]-0) Y