

# Science (General) (SCIE)

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## COURSES

### **SCIE 1201. STEP 1: INQUIRY APPROACHES TO TEACHING. 2 Hours.**

STEP 1 allows students to explore teaching as a career. Following an introduction to the theory and practice behind excellent inquiry-based science and mathematics instruction, students observe two and teach three lessons in elementary classrooms to obtain firsthand experience in planning and implementation. A grade of C or better is required for this course to apply towards a UTeach degree.

### **SCIE 1202. STEP 2: INQUIRY-BASED LESSON DESIGN. 2 Hours.**

In STEP 2, students continue developing the lesson planning skills learned in STEP 1 as they become familiar with exemplary middle school science curricula. After observing a lesson being taught in a local school district classroom, students work alone or in pairs to plan and teach three inquiry-based lessons to sixth, seventh, or eighth graders. Prerequisite: C or better in SCIE 1101 or SCIE 1201.

### **SCIE 1334. STEP 1 & 2 COMBO: INQUIRY APPROACHES TO TEACHING & LESSON DESIGN. 3 Hours.**

STEP 1 & 2 Combo allows students to explore teaching as a career. Following an introduction to the theory and practice behind excellent inquiry-based science and mathematics instruction, students observe two lessons being taught in a local school district. Students will then work alone or in pairs to plan and teach four inquiry-based lessons to elementary and middle school students. This course is for students completing the UTeach program in two years or less. A grade of C or better is required for this course to apply towards a UTeach degree.

### **SCIE 1350. INTRODUCTION TO DATA SCIENCE. 3 Hours.**

A survey of contemporary approaches to data-driven discovery. This course will be the required entry point for students majoring in Data Science and is designed to be accessible to all others interested in the modern data revolution. The course includes discussions of ethical principles involving privacy, data security, and broader societal implications.

### **SCIE 2301. FOUNDATIONS OF SCIENCE. 3 Hours.**

An integrated presentation of the methodology and fundamental concepts in the physical, biological and behavioral sciences with special emphasis on their social, cultural and historical context. Topics will be organized around a selected theme, such as origins, the environment or science and society. The primary goal is to prepare students to participate in modern society. This course does not require previous background in the sciences.

### **SCIE 2392. SPECIAL TOPICS IN SCIENCE. 3 Hours.**

Topics as selected by the instructor. May be repeated for credit as the topic varies. Prerequisite: permission of the department.

### **SCIE 3301. PHYSICAL SCIENCE - PHYSICS. 3 Hours.**

This integrated study of physics and chemistry includes force and motion, waves, thermodynamics energy transformations, and quantum physics. This course is designed to meet the needs of students seeking to become elementary or middle school science teachers.

### **SCIE 3302. PHYSICAL SCIENCE - CHEMISTRY. 3 Hours.**

This physical science includes atomic structure, chemical bonding, the periodic table, nomenclature, kinetic theory, gas laws, chemical equations, and solutions. This course is designed to meet the needs of students seeking to become elementary or middle school science teachers.

### **SCIE 3303. GEOLOGY, METEOROLOGY, AND OCEANOGRAPHY. 3 Hours.**

This integrated study of the earth emphasizes interactions among plate tectonics, the atmosphere, the oceans, the biosphere, and human activity. Topics include formation, composition, and shaping of the earth, including plate tectonics, the rock cycle, natural energy resources, characteristics of oceans, characteristics of the atmosphere, climate, and weather. This course is designed to meet the needs of students seeking to become elementary or middle school science teachers.

### **SCIE 3304. ASTRONOMY. 3 Hours.**

Topics include the evolution of the universe, properties of light and the life cycle of stars, galaxies, and apparent motions and characteristics of the solar system. This course is designed to meet the needs of students seeking to become elementary or middle school science teachers.

### **SCIE 3305. ENVIRONMENTAL SYSTEMS. 3 Hours.**

Topics include interrelationships among biotic and abiotic factors within habitats, ecosystems, and biomes and the energy flow through environmental systems. This course is designed to meet the needs of students seeking to become elementary or middle school science teachers.

### **SCIE 4101. SPECIAL TOPICS IN COMPOSITE SCIENCE. 1 Hour.**

This special seminar will focus on contemporary issues on integrated science topics, including reflections on science teaching experiences and contemporary critical issues in science education. Prerequisite: permission of instructor.

### **SCIE 4107. CAPSTONE TEACHING EXPERIENCE SEMINAR. 1 Hour.**

Restricted to students in the UTeach Arlington program. Discussions include capstone teaching experiences, contemporary critical issues in education, and preparation for the state certification exams. Prerequisite: C or better in SCIE 4333; concurrent enrollment in SCIE 4607; in good standing with UTeach program.

### **SCIE 4192. SELECTED TOPICS IN SCIENCE. 1 Hour.**

(Variable credit 1-3 hours as arranged). Topics in science not treated in the regular curriculum. Topic, format, and prerequisites to be determined by the instructor. May be repeated for credit as different topics are offered.

**SCIE 4301. ISSUES IN AMERICAN HEALTHCARE. 3 Hours.**

Survey of current issues in American healthcare to include medical ethics, holistic medicine, nutrition, wellness, and the economics of healthcare. This course is the capstone course required for a College of Science interdisciplinary minor in Health Studies. This course is only open to students completing a minor in Health Studies within the College of Science.

**SCIE 4302. TEACHING AND LEARNING: SCIENTIFIC INQUIRY. 3 Hours.**

Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. This course explores inquiry as it refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world.

**SCIE 4303. CLINICAL MEDICINE AND THE HUMAN EXPERIENCE. 3 Hours.**

This will be a medical survey course describing the human experience through the lens of different medical specialties and patient perspective rather than current medical therapies. Example: in our cardiology discussion will examine the patient's perspective on having a heart attack rather than the medications for treatment.

**SCIE 4304. DIAGNOSIS OF HUMAN DISEASE. 3 Hours.**

This clinical medicine course will examine a variety of diagnostic tools, such as laboratory, radiologic, and scanning techniques used to screen, diagnose, and monitor a wide variety of health and disease states.

**SCIE 4325. WOMEN IN SCIENCE. 3 Hours.**

Explores the role of women in science. Emphasis on gender and science, the history of women in science, gender equity in the classroom, strategies for the retention of women scientists, the current culture/climate for women in science, and contemporary women in science. Offered as EDUC 4325, SCIE 4325, and GWSS 4325. Credit will be granted only once.

**SCIE 4331. KNOWING AND LEARNING IN STEM. 3 Hours.**

Psychological foundations of learning; problem solving in mathematics and science education utilizing technology; principles of expertise and novice understanding of subject matter; implications of high-stakes testing; and foundations of formative and summative assessment. A grade of C or better is required for this course to apply towards a UTeach degree. Prerequisite: C or better in SCIE 1201 or SCIE 1334 or concurrent enrollment in either.

**SCIE 4332. CLASSROOM INTERACTIONS. 3 Hours.**

Principles of delivering effective instruction in various formats (lecture, lab activity, collaborative settings); examination of gender, class, race, and culture in mathematics and science education; overview of policy related to mathematics and science education. Includes approximately 6 hours of field experience at the high school level. A grade of C or better is required for this course to apply towards a UTeach degree. Prerequisite: C or better in SCIE 1202 or SCIE 1334; C or better in SCIE 4331 or concurrent enrollment.

**SCIE 4333. MULTIPLE TEACHING PRACTICES. 3 Hours.**

Multiple research-based teaching practices including foundations of project-based, case-based, and problem-based learning environments; principles of project-based curriculum development in mathematics and science education; classroom management and organization of inquiry-based, problem-based/project-based learning classrooms. Includes approximately 10 hours of field experience at the high school level. A grade of C or better is required for this course to apply towards a UTeach degree. Prerequisite: C or better in SCIE 4332.

**SCIE 4607. CAPSTONE TEACHING EXPERIENCE FOR STEM SECONDARY GRADES. 6 Hours.**

Closely supervised field experience in a cooperating school. Experience includes carrying out the duties of a secondary teacher. Consent of the UTeach Arlington advisor is required. Prerequisite: C or better in SCIE 4333; concurrent enrollment in SCIE 4107; in good standing with UTeach program.

**SCIE 5192. SELECTED TOPICS IN SCIENCE. 1 Hour.**

Topics in science not treated in the regular curriculum. Topic, format, and prerequisites to be determined by the instructor. May be repeated for credit as different topics are offered.

**SCIE 5292. SELECTED TOPICS IN SCIENCE. 2 Hours.**

Topics in science not treated in the regular curriculum. Topic, format, and prerequisites to be determined by the instructor. May be repeated for credit as different topics are offered.

**SCIE 5301. CONTEMPORARY SCIENCE. 3 Hours.**

This class will review modern topical areas in contemporary science from a broadly multidisciplinary view. Readings from popular and scientific journals will be combined with lectures from different disciplines, to review the newest science innovations. Materials presented will familiarize students with current research, major breakthroughs in various fields, and the foundational science behind the discoveries. Topics covered should enrich K-12 science curricula and help teachers to address student questions about breaking science news. This class is intended for M.A. in Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in the College of Science.

**SCIE 5302. CAPSTONE SCIENCE SEMINAR. 3 Hours.**

The Capstone Science Seminar is an intensive research and discussion class that will focus on new studies in science education and practice. Students in the M.A. in Science program should take this class in the last semester of study. This class will include a research project relevant to science education, and formal presentation of the research. This class is intended for M.A. in Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in the College of Science.

**SCIE 5303. TEACHING AND LEARNING: SCIENTIFIC INQUIRY. 3 Hours.**

Scientific inquiry refers to the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. This course explores inquiry as it refers to the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world.

**SCIE 5304. SPECIAL TOPICS IN SCIENCE I. 3 Hours.**

Seminar on significant research in science. Topics are selected with the assistance of the instructor and may include both pure and applied science.

**SCIE 5305. SPECIAL TOPICS IN SCIENCE II. 3 Hours.**

Seminar on significant research in science. Topics are selected with the assistance of the instructor may include both pure and applied science.

**SCIE 5307. INTEGRATED PHYSICS AND CHEMISTRY: CHEMISTRY. 3 Hours.**

This integrated study of physics and chemistry fundamental chemical principles including atomic structure, chemical bonding, the periodic table, nomenclature, kinetic theory, gas laws, chemical equations, and solutions.

**SCIE 5308. INTEGRATED PHYSICS AND CHEMISTRY: PHYSICS. 3 Hours.**

This integrated study of physics and chemistry includes force and motion, waves and thermodynamics, energy transformations, quantum physics, and atomic structure.

**SCIE 5321. MECHANICS, HEAT, & WAVE MOTION. 3 Hours.**

This course is intended for students who wish to achieve a higher level of knowledge and effectiveness in the teaching of fundamental physics. Topics include: 1) Newton's laws of motion, gravitation, and planetary motion; 2) the basic laws of thermal and statistical physics; 3) oscillatory motion including wave and sound. Replicable experiments will be demonstrated throughout the course. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for M.S. or Ph.D. degrees in the College of Science. Prerequisite: Trigonometry.

**SCIE 5322. ELECTRICITY, MAGNETISM, CIRCUITS, & OPTICS. 3 Hours.**

This course is intended for students who wish to achieve a higher level of knowledge and effectiveness in the teaching of fundamental physics. Topics include: 1) Static charges, current flows, electric and magnetic fields; 2) simple DC/AC electrical circuits including examples from household circuit and practical electronic devices; 3) light and optics including examples such as camera, microscopes and telescopes. Replicable experiments will be demonstrated throughout the course. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for M.S. or Ph.D. degrees in the College of Science. Prerequisite: SCIE 5321.

**SCIE 5323. MODERN PHYSICS. 3 Hours.**

This course is intended for students who wish to achieve a higher level of knowledge and effectiveness in the teaching of fundamental physics. Topics include: 1) introduction to special relativity and quantum theory; 2) light and radiation; 3) applications to modern electronic devices; 4) nuclear particle physics. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for M.S. or Ph.D. degrees in the College of Science. Prerequisite: SCIE 5321, SCIE 5322.

**SCIE 5329. LABORATORY TECHNIQUES IN PHYSICS. 3 Hours.**

This course is intended for students who wish to achieve a higher level of knowledge and effectiveness in the teaching of fundamental physics. Experiments demonstrating various topics are covered. Experiments include gravitational acceleration heat flow, harmonic motion, sound, electric, magnetic fields, electric circuits, optic, x-rays and nuclear radiation. This class is intended for M.A. in Interdisciplinary Science majors and may not be taken for credit for M.S. or Ph.D. degrees in the College of Science. Prerequisite: SCIE 5321, SCIE 5322.

**SCIE 5330. EARTH SYSTEMS, PART I. 3 Hours.**

A review of Earth materials and their chemistry. Earth structure and geologic time, followed by a detailed discussion of the plate tectonic system, the hydrologic system, and their interaction in weathering and erosion, sedimentation, and landscape development. Laboratory demonstrations will include identification of earth materials, estimating plate motions, location of earthquake epicenters, flood frequency, and groundwater discharge. These classes are intended for M.A. in Interdisciplinary Science majors and may not be taken for credit for the M.S. or Ph.D. degrees in Geology or any other College of Science discipline.

**SCIE 5331. EARTH SYSTEMS, PART II. 3 Hours.**

A detailed discussion of the atmosphere system, oceanic systems, biologic systems, and their history. A summary discussion of the interaction of Earth Systems for an understanding of processes that have formed and continue to form the Planet Earth. Laboratory demonstrations will include weather forecasting, ocean currents, sea level change, and fossil identification. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Geology or any other College of Science discipline. Prerequisite: SCIE 5330 and admission into the M.A. in Interdisciplinary Science program.

**SCIE 5332. EARTH RESOURCES & THE ENVIRONMENT. 3 Hours.**

A detailed discussion of resources that support life: atmosphere, water, soil, minerals and materials, and energy; the use of those resources and the effect on the environment and global change; and the relation between population, resource distribution and availability, and environmental pollution. These classes are intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Geology or any other College of Science discipline. Prerequisite: SCIE 5330, SCIE 5331, and admission into the M.A. in Interdisciplinary Science Program.

**SCIE 5335. LABORATORY METHODS & TECHNIQUES. 3 Hours.**

Methods and techniques used to identify minerals, rocks and fossils; maps and mapping of geological data; recognition of landslides; flood frequency and erosion processes of river and streams; location of earthquakes. These classes are intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Geology or any other College of Science discipline. Prerequisite: SCIE 5330, SCIE 5331 and admission into the M.A. in Interdisciplinary Science Program.

**SCIE 5355. PRINCIPLES OF CHEMISTRY. 3 Hours.**

The fundamentals of atomic structure, chemical bonding, the periodic table, nomenclature, gas laws, chemical equations, and solutions. The course will be supplemented with laboratory demonstrations devoted to chemical problem-solving, library and Internet resources, chemical ethics, etc. This course is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Chemistry or any other College of Science discipline.

**SCIE 5356. PRINCIPLES OF CHEMISTRY II. 3 Hours.**

Study of advanced atomic structure and bonding concepts, acid-base theory, kinetics and equilibria, thermodynamics, electrochemistry, and the chemistry of some elements. The course will be supplemented with laboratory demonstrations devoted to chemical problem solving, library and internet resources, chemical ethics etc. This course is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for M.S. or Ph.D. degrees in Chemistry or any other College of Science discipline. Prerequisite: SCIE 5355.

**SCIE 5357. INTRODUCTORY ORGANIC & BIOCHEMISTRY. 3 Hours.**

Survey of organic and biochemistry with emphasis on application to the human body. Organic functional groups and nomenclature, organic reactions, carbohydrates, lipids, proteins, enzymes, metabolism, and nucleic acids. This course is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for M.S. or Ph.D. degrees in Chemistry or any other College of Science discipline. Prerequisite: SCIE 5355, SCIE 5356.

**SCIE 5358. LABORATORY PROBLEMS IN CHEMISTRY. 3 Hours.**

Experiments related to fundamental principles covered in SCIE 5355 (formerly CHEM) and SCIE 5356. Volumetric and gravimetric determinations and qualitative analysis. This course is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Chemistry or any other College of Science discipline. Prerequisite: SCIE 5355, SCIE 5356.

**SCIE 5371. CELL AND MOLECULAR BIOLOGY. 3 Hours.**

The course focuses on the chemical and molecular basis of life, including metabolism, cell structure and function and genetics. This class is intended for M.A. in Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Biology or any other College of Science discipline.

**SCIE 5372. STRUCTURE & FUNCTION OF ORGANISMS. 3 Hours.**

The study of structure and function of plants and animals. Topics to be covered include structure at the level of the cell, tissue, organ and individual, growth, transport/circulation/gas exchange, nutrition, reproduction, development, endocrinology, and animal neural regulation. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Biology or any other College of Science discipline. Prerequisite: SCIE 5371.

**SCIE 5373. EVOLUTION, ECOLOGY, AND BIODIVERSITY. 3 Hours.**

Reviews three significant aspects of organismal biology and presents current hypotheses concerning the origin and diversification of life on Earth. The ecological and behavioral interactions between organisms and their biotic/abiotic environments are considered from an evolutionary perspective. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Biology or any other College of Science discipline. Prerequisite: SCIE 5371, SCIE 5372.

**SCIE 5374. LABORATORY PROBLEMS IN BIOLOGY. 3 Hours.**

Laboratory experiments related to fundamental principles covered in SCIE 5371 (formerly BIOL) and SCIE 5372. This course will utilize labs designed by Master Biology Teachers. These will be supplemented by labs published by the National Association of Biology Teachers, and various biology publishers. This class is intended for M.A. in Interdisciplinary Science majors, and may not be taken for credit for the M.S. or Ph.D. degrees in Biology or any other College of Science discipline. Prerequisite: SCIE 5371, SCIE 5372.

**SCIE 5380. MENTORED RESEARCH. 3 Hours.**

Research under the direction of a College of Science faculty member. No more than six credit hours of SCIE 5380 may be taken for a letter grade. Prerequisite: written permission of the instructor.

**SCIE 5392. SELECTED TOPICS IN SCIENCE. 3 Hours.**

Topics in science not treated in the regular curriculum. Topic, format, and prerequisites to be determined by the instructor. May be repeated for credit as different topics are offered.