

# Science (SCI)

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## **SCI 2600. Lab Safety for Teachers. 1 Hour.**

Scientific school laboratory safety certification course required for secondary education majors to receive teaching endorsements in the sciences. Course will include the necessary knowledge required for pre-service teachers to safely teach lab science, including identifying the most common safety issues and providing affordable solutions. Offered upon sufficient student need. **\*\*COURSE LEARNING OUTCOMES (CLOs)** At the successful conclusion of this course, students will be able to: 1. Prepare and manage a safe and effective secondary education science laboratory. 2. Explain general safety responsibilities of workers and employers. 3. Interpret and explain safety data sheets (SDS). 4. Explain hazard communication standards (right to know laws). 5. Recognize and teach emergency procedures as well as the proper use of protective personal equipment. 7. Explain and communicate proper disposal procedures.

## **SCI 4100R. Cultural and Archaeological Expedition to Oman. 1 Hour.**

Embark on a transformative journey through the heart of Oman's cultural heritage and archaeological wonders. This is a captivating travel study program designed to immerse participants in the vibrant tapestry of Omani traditions, history, and archaeological marvels. This experiential course offers a unique blend of in-depth cultural exploration and hands-on archaeological adventures. A highlight of this course is an archeological dig and exploration at Khor Kharfot in Oman where students will gain practical experience in the excavation, handling, and recording of artifacts. See [studyabroad.utahtech.edu](http://studyabroad.utahtech.edu) for additional travel costs that may apply. **\*\*COURSE LEARNING OUTCOMES (CLOs)\*\*** At the conclusion of this course students will: 1. Compare literary and scientific readings. 2. Produce and analyze scientific data from field investigations. 3. Interpret the local context of collected data. 4. Apply the concepts and skills they are acquiring in their own areas of study.

## **SCI 4700. Secondary Science Teaching Methods. 3 Hours.**

Acquaintance and practice with various teaching and assessment methods in science. Development of science curricula emphasizing the integrated linkages between subjects. Development of science lesson and unit plans. It is recommended that students complete this course immediately prior to student teaching. **\*\*COURSE LEARNING OUTCOMES (CLOs)** At the successful conclusion of this course, students will be able to: 1. Plan and teach lessons based on differences in cognitive, linguistic, social, emotional and physical areas of student development. 2. Create content instruction according to individual learner differences and cultural and linguistic diversity. 3. Apply current science education standards to lesson plan development. 4. Use varied assessments to promote student achievement of science content standards. 5. Articulate a rationale for the place of controversial scientific topics in the secondary schools. 6. Develop awareness of the role of science content as a means for participation of youth as contributing members of a social and political democracy. 7. Demonstrate appropriate proficiency in practicum experience. SP.

## **SCI 4710. Innovative Solutions - Research and Design. 1 Hour.**

This is the first course in the Innovative Solutions Course Series focusing on research and design. The goal of this course series is to prepare students to solve interdisciplinary problems by engaging them in research setting that come directly from real world scenarios. As part of this course, interdisciplinary groups of 3-5 will be created, with each member of the group from a different STEM discipline. Student teams will select a project from a number of available real-world problems. This course will engage students in the following research experiences: evaluation of research literature; collaboration across multiple disciplines; application of knowledge toward novel solution; reflection; and participation in the design process. By the end of the course series, each group will produce a solution to their problem and complete a written, oral, and poster summary of their work. **\*\* COURSE LEARNING OUTCOMES (CLOS)** 1. Experience how interdisciplinary problems are solved in the real world. 2. Assess and revise their own results in order to arrive at a solution that meets the practical constraints of the real-world scenario. 4. Collaborate in small teams working toward a common goal. 5. Improve their communication skills by presenting and clarifying technical results. 6. Prepare for a potential career in STEM and increase awareness about the growing pool of non-academic careers. FA.

## **SCI 4720. Innovative Solutions - Product Development. 1 Hour.**

This is the second course in the Innovative Solutions Course Series focusing on prototyping and deployment. The goal of this course series is to prepare students to solve interdisciplinary problems by engaging them in research setting that come directly from real world scenarios. As part of this course, interdisciplinary groups of 3-5 will be created, with each member of the group from a different STEM discipline. Student teams will select a project from a number of available real-world problems. This course will engage students in the following research experiences: evaluation of research literature; collaboration across multiple disciplines; application of knowledge toward novel solution; reflection; and participation in the design process. By the end of the course series, each group will produce a solution to their problem and complete a written, oral, and poster summary of their work. **\*\*COURSE LEARNING OUTCOMES CLO's** At the successful conclusion of this course, students will be able to: 1. Experience how interdisciplinary problems are solved in the real world. 2. Assess and revise their own results in order to arrive at a solution that meets the practical constraints of the real-world scenario. 4. Collaborate in small teams working toward a common goal. 5. Improve their communication skills by presenting and clarifying technical results. 6. Prepare for a potential career in STEM and increase awareness about the growing pool of non-academic careers. SP.

**SCI 4730. Innovative Solutions - Entrepreneurship. 1 Hour.**

This is the third course in the Innovative Solutions Course Series focusing on entrepreneurship. The goal of this course series is to prepare students to solve interdisciplinary problems by engaging them in research setting that come directly from real world scenarios. As part of this course, interdisciplinary groups of 3-5 will be created, with each member of the group from a different STEM discipline. Student teams will select a project from a number of available real-world problems. This course will engage students in the following research experiences: iteration of their minimum viable product, entrepreneurship and business model creation, identify the appropriate customer for their product, and applying entrepreneurship principles to their project prototype, and participating in a pitch competition with their product. **\*\*COURSE LEARNING OUTCOMES (CLO's)** At the successful conclusion of this course, students will be able to: 1. Validate your minimum viable product to match customer needs. 2. Identify a potential market for your minimum viable product. 3. Distinguish all the stakeholders, deployment issues, costs, and resources involved in taking your minimum viable product. 4. Identify key personal attributes that are more likely to lead to entrepreneurial success. 5. Apply principles of entrepreneurship to prototyped project. FA.

**SCI 4750. Science and Engineering Pedagogical Knowledge. 3 Hours.**

Using the 3 dimensions of science and engineering (Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts), this course will engage students in developing meaningful understandings of problem-based approaches to teaching, learning, and the integration of engineering practices across science curriculum using appropriate practices. Students will demonstrate their skills through the development and creation of a problem-based, hands-on design experience, and introduces practicing teachers to the nature of science and engineering practices and processes. **\*\*COURSE LEARNING OUTCOMES (CLOs)\*\*** At the successful conclusion of this course students will: 1) Develop a deeper understanding the nature of science and engineering. 2) Use scientific understanding and engineering solutions for different topics. 3) Demonstrate that science is a way of knowing and assumes an order and consistency in natural systems. 4) Compare and contrast the process of scientific inquiry with the engineering design cycle. 5) Use empirical evidence to develop scientific knowledge and engineering solutions. FA.

**SCI 4800R. Independent Research. 1-3 Hours.**

Students will devise and perform original, preferably unique research projects in their respective Physical Science fields. The culmination of this project will be a publication-quality paper on their research that uses primary scientific literature pertinent to the student's field and individual projects. Repeatable for a maximum of 6 credits subject to graduation restrictions. Offered upon sufficient student need. **\*\*COURSE LEARNING OUTCOMES (CLOs)** At the successful conclusion of this course, students will be able to: 1. Use the scientific method to develop hypotheses, design experiments, and draw conclusions from results. 2. Design and modify experiments during the progress of a research project. 3. Interpret results from experiments, modify the hypothesis. 4. Draw conclusions according to research goals. 5. Perform research independently, and interact with other students and faculty that are engaged in the project. 6. Utilize outside resources (scientific databases, literature, etc) to interpret results and compare to existing and previous work in the field of your research project. Prerequisite: Instructor permission and Senior standing. FA, SP, SU.