



## **SCED 3409: Foundations of Elementary Science II**

**Sul Ross State University**

**Spring 2024**

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**Office Location: Online**

**Office Hours: Online (Blackboard Collaborate)**

**M 12-1:30 PM, TH 12-1:30 PM, or by appointment**

**Course Hours: Online (Blackboard Collaborate)**

**Lecture MW 5:00-6:15 PM**

**Lab M 6:30-8:10 PM**

### **COURSE PREREQUISITES:**

None listed.

### **CATALOG COURSE DESCRIPTION:**

SCED 3409 Foundations of Elementary Science II (3-2). Second course in a series of two in required science content sequence for preservice elementary and middle school teachers. Topics covered will include the following TEA (Texas Education Agency) science competencies: Lab Processes, Equipment & Safety; Students as Learners & Science Instruction; Science Assessment; Adaptations & Evolution; Organisms & the Environment; Structure & Function of Earth Systems; Cycles in Earth Systems; Energy in Weather & Climate; Solar System & the Universe. Emphasis on problem-solving as a pedagogical tool with integration of manipulative-based explorations. For elementary education majors only. Offered spring. Equivalent courses: BIO 3309 (through Summer 2022), SCER 3409

**REQUIRED TEXTS: Open resources as listed below...**

Resources for Elementary School Science:

- Annenberg Media:

[Science Archives - Annenberg Learner](#)

- National Science Education Standards:

[http://www.nap.edu/openbook.php?record\\_id=4962](http://www.nap.edu/openbook.php?record_id=4962)

(download can also be found here (if it doesn't go, try to copy and paste the link into the browser): [Foundations of Elementary Science II](#))

- National Science Teachers Association:

<http://www.nsta.org>

- Project 2061:

<http://www.project2061.org/>

- Texas Education Agency:

[Texas Administrative Code, Title 19, Part 2 | Texas Education Agency](#)

- Science Generalist EC-6 Standards State of Texas (Teacher Competencies):

[Oral Language \(texas.gov\)](#)

- AI Student Tutor

[www.ck12.org](http://www.ck12.org)

- Edutopia is likely to be used for submission of lesson plans, and other applications on the job

as a teacher:

<http://www.edutopia.org>

- Videos for Educators:

<http://www.teachertube.com>

TEKS:

[Texas Essential Knowledge and Skills - Wikipedia](#)

downloads of Elementary School Science TEKS and Middle School TEKS for Science will be posted to BlackBoard

STAAR Exams:

[State of Texas Assessments of Academic Readiness - Wikipedia](#)

Old STAAR EXAM Questions:

[STAAR Released Test Questions | Texas Education Agency](#)

### **PROFESSOR EXPECTATIONS FROM STUDENTS:**

Professor will provide weekly communication with the class via Blackboard Announcements, emails, and weekly class sessions.

Professor will respond to emails within 24 – 48 hours.

Clearly outlined assignments and expectations will be provided.

Assignments will be graded within 2 weeks of the submission date.

### **PROFESSOR EXPECTATIONS OF STUDENTS:**

Students will respond to email requests from professor within 48 hours.

Students will attend class sessions on a weekly basis. Attendance will be taken.

### **STUDENT LEARNING OUTCOMES:**

1. Students will demonstrate effective lesson planning.
2. Students will present science lesson(s).
3. Students will demonstrate written and oral proficiency through a variety of instructional strategies.
4. Students will become familiar with TExES Science Competencies covered on the Core Content examination.
5. Students will become familiar with Science TEKS.

**COURSE OBJECTIVES:**

1. Students will be able to distinguish science from pseudoscience and skeptically evaluate claims based on strength of evidence.
2. Students will describe the organization and functioning of living things, via observing, analyzing and investigating.
3. Students will refine personal teaching philosophy through studying theories and methodologies of elementary instruction and science pedagogy.
4. Students will utilize instructional strategies including planning, organizing, writing and implementing science lesson plans.
5. Students will demonstrate the teaching of science lessons.

**MARKETABLE SKILLS:**

1. Students have the ability to teach diverse learners in an inclusive learning environment.
2. Students have the ability to assess student learning.
3. Students have the ability to critically think and creatively adapt instructional strategies to an instructional setting.
4. Students have the ability to construct a classroom management plan.
5. Student have the ability to effectively use technology to communicate

**ATTENDANCE POLICY:**

Students missing 20% of lectures OR 3 labs may be dropped from class per SRSU catalog. Any student dropped for excessive absences will receive an F for the course grade. Please notify your instructor BEFORE missing class for authorized activities, death in the family, or illness. Assignments missed for any reason must be made up within one week of the originally scheduled date.

**LECTURE COURTESY:**

The general rules of classroom etiquette are below.

1. Please do not talk to others in class while the instructor is lecturing. If you have a question, ask the instructor.

2. Please turn cell phones to silent while in class.

### **TEXES SCIENCE STANDARDS:**

This course will build mastery of the following Standards:

Science Standard I – The science teacher manages classroom, field, and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.

Science Standard II – The science teacher understands the correct use of tools, materials, equipment and technologies.

Science Standard III – The science teacher understands the process of scientific inquiry and its role in science instruction.

Science Standard IV – The science teacher has theoretical and practical knowledge about teaching science and about how students learn science.

Science Standard V – The science teacher knows the varied and appropriate assessments and assessment practices to monitor science learning.

Science Standard IX – The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills (TEKS) in life science.

Science Standard X – The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills (TEKS) in Earth and Space science.

### **TEXES COMPETENCIES FOR THIS COURSE:**

**Competency 001—(Lab Processes, Equipment and Safety): The teacher understands how to manage learning activities, tools, materials, equipment and technologies to ensure the safety of all students.**

The beginning teacher:

1. Understands safety regulations and guidelines for science facilities and science instruction.
2. Knows procedures for and sources of information regarding the appropriate handling, use, disposal, care and maintenance of chemicals, materials, specimens and equipment.
3. Knows procedures for the safe handling and ethical care and treatment of organisms and specimens.

4. Selects and safely uses appropriate tools, technologies, materials and equipment needed for instructional activities.
5. Understands concepts of precision, accuracy and error with regard to reading and recording numerical data from a scientific instrument.
6. Understands how to gather, organize, display and communicate data in a variety of ways (e.g., charts, tables, graphs, diagrams, written reports, oral presentations).
7. Understands the international system of measurement (i.e., metric system) and performs units conversions within measurement systems, including the use of nonstandard units.

**Competency 005—(Students as Learners and Science Instruction): The teacher has theoretical and practical knowledge about teaching science and about how students learn science.**

The beginning teacher:

1. Understands how developmental characteristics, prior knowledge and experience and students' attitudes influence science learning.
2. Selects and adapts science curricula, content, instructional materials, collaborations, vocabulary and activities to meet the levels of interest, knowledge and understanding as well as the abilities, experiences and needs of all students, including English-language learners.
3. Understands how to use situations from students' daily lives to develop instructional materials that investigate how science can be used to make informed decisions.
4. Understands common misconceptions in science and has effective ways to address those misconceptions.
5. Understands developmentally appropriate design and implementation of hands-on learning experiences in science and selects effective, appropriate instructional practices, activities, technologies and materials to promote students' scientific knowledge, skills and inquiry processes.
6. Understands questioning strategies designed to elicit higher-level thinking and how to use them to move students from concrete to more abstract understanding.
7. Understands the importance of planning activities that are inclusive and that accommodate the needs of all students.

8. Understands how to sequence learning activities in a way that enables students to build on their prior knowledge and that challenges them to expand their understanding of science.

**Competency 006—(Science Assessment): The teacher knows the varied and appropriate assessments and assessment practices for monitoring science learning in laboratory, field and classroom settings.**

The beginning teacher:

1. Understands the relationships between a science curriculum, assessment and instruction and bases instruction on information gathered through assessment of students' strengths and needs.
2. Understands the importance of monitoring and assessing students' understanding of science concepts and skills on an ongoing basis, including how to use formal and informal assessments of student performance and how to use products (e.g., projects, lab journals, rubrics, portfolios, student profiles, checklists) to evaluate students' understanding of and participation in the inquiry process.
3. Selects — or designs — and administers a variety of appropriate assessments (e.g., performance assessment, self-assessment, formal/informal assessment, formative/summative assessment) to monitor students' understanding and progress and to plan for instruction.
4. Understands the importance of communicating evaluation criteria and assessment results to students.

**Competency 013—(Adaptations and Evolution): The teacher understands adaptations of organisms and the theory of evolution.**

The beginning teacher:

1. Demonstrates knowledge of adaptive characteristics and explains how adaptations influence the survival of populations or species.
2. Describes how populations and species change through time.
3. Describes processes that enable traits to change through time, including selective breeding, mutation and other natural occurrences.

**Competency 014—(Organisms and the Environment): The teacher understands the relationships between organisms and the environment.**

The beginning teacher:

1. Understands that organisms respond to internal or external stimuli and analyzes the role of internal and external stimuli in the behavior of organisms.
2. Understands relationships between organisms and the environment and describes ways that living organisms depend on each other and on the environment to meet their basic needs.
3. Identifies organisms, populations or species with similar needs and analyzes how they compete with one another for resources.
4. Analyzes the interrelationships and interdependence among producers, consumers and decomposers in an ecosystem (e.g., food webs, food chains, competition, predation).
5. Identifies factors that influence the size and growth of populations in an ecosystem.
6. Analyzes adaptive characteristics that result in a population's or species' unique niche in an ecosystem.
7. Knows how populations and species modify and affect ecosystems.

**Competency 015—(Structure and Function of Earth Systems): The teacher understands the structure and function of Earth systems.**

The beginning teacher:

1. Understands the structure of Earth and analyzes constructive and destructive processes (including plate tectonics, weathering and erosion) that produce geologic change, including how these processes have affected Earth history.
2. Understands the form and function of surface water and groundwater.
3. Applies knowledge of the composition and structure of the atmosphere and its properties.
4. Applies knowledge of how human activity and natural processes, both gradual and catastrophic, can alter Earth systems.

**Competency 016—(Cycles in Earth Systems): The teacher understands cycles in Earth systems.**

The beginning teacher:

1. Understands the rock cycle and how rocks, minerals and soils are formed, and their respective properties.
2. Understands the water cycle and its relationship to weather processes.



3. Understands the nutrient (e.g., carbon, nitrogen) cycle and its relationship to Earth systems.
4. Applies knowledge of how human and natural processes affect Earth systems.
5. Understands and describes the properties and uses of Earth materials (e.g., rocks, soils, water, atmospheric gases).

**Competency 017—(Energy in Weather and Climate): The teacher understands the role of energy in weather and climate.**

The beginning teacher:

1. Understands the elements of weather (e.g., humidity, wind speed and direction, air pressure, temperature) and the tools used for measurement.
2. Compares and contrasts weather and climate.
3. Analyzes weather charts and data to make weather predictions.
4. Applies knowledge of how transfers of energy between Earth systems affect weather and climate.
5. Analyzes how Earth's position, orientation, and surface features affect weather and climate.

**Competency 018—(Solar System and the Universe): The teacher understands the characteristics of the solar system and the universe.**

The beginning teacher:

1. Understands the properties and characteristics of objects in the sky.
2. Applies knowledge of the Earth–Moon–Sun system and the interactions among them (e.g., day and night, seasons, lunar phases, eclipses).
3. Identifies properties of the components of the solar system.

**DISTANT LEARNING STATEMENT:**

Students enrolled in distance education courses have equal access to the university's academic support services, such as Smarthinking, library resources, such as online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login information to verify students' identities and to protect students' information. The procedures for filing a student complaint are included in the student handbook. Students enrolled in distance education courses at Sul Ross are expected to

adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website.

### **ACADEMIC INTEGRITY:**

Students in this class are required to demonstrate scholarly behavior and academic honesty in the use of intellectual property. A scholar is expected to be timely, prepared, and focused. Meaningful, respectful, and pertinent online participation is also expected.

Examples of academic dishonesty include but are not limited to: submitting work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation.

### **SAFE ASSIGN:**

The Safe Assignment Tool is an advanced plagiarism prevention system deeply integrated with the Blackboard Learning Management System. SafeAssignment compares student papers submitted to Blackboard against an enormous wide range of sources and provides instructors with detailed Originality Reports. Because of SafeAssignment's flexibility, this product is an effective plagiarism prevention system that helps instructors to raise student awareness about plagiarism and to educate students about the ways to avoid plagiarism. You can check your similarity report and make corrections if needed. With your similarity report, you will note highlighted areas that have similarity noted between your paper and another source. You will click on the tab within the colored square to see the percentage of the similarity. Percentages above 10% must be corrected. It does not matter if the source that is being noted for similarity is not the same source that you used. The system is telling you what you have written is too similar to another source and you need to make corrections. You may need to change up some of the wording or order of information to make it your information. More than three or four words in a row that are identical to the originating author can be detected. You can submit your paper as many times as you would like. This system is designed to assist students with increasing awareness of plagiarism. Typically, plagiarism is an accidental occurrence and occurs when students do not realize their writing is overly similar to another source.

### **SRSU DISABILITY SERVICES:**

The University is committed to equal access in compliance with the Americans with Disabilities Act of 1990 (ADA) and Section 504 of the Rehabilitation Act of 1973. The Disability Services Coordinator in Counseling and Student Support Services has the responsibility to ensure students with disabilities the opportunity for full participation in programs, services, and activities. Students seeking disability services need to contact the Disability Services Coordinator, Mary Scwartz Grisham, located in Ferguson Hall,

room 112. The mailing address is P.O. Box C-171, Sul Ross State University, Alpine, TX 79832. Telephone: 432-837-8203; Fax: 432-837-8724.

### **COURSE REQUIREMENTS:**

#### **TECHNOLOGY REQUIREMENTS:**

Students are required to have their own computers and internet that can handle the required technology, including audio, a camera, Chrome, Blackboard, Zoom, YouTube, and other applications. Not having the technology at your disposal at any time is not an excuse for failure to submit an assignment, join in a Teams or Blackboard session, or take an exam.

#### **LIBRARY:**

The Bryan Wildenthal Memorial Library in Alpine. Offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, [library.sulross.edu](http://library.sulross.edu). Off-campus access requires logging in with your LoboID and password. Librarians are a tremendous resource for your coursework and can be reached in person, by email ([srsulibrary@sulross.edu](mailto:srsulibrary@sulross.edu)), or phone (432-837-8123).

#### **ACADEMIC INTEGRITY:**

Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. A scholar is expected to be punctual, prepared, and focused; meaningful and pertinent participation is appreciated. Examples of academic dishonesty include but are not limited to: Turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden.

#### **CLASSROOM CLIMATE OF RESPECT:**

Importantly, this class will foster free expression, critical investigation, and open discussion of ideas. This means that all of us must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, we must all learn how to probe, oppose and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Still, we will not be silenced by the difficulty of fruitfully discussing politically sensitive issues

**EVALUATION:**

The learner will be evaluated utilizing the following methods in order to ensure that the learning outcomes are being addressed: The learner will post a lesson plan over a Science lesson on Blackboard and will then present the lesson. Classmates will follow along with the lesson being taught. Discussion, feedback and reflection will take place after each lesson that is taught. Rubrics over the lesson plan and lesson presentation will be completed by the instructor.

**GRADING POLICY:**

Your grade for this course will be determined by evidence of the quality of your learning as demonstrated by your performance on the following:

**COURSE REQUIREMENTS AND GRADING:**

- ✓ Final Exam - 15%
- ✓ Lesson Plans –25%
- ✓ Presentations – 50%
- ✓ Class Participation – 10%

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A = 90-100%

B = 80-89%

C = 70-79%

D = 60-69%

F = 59 and below

**EXAMPLE OF TEKS:****§112.5. Science, Grade 3, Adopted 2021**

(b) Knowledge and skills. (5) Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines. The student is expected to: (C) use scale, proportion, and quantity to describe, compare, or model different systems; (D) examine and model the parts of a system and their interdependence in the function of the system

## **ASSIGNMENTS AND REQUIREMENTS**

### **Exam: 15%**

There will be a Final exam worth 15%. The exam will consist of short answer and/or essay questions. You will have 2 hours to complete the exam. Part I consists of 6 essay questions worth 10 pts. each. For Part II, you will be given a topic and science TEKS and will need to come up with a lesson plan, incorporating all the steps presented in the course rubric.

### **Lesson Presentations: 50%**

Students will independently work on presentations related to science and will present on the due date assigned. Lesson presentations will be graded utilizing a rubric. You will be required to post Lesson Plans, PowerPoint presentations, as well as handouts and materials needed to Discussion Board. Classmates not presenting will need to have necessary materials that are required to enact the lesson as well as complete the activity that is included in the lesson.

### **Lesson Plans: 25%**

Students will be expected to type up lesson plans and turn in prior to presenting their lesson presentation. Lesson Plans will be posted to Blackboard and will be graded utilizing a rubric that will be shared with you.

### **Class Participation: 10%**

Students are expected to participate in class discussions and class activities. The format of the class will be lecture, discussion, group activities, role-playing and presentations. Failure to participate will result in a loss of points.

**Why Lesson Plans are due on the day before the PowerPoint Presentation is due – I will be grading each assignment independently. So, I will utilize the rubric to grade the lesson plans before I ever see the Presentations. Then I will use the presentation rubric to grade the Presentation. Both rubrics are very similar, however Lesson Plans and Presentations are graded independently of each other.**

**TENTATIVE SCHEDULE** - Topics and dates are subject to change.

<b>Date</b>	<b>Topic</b>
January 17	Syllabus, Introductions
January 22	Lecture – Inquiry-based instruction
January 22	Lab – Example of inquiry-based science lessons by instructor
January 24	Lecture – cont. Inquiry-based instruction Discussion
January 29	Lecture – Science TEKS implementation
January 29	Lab – View and discuss correlation of the TExES Science Core certification exam with Science Standards and Science Competencies, along with the Texas Essential Knowledge and Skills (TEKS)
January 31	Lecture – Foundations of Education
February 5	Lecture – Lesson Cycle
February 5	Lab - Work in groups on short lessons, present and discuss
February 7	Lecture – Review Lesson Plan and Presentation Rubrics
February 12	Lecture – Problem-solving and using manipulatives
February 12	Lab – Examples of problem-solving lessons and lessons utilizing manipulatives for science instruction
February 14	Lecture – Review Science Content listed under Competency 001
February 19	Lecture – Implement Lesson – Competency 001 – Lab Processes, Equipment and Safety
February 19	Lab – Implement Lesson – Competency 001 – Lab Processes, Equipment and Safety
February 21	Lecture – Review Science Content listed under Competency 005
February 26	Lecture - Implement Lesson – Competency 005 – Students as Learners and Science Instruction
February 26	Lab – Implement Lesson – Competency 005 – Students as Learners and Science Instruction
February 29	Lecture – Review Science Content listed under Competency 006
March 4	Lab – Implement Lesson – Competency 006 – Science Assessment
March 4	Lab – Implement Lesson – Competency 006 – Science Assessment
March 6	Lecture – Review Science Content listed under Competency 013
March 11-15	Spring Break
March 18	Lecture - Implement Lesson – Competency 013 – Adaptations and Evolution
March 18	Lab – Implement Lesson – Competency 013 – Adaptations and Evolution
March 20	Lecture – Review Science Content listed under Competency 014
March 25	Lecture - Implement Lesson – 014 – Organisms and the Environment
March 25	Lab – Implement Lesson – 014 – Organisms and the Environment
March 27	Lecture – Review Science Content listed under Competency 015
April 1	Lab – Implement Lesson – 015 – Structure and Function of Earth Systems
April 1	Lab – Implement Lesson – 015 – Structure and Function of Earth Systems
April 3	Lecture – Review Science Content listed under Competency 016

April 8	Lecture - Implement Lesson – 016 – Cycles in Earth Systems
April 8	Lab – Implement Lesson – 016 – Cycles in Earth Systems
April 10	Lecture – Review Science Content listed under Competency 017
April 15	Lecture – Implement Lesson – 017 – Energy in Weather and Climate
April 15	Lab – Implement Lesson – 017 – Energy in Weather and Climate
April 17	Lecture – Review Science Content listed under Competency 018
April 22	Lecture – 018 – Solar System and the Universe
April 22	Lab – 018 – Solar System and the Universe
April 24	Lecture – STAAR Exam Science Content
April 29	Lecture – Make-up Presentations
April 29	Lab – Make-up Lesson Presentations
May 1	Review for Final
	Final