SCED 570-702
TEACHING SCIENCE IN THE ELEMENTARY SCHOOL
COURSE SYLLABUS
FALL 2015

Course day/times: Thursday 1:00-4:40pm
Credit: 3 semester hours
Location: Centerra - Steamboat
Instructor: Dr. Teresa Higgins
  Office Hours: by appointment
  Office: Ross Hall 2526
  Office phone: 970-351-2617
  Email: teresa.higgins@unco.edu

Course Description

SCED 570 is a study of the underlying models of science instruction and learning, curriculum, instructional methods, materials, science classroom safety, technology, and assessment for teaching in grades K-8. The course is a practical approach to developing a community of learners and thinkers, and evaluating and designing student-centered, inquiry-based learning activities, lessons, and curricular units.

Course Text and Readings

2. *Invitations to Science Inquiry* by Tik Liem (Blackboard)
3. *Project WET / Project Learning Tree / Project Wild* – this will be acquired in workshop assignment
8. *Colorado Department of Education*, [http://www.cde.state.co.us/index_home.htm](http://www.cde.state.co.us/index_home.htm). Connect to this site particularly for information on:
   • performance based standards for educators
   • K-12 science standards
   • K-12 grade level expectations for science
   • [http://www.cde.state.co.us/coscience/statetstandards](http://www.cde.state.co.us/coscience/statetstandards)
9. *Articles provided by the instructor*

Recommended Texts

Course Goals & Student Learning Outcomes

Upon completing this course, students will:

1. Describe and value science and scientific inquiry as a methodology for exploring and explaining the natural world.
2. Describe and identify science practices (inquiry) and process skills in course activities and experiences.
3. Justify that all children can perform scientific inquiry and are natural scientists.
4. Identify and model strategies to support science learning for all students including ELL.
5. Analyze and describe the research foundations for best practices in teaching science.
6. Coordinate student-centered curriculum that focuses on students’ needs, interests, community, culture and local environment that are aligned with standards.
7. Work collaboratively both in the classroom and on projects.
8. Apply national and state science standards to designed lesson plans.
9. Design, perform and analyze an experiment incorporating the use of technology.
10. Describe the basic tenets of constructivism and the learning cycle.
11. Analyze, write and instructionally deliver lesson plans based on the 5E learning cycle
12. Describe the appropriate uses of three types of lesson delivery: direct instruction, demonstrations, and student centered inquiry.
13. Evaluate instructional materials using criteria based on research-informed criteria.
14. Make curriculum connections between science and other subjects.
15. Describe why good teachers are flexible, reflective and focus on students first.
16. Accommodate the needs of culturally and linguistically diverse students in teaching science.
17. Evaluate the uses of different types of assessments.
18. Create a vision statement of a student who is scientifically literate and a classroom that promotes scientific literacy.
19. Describe why good teachers are flexible, reflective and focus on students first.
20. Be confident in their ability to teach science.

Attendance

Active participation and engagement in classroom activities is essential to your learning to create and sustain a student-centered, inquiry based learning environment; therefore your attendance is critical. **Two absences** will require you to meet with the instructor to discuss your commitment to the completion of the course. A **third absence may result in a failing grade.** Being more than **10 minutes** late will be considered an absence. Only the instructor can approve a student request to be absent from class. The student is responsible for requesting such approval when absence is unavoidable.

Students involved in University-sponsored activities, including intercollegiate athletics, may need to be excused from a class, lab, or studio meeting. In all instances it is the student’s responsibility to present a written request for permission for the absence from the instructor. The student must also discuss how the absence will affect his/her ability to meet the course requirements. Students should do this as early in the semester as possible. While instructors should seek to the greatest extent possible, consistent with course requirements, to make reasonable accommodations for a student involved in University-sponsored activities, students should recognize that not every course can accommodate absences and neither the absence (nor the notification of an absence) relieves them from meeting the course requirements.

In recognition of the diversity of the student body, the University provides that a student may request an excused absence from class for participation in religious observances. In all such instances, it is the student’s responsibility to request, in writing, that the instructor permit the absence. The student must also
discuss how the absence will affect the student’s ability to meet the course requirements. A student should make any such requests before the course drop deadline for the semester.

**Grading (subject to revision)**

Late Assignments: It is the student's responsibility to be aware of all assignments and when they are due. In general, assignments turned in within one week of the due date will receive a 10% reduction of points. Assignments more than one week late will NOT be accepted.

Your final grade will be calculated as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Assignments</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Participation (attendance, in-class activities, Blackboard)</td>
<td>15</td>
</tr>
<tr>
<td>Reflection Papers (Science Photo Autobiography, Science Inquiry, Science Notebooks)</td>
<td></td>
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<tr>
<td>Science Investigation</td>
<td>15</td>
</tr>
<tr>
<td>Quizzes/Exams</td>
<td>25</td>
</tr>
<tr>
<td>Science Microteach with Lesson Plan</td>
<td>20</td>
</tr>
<tr>
<td>Classroom Research Project (Final)</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
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**Classroom participation**

Classroom participation is NOT equal to attendance (see details on attendance above). As a future elementary teacher, you are responsible for your learning in the classroom. That is, you are expected to be actively engaging in the classroom activities, teaching discussions, reflections from readings and at times you will be asked to reflect on the activities conducted in the classroom in Blackboard…find your teacher voice and use it!

**Reflection Papers**

Throughout the semester, you will be asked to write your reflections on diverse topics. Two major reflection papers are “Science Photo Autobiography” and “Science Inquiry Experience”. Further details will be provided in a separate handout.

*Science Photo Autobiography.* At the beginning of the semester, you will be asked to define your vision for teaching science in the elementary classroom. You are asked to reflect deeply on the question “where is science in my life?” You should consider your life history and identify meaningful experiences/encounters you have had with science. You will put together a visual and text-based piece of work that reflects your science experiences from elementary school, middle/junior school, high school and college.

*Field Science Inquiry Experience.* While in the elementary classroom you will complete an analysis of inquiry in science instruction. You will articulate your working definition of inquiry and devise a process to examine classroom science experiences for the elements of inquiry based on your definition.

*Science Notebooks.* Periodically you will be provided with pages to include in your notebooks. These will include prompts for written responses, sketches or data entry. The subject of your responses will be course readings, class discussions, lab activities, teacher instruction, student
presentations and science observations. The notebooks will be turned in for grading three times during the course.

**Science Investigation (Group project) –**

In groups of two or three, design and conduct a science investigation. It should be on a topic that interests both of you and one to which you do not already know the answer. Criteria for the assignment will be discussed in class. Peer reviews of the investigation hypothesis, and design will be done later in the semester. This activity will help you to refine thoughts and ideas related to your investigation. Once completed, prepare a final investigation report to include:

a. the problem you investigated;
b. the hypothesis and identify the variables;
c. the experimental procedure;
d. the data – generate an Excel data table and graph to display results;
e. an analysis or interpretation of findings and conclusions; and
f. how you might use an investigation like this in your own classroom.

**Science Microteach with Lesson Plan (Individual project) – Due November 12**

Design and deliver, in a microteach format, a lesson teaching a science concept as a discrepant event. Prepare a lesson plan based on the learning cycle model (5E) discussed in class. The portion of the lesson actually taught should last no longer than 15 minutes and may be either a demonstration or group activity. The written lesson plan should include detailed plans for the entire lesson. The topic may be selected from *Invitations to Science Inquiry* by Tik Liem. You will be presenting this activity at the state science conference on Friday, Nov. 20th and will be in lieu of class that week. Be prepared to discuss the experience from both learning and teaching perspectives.

**Classroom Research Project (Individual project) – Due December 10**

While in the elementary classroom you will complete a project as a teacher researcher. You will select a topic of interest, collect & analyze data from your classroom, and write a short research paper. Further details will be provided in a separate handout.

**Course Topics and Quiz/Exam Dates**

<table>
<thead>
<tr>
<th>Topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td>Science practices (inquiry) and content</td>
<td>Chapters 2, 8, 9, 10</td>
</tr>
<tr>
<td>Multicultural science teaching</td>
<td>Journal Articles</td>
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<tr>
<td>ELL science teaching</td>
<td>TBA</td>
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<tr>
<td>5E instruction</td>
<td>Chapters 1, 3, 4</td>
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<tr>
<td>Alternative Conceptions</td>
<td>Journal Articles</td>
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<tr>
<td>Standards and science literacy</td>
<td>TBA</td>
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<tr>
<td>Lesson planning – objectives, assessment</td>
<td>Chapters 5, 6, 7</td>
</tr>
<tr>
<td>Professional Development</td>
<td>Journal Articles</td>
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<tr>
<td>Science Safety</td>
<td>TBA</td>
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**Dates to know:**

- September 24: PWild
- November 20: Colorado Science Conference Presentation

**Other Information**
Emails – Communicating with instructor via email is acceptable but does not guarantee responses will arrive in the timeframe you desire. If you have a question regarding class experiences I strongly suggest that you speak directly with me during office hours or via phone or skype.

Students with disabilities - Any student requesting disability accommodation for this class must inform the instructor giving appropriate notice. Students are encouraged to contact Disability Support Services at (970) 351-2289 to certify documentation of disability and to ensure appropriate accommodations are implemented in a timely manner.

Honor Code - All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

UNC Honor Code: [www.unco.edu/dos/honor_code.htm](http://www.unco.edu/dos/honor_code.htm)

UNC's Policies - UNC's policies and recommendations for academic misconduct will be followed. For additional information, please see the Dean of Student’s website, Student Handbook link [http://www.unco.edu/dos/handbook/index.html](http://www.unco.edu/dos/handbook/index.html)

Portable Electronic Devices - Please extend courtesy to your instructor and fellow students by turning off your portable electronic devices such as: cell phones, pagers, and iPods. Although not an audio issue, text-messaging is a distraction to other students and prevents you from full participation in class. You should keep your portable electronic devices in your backpack or purse during class. Your personal electronic devices should not be on your desks. If you know that you may need to accept an emergency phone call during class or if you have children in childcare or school, please let the instructor know. If you need to take a phone call during class, please step out of the classroom while you complete your call. Thank you for your cooperation.

Plagiarism - [www.unco.edu/dos/plagiarism.htm](http://www.unco.edu/dos/plagiarism.htm)

Recommended Children’s Books

Dr. Seuss. (1990). *Oh, the places you’ll go!* Random House.  

**Useful Websites**

**Activity supplements**
Galileo's Pendulum Experiments: [http://galileo.rice.edu/](http://galileo.rice.edu/)
Exploratorium Activities: [http://www.exploratorium.edu/snacks/iconmechanics.html](http://www.exploratorium.edu/snacks/iconmechanics.html)
Oranges: [http://www.factmonster.com/ipka/A0781683.html](http://www.factmonster.com/ipka/A0781683.html)

**Learning Cycle**
[http://www.coe.ilstu.edu/scienceed/lorsbach/257lrcy.htm](http://www.coe.ilstu.edu/scienceed/lorsbach/257lrcy.htm)
[http://www.learnercentereded.org](http://www.learnercentereded.org)

**Learning Theories**
Piaget: [http://www.funderstanding.com/piaget.cfm](http://www.funderstanding.com/piaget.cfm)
Constructivism: [http://www.funderstanding.com/constructivism.cfm](http://www.funderstanding.com/constructivism.cfm)

**Safety**
[http://www.nsta.org/positionstatement&psid=16](http://www.nsta.org/positionstatement&psid=16)

**Videos**

**Resources**
Activities Integrating Math & Science (AIMS): http://www.aimsedu.org/
Teacher Resources: http://www.teachersource.com/
Teacher Created Resources: http://www.teachercreated.com/
Steve Spangler Science: http://www.stevespangler.com/