

**SCI 465, Principles of Scientific Inquiry**  
**Fall 2012**  
**MWF 10:10-11:00 AM**  
**ROSS 2280**

**Instructor:** Wendy Adams  
**Office:** Office 0232C Ross Hall  
**Hours:** MWF 11:00 – 1:00  
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**Course Website:** <http://www.unco.edu/nhs/physics/faculty/adams/Sci465home.html> Check it often!!

**Course Objectives:**

This is a “capstone” course which means it is designed to help you integrate your knowledge and will be a challenge. Rather than just memorizing facts in this class we will be thinking, creating and synthesizing. You will be asking questions, defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational skills, constructing explanations and designing solutions, engaging in argument from evidence, obtaining, evaluating and communicating information.

Specifically the objectives are:

To examine science as a “way of knowing” through experiencing scientific inquiry via a course project, activities, readings, and discussion.

To provide content necessary to enable teacher licensure students to address [K-12 Colorado Model Content Standards in Science](#).

At the end of this course students will be able to:

- Explain what it is to “do science” and how the idealized steps of the “scientific method” do not do an adequate job of explaining what it is to do science.
- Describe what a generalization is and what it takes to prove and to disprove a generalization or scientific theory.
- Describe the necessity for observations and characterization of patterns to understand the invisible.
- Describe effortful practice and its necessity in becoming an expert.
- Describe differences in the process of scientific discovery as described in Derry text.
- Describe the value of a model regardless of whether it models the phenomena exactly.
- Explain the value of comparing and contrasting phenomena to understand the science.
- Explain the value of categorization and its place in science.
- Describe different types of tools scientists might use and whether these limit the value of the scientist’s contribution.

Material in this class will be presented at the “400” level. Therefore, you are expected to reflect senior-level thinking and work in completing your assignments. The course’s success depends on your regular contribution from your past experiences to class discussion.

**Textbooks:**

1. *Science Matters: Achieving Scientific Literacy*, by Robert M. Hazen, James S. Trefil
2. *What Science Is and How It Works*, Gregory N. Derry
3. *Step Ball Change*, Jeanne Ray
4. Optional: *Eat Cake*, Jeanne Ray

The first three books are required with the first two being used throughout the course.

**Course Website:**

<http://www.unco.edu/nhs/physics/faculty/adams/Sci465home.html>

All assignments will be listed on this page. You are responsible for checking this page daily since not all assignments will be announced in class.

**Topics:**

To learn what it means to do science as described in the objectives above, we will practice these skills in the context of specific science content. We will focus on major topics in the sciences that appear in Elementary Science Standards at both the State and National Levels. *Most* of the class activities will use ideas from a combination of disciplines such as physics and biology. We will learn about the following topics (not in this order):

Biology

- The human body: Reproduction, eyes, ears, voice
- Animal communication
- Flow and conservation of energy

Chemistry

- Organization of elements
- Flow and conservation of energy

Earth Science

- Earthquakes

Physics

- Sound and Waves
- Flow and conservation of energy

Your goal is to approach each topic as an inquiry challenge – as a scientist would. You will be provided with ample opportunities to collaborate with your colleagues, achieve new levels of frustration (a good thing!), and accomplish much with your intellect. In the end, you will become a better scientist in order to better teach others to become scientists.

**Grading:**

Method of Assessment	Approximate weight
Report and Presentation	15%
Course project	15%
In-Class discussion & HW	30%
Quizzes	10%
Exams	15%
Final exam	15%

Grades will be assigned according to the following scale:

- 100 - 90 - A
- 89 - 80 - B
- 79 - 70 - C
- 69 - 60 - D
- less than 60 - F

“A” quality work will require deep thinking, creativity and synthesis of ideas. Effort beyond

“knowing the material”. A grading rubric will be provided and sample “A” quality work demonstrated.

### **Quizzes:**

Some quizzes will be given in class and others online. These quizzes will be used as both pre-reading quizzes and weekly quizzes. One of each type of quiz will be dropped – no exceptions.

Online quizzes will be posted at least a day in advance of the deadline. It is advised that you complete the quiz with time to spare, as technical difficulties may arise and prevent you from completing the quiz on time.

You are responsible for verifying that you are getting credit for online work. It will not be possible to correct several missing items that were discovered at the end of the semester. Only one of each type of quiz will be dropped.

### **In-class Activities and Homework:**

If you miss class on the day an assignment is given or an activity is done you will probably NOT be able to make it up. Homework assignments will not be accepted late.

Assignments that are not collected the day they are done in class should be typed. Please use standard fonts such as 10-12 point Times Roman or Calibri. Creativity should go into the content rather than the way it looks. Depending on the assignment daily work can be single spaced; however, more formal papers (review paper and project) should have a cover page, be double spaced and follow the APA style recommendations - the style most commonly used for educational writing.

<http://www.ccc.commnet.edu/apa/>

Assignments that are not collected the day they are done in class are expected to be written clearly and at the level a professional teacher would write. Grading will be based on the content as well as grammar and spelling. Please proof read all work before submitting. If you need help with your writing, the Writing Center, Ross Hall 1230, is an excellent resource.

Discussions with your peers are an important learning tool. The best way to learn something is to teach it. Also scientists rarely work alone, despite society’s stigma that scientists are unsocial intellectuals working in some smelly lab. You are strongly encouraged to form friendships and exchange emails and phone numbers that will enable you to work on assignments outside of class especially with your table members.

### **Review Paper:**

You will be asked to read a biography of a scientist and give a poster presentation concerning this book. Presentations on 11/5 and 11/7. More details concerning this assignment will be given in advance of the deadline.

### **Course Project:**

You will apply your understanding of the various science interrelationships in a course project. This project is an individual effort and the final project your own work. Presentations are scheduled for 11/28 and 11/30. More details concerning this assignment will be given in advance of the deadline.

### **Exams:**

Each exam will cover material from the previous 5 ½ weeks.

### **Final Exam:**

The final exam is scheduled for Friday, December 14, 2012 from 8:00 AM to 10:30 AM. Students will be expected to take the exam at this time and should **NOT** make plans that conflict.

### **Student Expectations:**

- Students are expected to work an average of 2 hours outside of class for each hour spent in class.

- Students are expected to regularly attend class. Absences greater than professional teaching responsibilities will probably have a detrimental effect on your final grade.
- Students are expected to read assignments in text and related literature.
- Students are expected to participate in classroom discussions and activities.
- Students are expected to turn in assignments on announced due dates.
- Students are expected to actively participate in group functions and fulfill other group responsibilities.
- Students are expected to take tests and quizzes on the days they are given
- Students are expected to be responsible for their own work and be thoughtful of others.
- Students are expected to follow UNC's Honor Code and Student Code of Conduct  
<http://www.unco.edu/dos/communityStandards/index.html>

**Resources:**

Students with disabilities who believe they may need accommodations in this class are encouraged to contact Disability Support Services (970) 351-2289 as soon as possible to better ensure that accommodations are implemented in a timely fashion. Students with accommodations must provide the disability access form at least 3 days before accommodations are needed.

Writing Center in Ross Hall 1230

Everything on this syllabus is subject to revision throughout the semester; however, adequate notice will be given.