

Education 45-01 & P61: Secondary Science Methods

Fall 2008

Dr. Kenneth L. Wareham

Office Hours: M & W 9:00-10:00 & 1:30-3:00 or by appointment
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Description:

An examination of curricular, instructional, and assessment practices for school science programs. Recent trends and their implications for the teaching of science in the schools will be reviewed. Representative curricula, teaching, and assessment practices will be examined. Emphasis will be placed on current science education standards and methods.

Rationale:

The need for a scientifically literate populace is well documented and a generally agreed upon objective of science education. President Bush established, as one of the America 2000 national education goals, that U.S. students will be first in the world in mathematics and science achievement by the year 2000. The National Research Council appointed a committee to develop and establish national consensus on Science Standards which were released in 1996. ***Teachers of science not only must have adequate content knowledge but need to examine what they are teaching and why and how they are teaching and assessing what is taught.*** They need to be aware of issues, trends, resources and research findings related to science curriculum, instruction and assessment. This course is designed to help facilitate this process.

Objectives:

The student will:

- 1) Become knowledgeable of current issues, problems, and initiatives in school science.
- 2) Become aware of past and current curricula developments and resources.
- 3) Become knowledgeable of best instructional and assessment practices in science.
- 4) Examine and discuss recent science education literature and research findings.
- 5) Produce artifacts to demonstrate his/her ability to effectively produce and conduct science instruction.

Text:

How Students Learn: Science in the Classroom. Donovan, Suzanne and Bransford, John. National Academies Press, Washington, D.C. ISBN 0-309-08950-6. This text may be purchased or read online for free. The link is <http://www.nap.edu/openbook.php?isbn=0309089506>

Other articles for discussion will be provided to students as appropriate.

Assignments:

1. *A full-year topical outline for a course you will likely teach.* When considering what you will teach in the classroom it is best to start with the big picture. This outline should include the topics you will cover within a subject and approximately how much time you will spend on each topic. The information should be presented in a table as illustrated below. Not sure how to begin? The state standards are a good place to start <http://www.sde.idaho.gov/ContentStandards/default.asp>

<i>Chemistry Outline</i>	
Time (days)	Topic
5	Introduction, class policies, grading, safety issues, what is chemistry, review of metric system measurements.
10	Structure of matter & atomic models (Earth-air-fire-water, Democritus, plumb-pudding, Bohr, planetary, p+, n, e-)
<i>x</i>	...
12	States of Matter: solid, liquid, gas, plasma
15	Gas Laws
176	TOTAL

2. *Survey and document the science scope and sequence in your school.* (NOTE: if you are not currently teaching see if you can use the school where you intend to student teach). What science courses are offered? What are the district science requirements and what are the electives? What is the enrollment in elective courses? What curriculum materials are used? What type of coordination is there between the grade levels and buildings within the district?
3. *Safety.* We will start by having each of you order the *Flinn Scientific* new teacher survival kit and a Flinn Scientific Catalog, aka “the science teachers bible”. You can get these by going to their web page: www.flinnsci.com I will talk more about Flinn and other suppliers as they provide a host of useful information and resources for science teachers. NOTE: THESE MATERIALS SHOULD BE ORDERED NOW SO THAT YOU HAVE THEM IN HAND WHEN IT COMES TIME TO TALK ABOUT THEM.
 - A. “The Dirty Dozen” exercise. I will email you a list of Idaho’s dirty dozen chemicals. You need to use your Flinn catalog to tell me why they are so bad and how to properly dispose of them.
4. *A detailed and complete instructional unit.* This will be a class project and the topic will be *Measurement; the System International (SI) units*. You will start with a goal and list of objectives, then add instruction and activities to make it something worth using in your science class.

5. *Class presentation of two lab/demonstration activities to be used in teaching.* These two demos can be anything you have found, seen, or used and that you think are particularly useful for demonstrating science concepts. I don't care where you get them from or even if you copy them as long as you acknowledge the credit where it is due. The demos will be presented either on campus or via your video link and should include **complete instructions** so that any novice teacher could replicate the demonstration without having seen it before. I will send you a model demo with complete instructions so you know what one looks like. **START THINKING ABOUT THESE DEMOS NOW.**
6. *Development of a "new" teaching demonstration.* The title here is a little imprecise as I don't really expect you to create something new, but rather, something new to *you*. Every teacher has weaknesses in content. Your task is to identify one of your weaknesses and then find a demo which will help you to better understand the concept so that you can teach it to your students. **START THINKING ABOUT THIS DEMO NOW.**

The materials will be graded on a pass/fail basis. It is expected that your work will be completed at a level that is expected of a first-year teacher. Submissions that do not meet this criterion will be returned with comments for revision. Final grades will be based on:

1. Acceptable completion of the assignments.
2. Active participation in the class.
3. A self evaluation and reflection of your performance and what you have learned over the course of the semester..

Your grade will be determined during a conference with the professor. It is expected that all students who complete the assignments in an acceptable manner will earn an A. Should you feel you have not met this standard we will negotiate a proper grade or conditions for earning the A.

Other:

If you have need for course adaptations or accommodations because of a disability, a medical condition I should know about, or any other special needs, please discuss them with me at your earliest convenience. My office location and hours are listed above.