Fall Semester 200
Wednesday, 5:00 - 8:00 PM; Walter Annex "Meyer" Room
Dr. Camille L. Wainwright, Carnegie #104
Office: 503-352-2963,
Home: 360-896-8735
Office Hours: By appointment
wainwric@pacificu.edu

Educ 338/538 – Special Methods: Science in the Middle School and High School
Pacific University College of Education (3 credits)

http://fg.ed.pacificu.edu/wainwright/index.html

Course Goals: To provide students with:

- an investigation of various methods and models for teaching science in middle and secondary schools;
- a study of materials, equipment, manipulatives, software and other resources for appropriate instructional applications;
- an opportunity to plan and deliver lessons to peers in order to gain confidence and experience with teaching strategies;
- an awareness and understanding of recent curricular innovations and current instructional issues in science education;
- an examination of the interaction between science and other content areas with an emphasis on interdisciplinary teaching;
- an opportunity to solidify content knowledge while gaining pedagogical content knowledge (PCK).

Conceptual Framework: This course establishes a risk-free environment within a community of prospective science teachers. Class discussions will emphasize respect for differing ideas and strategies as well as cultures. It introduces aspiring educators to the theories, strategies, resources, and technology applications appropriate to science curriculum and instruction at the middle and high school levels. The course emphasizes research-based teaching and evaluation methods as well as an in-depth analysis of national and state science standards.

Textbooks:

Chiappetta, E. L., Koballa, T. R. (2002) Science Instruction in the Middle and Secondary Schools, 6th ed. Merrill/Prentice Hall. (Required)

AAAS (1993). Benchmarks for Science Literacy (Optional)

Grading: Grades in this course will be based on evaluation of written assignments, presentations, class participation, quizzes and a portfolio.

Course Structure/Approach: This course is taught through a combination of teacher presentations, discussions and interactive explorations with an emphasis on inquiry-based approaches.

Prerequisite: Admission to MAT/5th Year program, MAT/FLEX program or consent of instructor.

Requirements:

1. Attend all classes. If you have a need to miss class, talk to the instructor in advance. Any class missed may require written make-up work. Missing class may result in a lower grade for the course.
2. Do all assigned readings so that you are prepared to contribute to class discussions.
3. Complete all written assignments (typed); maintain these in a ring binder when returned.

Special Needs:

It is my intent to fully support persons with special needs in this course. Please let me know if you need any special accommodations in the curriculum, instruction, or assessment to enable you to participate fully. I will make every effort to maintain the confidentiality of any information you share with me.

University and College of Education Policies

Be aware of the Pacific University Code of Academic Conduct and the College of Education policies for professional behavior. In this course students are expected to demonstrate behavior consistent with the Professional and Academic Standards of the College of Education.

Students With Disabilities
In general, the University will work with students to improve conditions that may hinder their learning. The university requires appropriate documentation of a disability in order to enable students to meet academic standards. It is the responsibility of each student to inform the Director of Learning Support Services of his or her disability. Students are encouraged to work with faculty proactively in developing strategies for accommodation.

Incompletes
Instructors may issue a grade of incomplete only when the major portion of a course has been completed satisfactorily, but health or other emergency reasons prevent the student from finishing all the requirements in the course. Should this occur, the instructor and the student should agree upon a deadline by which all work will be completed, with the following guidelines:

1. Incompletes given for Fall and or Winter III terms must be completed by the following April 15.
2. Incompletes given for Spring semester must be completed by the following November 15.

Instructors will issue the grade the student would have earned by not completing the course, preceded by an "I". This grade is determined by including a failing grade for the missing assignment(s) in the calculation of the final grade. If the agreed upon course work is not completed in the period allotted and an extension has not been granted, the grade issued will be permanent. The contingency grade will be used in the computation of the GPA until such time as a new grade is recorded.

Grade Changes
Once a grade is submitted to the Registrar it shall not be changed except in the case of recording errors. Grade changes must be approved by the appropriate Dean or Director.

Safe Environment Policy
Pacific University's Rights and Responsibilities policy seeks to maintain conditions favorable to learning. Students have the right to pursue an education free from discrimination based on gender, religion, marital status, age, sexual orientation or handicap. Students have the responsibility to conduct themselves, both individually and in groups, in a manner which promotes an atmosphere conducive to teaching, studying and learning.

Academic Integrity
Honesty and integrity are expected of all students in class preparation, examinations, assignments, practica and other academic work. Misconduct includes, but is not limited to cheating; plagiarism; forgery; fabrication; theft of instructional materials or tests; unauthorized access or manipulation of laboratory or clinic equipment or computer programs; alteration of grade books, clinical records, files or computer grades; misuse of research data in reporting results; use of personal relationships to gain grades or favors or other attempts to obtain grades or credit through fraudulent means; unprofessional conduct related to student care; threats to University personnel and conduct inconsistent with academic integrity. Plagiarism is not only the use of another person's words, but also the use of another's ideas without attribution.

Date	Topic	Assignment (for the following week)
September		
5	Discrepant Events - I Course Introduction	Read SFAA Chapters as assigned by content focus Read syllabus; bring questions to next class
12	Discrepant Events - II Curriculum Alignment	Do T/F Quiz (Chiappetta, p. 90, Figure 7.1) Read Chiapetta Ch. 7 Start Library Assignment D (due September 26)
19	History of Science Education Nature of Science National Standards	Do p. 11 (Chiappetta, Figure 1.2) before reading Read Chiappetta Ch. 1 & 2; particularly p. 10 Do Assignment A (#1) on Ch. 1, 2, and/or 7
26	Teaching About Photosynthesis Scoring Scientific Inquiry	Library Assignment due today (D) Read Chiappetta Ch. 3 & 4 Do Assignment A (#2)
October		
3	Teaching About Astronomy Conceptual Change	Start Interview I (C), due October 17 Read Driver article (hand-out)

10	(No Class: October 12 is Teacher Inservice Day)	Read Chiappetta Ch. 13 Do Assignment A (#3) Conference Report (F) due by December 12
17	Planning Field Trips	Read Chiappetta Ch. 12 Do Assignment A (#4)
24	Teaching About Electricity	Interview I (C) due today Start Interview II (G), due November 7 Read Chiappetta Ch. 10 Skim NSTA site: http://www.nsta.org/position#list
31	Teaching About Light, Color, and Human Vision	Read Chiappetta Ch. 8 Skim Chiapetta, Appendices A, B, C Prepare for MicroTeaching I (E)
November		
1	Safety Issues MicroTeaching I	Read Chiappetta Ch. 9 and 14 Do Safety Study (I) due Nov. 14
7	Educational Technology Real-Time Data Collection	Read Chiappetta Ch. 15 Do Assignment A (#5) on Ch. 9, 14 and/or 15 Interview II (G) due today
14	Demos and Discussions	Read Chiappetta Ch. 6 & 11 Email Website URLs (J) to Instructor Do Assessment Hand-out (H)
21	No Class (Thanksgiving Holiday)	Prepare MicroTeaching II
28	MicroTeaching II	Do Resource Purchase (K) for December 5 Prepare Mini-Portfolio (due 12/14/07)
December		
5	Classroom Management	Resource Purchase (K) due today Read Chiappetta, Ch. 5
12	Course Summary and Evaluation	Complete Mini-Portfolio (L) by December 14

Assignment Guidelines

A -- Reflections on Reading; written assignments (1 - 2 pages). What was most significant? What did you learn about your own understanding of science? What ideas/exercises will you attempt to use in your own teaching? Or what did you disagree with? (Plan to share at least one idea or question in class discussion.)

B – Nature of Science Quiz: 1) Answer the questions on the Nature of Science quiz (T/F, p. 90) prior to reading the assignment; 2) read Chapter 7; 3) review the quiz – identify any items whose answer you changed; 4) review the NSTA Position Statement at http://www.nsta.org/positionstatement&psid=22 and 5) be prepared to discuss the reading in class.

C – Interview I: Once you have read the Rosalind Driver chapter, determine a topic on which you will interview students. Arrange an opportunity to hold a clinical interview with three (or so) Middle School or High School students. Write up what you found most interesting regarding student responses. (If you have difficulty scheduling a time with students, discuss this with the instructor.)

D – Library Assignment

Part I: Choose *two different* issues of The Science Teacher; skim both entire issues. Then answer the following questions.

1. Dates of the issues you have studied.
2. Who publishes this periodical?

3. What is the annual cost of a subscription? (Note both teacher and *student* membership rates)
4. Who is the target audience?
5. List any five advertisers, and the type of product they market.
6. List any six Departments or regular sections which are included in essentially every issue; describe the type of material to be found in this category or Department.
7. Summarize the most interesting feature article in each.
8. After skimming the entire periodical, what are your impressions?

Part II: Choose two additional science journals or periodicals. Skim at least one issue of each. Then write a brief (one paragraph) description of each periodical and the ways each of them might be useful to you as a science educator. You may be able to access a science journal/periodical on-line. Some periodicals in our library which you might consider reviewing are:

American Biology Teacher
American Journal of Botany
American Naturalist
American Scientist
Arithmetic Teacher
Bulletin of the Atomic Scientists
Chemical and Engineering News
Chemical Education
Chemical Reviews
Discover
Ecology
Environment
Evolution
Impact of Science on Society
Journal of Chemical Education
Journal of Research in Science Teaching
J. of the American Chemical Society
Nature
Natural History
Northwest Science
Oregon Geology
Oregon Wildlife
Pacific Discovery
The Physics Teacher
Physics Today
Reviews of Modern Physics
School Science and Mathematics
Science
Science and Children
Science Education
Science Scope
Scientific American
Sky and Telescope
The Oregon Science Teacher

E – MicroTeaching

Planning: (Scored)

Your lesson plan should describe objectives, activities, instructions to students, questions you will ask, manipulatives/equipment you will use, and a timeline. Attach student hand-outs if you use any. You may choose to prepare a detailed script, or your plans may be in a concise outline form. You may choose to use the standard MAT Lesson Plan form, or some other format.

Be certain that your plans are clear, neat and easy to follow. **Include at least 6 probing questions which you will ask during the lesson.** (Note: Cite any references that you used as sources for your plan.)

Teaching: (NOT Scored)

You will be allotted 30 minutes for your presentation. Of that, plan on 5 minutes for set-up and preparing your group as the target student audience. Inform them of their age, grade and ability level, what teaching/learning may have preceded your lesson, what their skill levels are, etc. The peer group should attempt to role play the student audience and ask appropriate questions, as much as possible.

Your lesson should be between 15 - 20 minutes of teaching. Ask a peer to time you; less than 15 minutes indicates inadequate preparation. If your lesson runs longer than 20 minutes, you will need to stop.

You will have 5 - 10 minutes for follow-up discussion of the lesson with your peers; their input will be valuable. Members of the group should provide constructive criticism, in a

positive tactful manner. However, do not hesitate to identify areas of needed improvement; this is a necessary and valuable component of MicroTeaching.

Evaluation: (Scored)

Write a 1- to 2-page analysis of your lesson planning and classroom instruction. Identify strengths of the lesson, areas for improvement, changes you might/will make when you teach it again, feedback from the group, etc.

Most important, provide personal reflection: what did you learn while teaching/planning this lesson? What did you learn about teaching, about science or mathematics, about students, about yourself?

The Lesson Plans and Evaluation (stapled together) should be handed in during class **the week following** your MicroTeaching presentation.

F – Conference Report: Attend a professional conference and write a summary and reflection indicating what was most surprising/interesting/useful (1 – 2 pages). Example: Check the OSTA website for information on the October 13 annual Teacher Inservice Day conference: http://www.oregonscience.org/conference.htm Also consider the Washington Science Teachers Conference; see http://wsta.net/html/ and check OMSI for *free* workshops at http://www.omsi.edu/teachers/workshops/

G – Interview II: The following questions are designed for discussions with your mentor teacher and/or various teachers during your field experience within the school. Please compile the information you have gathered from formal or informal interviews; type it to hand in and discuss (2 - 3 pages).

1. What changes have you observed in science teaching in the previous five to ten years? Do you view these changes as positive?
2. What changes do you anticipate in science education in the next five to ten years?
3. What are the most important topics/skills/knowledge which one should gain from a science methods course in a Teacher Education program?
4. What do you enjoy most about teaching?
5. What would you like to change about teaching in general (not just science)? How would you change it?
6. How much do you rely on the textbook in determining the content of your curriculum? What text(s) do you use?
7. To what extent have you been influenced by the National Science Education Standards, the AAAS Benchmarks, or the Oregon Content Standards?
8. To what extent are these and other resources available? How do you use them?

   Calculators; Films — Computers/Software/CD-ROMs
   Laboratory equipment/supplies — Videos/DVDs
   Computer-based data collection devices
9. How do you accommodate students with special needs, such as learning or behavior disorders, lack of English fluency, physical disabilities?
10. Do you deal with controversial issues in your classroom? If so, which ones and how?
11. Do you have a favorite science lesson or activity? Why is it your favorite?

H – Assessment Hand-out: Prepare a one-page hand-out for parents (Back-to-School Night) describing your assessment and grading system. An example will be provided. See also: http://www.aahe.org/principl.htm

I – Safety Study: Skim the following websites on safety issues:

http://www.flinnsci.com/Sections/Safety/safety.asp
http://www.nsta.org/positionstatement&psid=32

Write a 1 – 2 page report on what you found either at these sites or in the Ch. 14 reading that was most helpful or most surprising regarding issues of safety.

J – Website URLs: Email the Instructor 5 useful websites you have found for science teachers/students. At least one should be a simulation activity for learning science. Include a one-sentence description of what appears to be useful at the site. These will all be shared with the entire class.

K – Resource Purchase: You have $1000 (of fictitious money) to spend. Explain the assumptions (what courses you will teach; how well-stocked the room is; what you need) and list your purchases/sources. You will be provided with catalogs. Also consider these online sources:

Sargent Welch: www.sargentwelch.com
Fisher Science Education: www.fisheredu.com
Carolina Biological Supply Co.: www.carolina.com
Science Kit & Boreal Labs: www.sciencekit.com/
PASCO scientific: www.pasco.com
Flinn Scientific Co.: www.flinnsci.com

L – Mini-Portfolio: a formal presentation of materials related to the course. Evaluation will be based on criteria developed during class discussions.

Alternative/Additional Assignment: Write a brief review of any four lessons found on the www.prenhall.com/chiappetta website. (First search by Topic) Would you recommend this site as a source of lessons? Why or why not?