INTRODUCTION
Welcome! This is Secondary Science Methods, a course designed to provide the opportunity for you to acquire the skills and knowledge necessary to teach high school science. I have planned for this course to be interesting, stimulating, and hopefully rewarding. As a teacher of science, you will have the opportunity to stimulate (or suffocate) student interest and enthusiasm. Your success or failure will impact the future of the United States as a leader in science and technology. With the current technical and biotechnical revolutions, it is difficult to imagine how any citizen will be able to function in the future without a basic understanding of the sciences. TEACHING SCIENCE EFFECTIVELY IS IMPORTANT TO THE FUTURE OF OUR SOCIETY!

COURSE DESCRIPTION
Prepares science teachers for the secondary schools. Emphasizes formulating objectives, selecting and organizing content, developing skill in using a variety of teaching strategies, and evaluating pupil progress. Stresses the investigatory approach to teaching biology in laboratory, field, and simulated teaching experiences. Includes observations and teaching experiences in area schools. Prerequisite: ED327 Instructional Strategies and Management.

REQUIRED TEXTS

Recommended:

BLACKBOARD COURSE SITE: http://online.clarion.edu, ED332

COURSE OBJECTIVES
After completing all course requirements, as a student of ED332 you should be able to:
• Develop and practice an instructional theory that is consistent with the National Science Education Standards. (Personal philosophy of teaching).
• Describe the history of science education, modern problems, and solutions indicated by research.
• Locate, describe and review current textbooks and other curriculum materials.
• Evaluate curriculum materials in light of the goals expressed by the National Science Education Standards.
• List and demonstrate examples of activities which focus on secondary science process skills.
• Plan and conduct a "micro-teach" which reflects an assigned instructional method.
• Design and conduct laboratory investigations.
• Design technology-integrated instruction.
• Describe and practice safety procedures for the science classroom.
• Become active a professional organization.
• Demonstrate effective evaluation techniques.
- Participate in a directed evaluation of a secondary biology classroom.
- Participate in an outdoor Environmental Teaching/Learning Experience.
- Demonstrate knowledge and use of computers in the classroom: record keeping, the Internet as a resource, computerized curriculum materials, and computers as learning tools.
- Synthesize a unit plan that demonstrates the goals and objectives outlined in this course.

ATTENDANCE and PARTICIPATION POLICY
This semester is crucial to your growth in preparation for high levels of success in your student teaching experience and your first years of teaching. Regular, punctual attendance is expected. Absences will be reflected in your levels of comprehension of key concepts, your levels of class participation as well as contributions to group activities.

INCOMPLETE GRADES
Must be arranged by the student with the instructor IN ADVANCE. Incompletes are given only in emergencies! If you feel you are having trouble, come for help as soon as possible. Student teaching will be delayed until satisfactory completion of the Block assignment.

SPECIAL SERVICES
Any student requiring accommodations for taking notes or tests should make arrangements, as early in the semester as possible, to discuss his or her needs with me.

ACADEMIC DISHONESTY  Academic dishonesty includes plagiarism, cheating on assignments, examinations or other academic work. Solutions for instances of alleged academic dishonesty will attempted to be found by the instructor and the student involved. If a mutually agreeable solution is not found, the instructor will notify the vice president for student affairs with an Incident Report Form for possible disciplinary action. Students’ rights, responsibilities and possible sanctions are outlined in the current Student Rights and Regulations Handbook.

WRITTEN ASSIGNMENTS:
Spelling and grammar errors will affect the grade that you receive on a written assignment! Think of yourselves as beginning professionals, not students!

Do not submit handwritten assignments, except those completed in class. Use a size 12 font, in an easy to read style such as Times New Roman, Courier, or Arial, double-spaced.

Use APA style for bibliographic references, citations, and general writing guidelines. A good online source of APA guidelines can be found at the Purdue University Online Writing Center: http://owl.english.purdue.edu/handouts/research/r_apa.html

To facilitate the creation of your Learning e-Portfolio and Professional portfolio:
All written assignments and lab reports should be securely saved in electronic format - as either a MS Word or similar document, or an .html file. This will greatly ease the synthesis of your professional portfolio.
ASSIGNMENTS Fall 2004

JOIN A PROFESSIONAL ORGANIZATION

As a student, you may join professional organizations at a very reduced rate. Examples are NSTA (National Science Teachers Association, www.nsta.org or www.joinscience.org), NABT (National Association of Biology Teachers, www.nabt.org), National Physics Teachers Association, The Chemistry Teacher. I strongly urge you to include PSTA (PA Science Teachers’ Association (http://www.pascience.org or http://www.joinscience.org). Membership in NSTA gives you access to their online resources including online full text access to all five journals and a discount on resources available at the NSTA Science Store. All of these organizations have valuable conferences and online resource links. Joining the Clarion Student Chapter of NSTA ($10/year) includes your first year’s subscription to NSTA! ($40 value).

PERSONAL PHILOSOPHY OF TEACHING SCIENCE

Over the course of the semester, beginning with the first day in class, you will participate in activities that are designed to aid you in constructing and clarifying your personal philosophy of teaching secondary science. The final essay, due at the end of the semester, will become part of your professional portfolio.

BLACKBOARD

There will be both individual assignments and class discussion board assignments on BlackBoard. A group page has been created for each of you within our class BlackBoard site (online.clarion.edu, ED332). You are responsible for checking the reading assignments and focused concept questions. You must answer the questions to the best of your ability before class! The due dates fluctuate and are given on the page with the questions in the Blackboard file. To get credit for your answer, it need not be “exactly right”, but it must represent an honest attempt to think through the question.

LESSON METHOD MICRO-TEACH

You will be assigned a teaching strategy with a partner to be demonstrated on a given topic in a 10-15 minute mini lesson before your peers. Prepare a short lesson plan with a one page written explanation of your strategy and how your lesson demonstrates this strategy.

DISCREPANT EVENT – CCM model lesson

You will practice and present a ~10-15 minute introductory lesson that uses the conceptual change model. A discrepant event must be engaging and challenge the learner to figure out what happened and why it “works that way”. You may choose a lesson from the Stepans text to practice. Add summary sheets, assessment worksheets etc if necessary. For what concept/topics would this lesson be useful?

EXPERIMENT*

You will design and conduct ON YOUR OWN a laboratory investigation appropriate for secondary science gr 7-12. A laboratory report must outline the purpose, hypothesis tested, identify variables, describe the experimental design, show the data collected in the form of a table and graphics and explain your conclusions. I suggest that you peruse the collections of high school lab workbooks in the Center (Peirce 220) for ideas to get you started.

MISCONCEPTION SURVEY AND LESSON
As a member of a group, you will a) choose a PA Standards-based science concept common to grades 7-12 science curricula, b) develop a short quiz or questionnaire, c) administer the survey to classmates, secondary students, family members, etc., d) analyze the results of the survey for common misconceptions regarding the science concept, and e) develop a 15-20 minute mini-lesson designed to address at least one common misconception surrounding your concept. This lesson will become the first lesson in your unit. The lesson will use at least the first 3 stages of the FERA planning model or the CCM model. You will submit the survey, results and analysis discussion.

EARLY FIELD TEACHING EXPERIENCE*

You will participate in the planning and teaching of a science topic using inquiry lab techniques and technology to high school students. Your team will develop a lesson plan that must be approved by the professor, and your presentation will be evaluated.

BLOCK EXPERIENCE

During your three-week field experience, you will complete several assignments, including teaching a lesson, keeping a reflective journal, conducting a teacher interview, conducting a nature of science assessment, and completing a focused classroom management observation.

SCIENCE EDUCATION JOURNAL ARTICLES

You will read and summarize two articles from the following journals. NO EXCEPTIONS! Your written summary should include a short synopsis of the article, how you would use the information, and what you learned from the article about teaching/learning science. (1 page minimum)

Please provide a copy of the article with your summary for a class collection. The journals listed are all available in our library, with the exception of Science Scope, which is available along with The Science Teacher at www.nsta.org.

The American Biology Teacher The Chemistry Teacher
The Science Teacher The American Physics Teacher
Science Scope Journal of Research in Science Teaching
Technology Educator Science Education

EDUCATION RESOURCES

You will research and turn in electronically an annotated list of at least 25 resources and FREE STUFF. A piece of advice: Collect paper copies of your resources in an organized file – you will need them during student teaching! Print useful web pages now – links often disappear!

Your resource list MUST INCLUDE:

• Standards-based lesson plans (what does that mean?)
• Rubric construction help
• Games for classroom or that can be adapted
• Science resources for use as lesson resources, e.g. current science developments
• Gender and racial equity in science education
• Types and sources of education technology for your subject
- Evolution vs. Creationism: Current educational laws/judgments regarding teaching evolution
- Ethical use and care of animals in the classroom
- Lab safety: contracts, storage systems, safe chemical storage, etc.
- Alternatives to dissection for Biology/Gen Sci majors

These resources may be from books, journals, magazines, government agencies, or the Internet. Again, a reminder that many resources are available for loan/copy in the Center for Science and Mathematics Education, Pierce 220.

Performance Artifact and EPORTFOLIO

The performance assessment from this class that is to be posted to your eportfolio is the Unit Plan. By the end of the semester, you will complete your Learning ePortfolio. You may have begun construction of the ePortfolio during ED217, and have required elements of your portfolio from several previous classes. This semester, we are adopting a web-based ePortfolio construction tool. You may use several other assignments from this class if you wish. Your Learning ePortfolio must be completed with links to all 9 areas of the Conceptual Framework with 9 Artifact Reflections before you go on to student teaching. There will be more information soon!

During the student teaching semester, you will convert this Learning ePortfolio into a Professional Portfolio suitable for interviewing. More information is located on Blackboard.

UNIT PLAN*
Detailed requirements are posted under Course Documents on Blackboard.

Course grade will be compiled from your work on the above assignments, Block requirements, your class participation, group participation and grades on 2 quizzes and a final exam.

COURSE GRADING SCALE

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100</td>
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<tr>
<td>B</td>
<td>85-92</td>
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<tr>
<td>C</td>
<td>75-84</td>
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Anything less than a C is unacceptable!