

Augsburg College

Course: ESE 340 - 341

5-12/MS Natural Science

Dates: Fall, 2003

Times: Mondays, 6:00 – 9:00 p.m.

Classroom: Old Main, 4

Instructor: John Stangl

Office hours: Before each class

Telephone: 651-748-6163 (voice mail, 24/7)

Course Credits: ESE 340 = 1.0; ESE 341 = .5 (Courses meet concurrently for the first 8 sessions.)

Prerequisites: Admission to the Education Department

Course Description:

This course focuses on providing students effective strategies for structuring science teaching and learning in middle school and secondary school science classrooms. The content and processes are designed for those who can understand that modern science teaching involves much more than mere repetition of information. From the beginning you should be advised that a conscientious study of science teaching is complex and challenging enough to keep you busy learning even after years of classroom work. Topics in this course have been chosen to foster your understanding and appreciation of scientific processes. You will have multiple opportunities to experience hands-on investigations that model modern inquiry learning and teaching strategies. In addition, we will carefully examine case studies to broaden our exposure to the inevitable dilemmas faced by science educators. Whether your interests lie in the life, physical, or earth sciences, the concepts we study will be an excellent foundation for your teaching career.

Education Department Mission Statement:

“The Augsburg College Education Department commits itself to developing future educational leaders who foster student learning and well-being by being knowledgeable in content, being competent in pedagogy, being ethical in practice, building relationships, embracing diversity, reflecting critically, and collaborating effectively.”

Applicable Standards of Effective Practice:

- Standard 1. Subject Matter. A teacher must understand the central concepts, tools of inquiry, and structures of the discipline taught and be able to create learning experiences that make these aspects of subject matter meaningful for students. A teacher of kindergarten through grade 6 must demonstrate fundamental knowledge of scientific perspectives, scientific connections, science in personal and social perspectives, the domains of science, and the methods and materials for teaching science and scientific inquiry.
- Standard 2. Student Learning. A teacher must understand how students learn and develop and must provide learning opportunities that support a student’s intellectual, social, and personal development.
- Standard 3. Diverse Learner. A teacher must understand how students differ in their approaches to learning and create instructional opportunities that are adapted to students with diverse backgrounds.
- Standard 4. Instructional Strategies. A teacher must understand and use a variety of instructional strategies to encourage students’ development of critical thinking, problem solving, and performance skills.

- Standard 5. Learning Environment. A teacher must be able to use and have an understanding of individual and group motivation/behavior to create learning environments that encourage positive social interaction, active engagement in learning and self-motivation.
- Standard 6. Communication. A teacher must be able to use knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction within the classroom.
- Standard 7. Planning in Instruction. A teacher must be able to plan and manage instruction based upon knowledge of subject matter, students, community, and curriculum.
- Standard 8. Assessment. A teacher must understand and be able to use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social, and physical development of the student.
- Standard 9. Reflection and Professional Development. A teacher must be a reflective practitioner who continually evaluates the effects of choices and actions on others, including students, parents, and other professionals in the learning community, who actively seeks out opportunities for professional growth.

Subject Matter Standards met:

- E.7, know and apply the fundamental concepts and principles of middle/secondary school science concerning the life, physical and natural sciences.
- E.8.d, know how to implement safe environments for learning science through knowing:
 - i. State and national legal responsibilities; safety guidelines for teaching science
 - ii. How to establish and enforce recognized safety procedures during the science learning experience
 - iii. How to use required safety equipment for classroom, field, and laboratory settings including goggles, fire extinguishers, fire blanket, eyewash, and chemical shower
 - iv. How to manage, maintain, and use science supplies and equipment
 - v. State and national guidelines; and plan for the care, storage, use, and disposal of chemical and equipment used to teach middle school and secondary science
 - vi. The ethics of and restrictions on making and maintaining collection of scientific specimens and data
 - vii. The ethics of and restrictions on the use of live organisms, and how to acquire, care, handle, and dispose of organisms

Technology Requirements:

Make a spreadsheet (with formulas) using Excel. Demonstrate proficiency in writing and delivering learner-centered lessons, which feature students using digital technologies to guide their own learning. In addition, the Education Department expects these entry-level technology skills from all pre-service teachers: have the ability to access and navigate the Internet, e-mail and standard PC word processing data-base software. Student who do not possess these skills are expected to contact the Lindell Library for help in developing these skills.

Field Experience Requirement:

This course requires a 20-hour field experience at the middle school level in the subject area of the license being sought. The exception to this is for those students seeking a 9-12 license in one of the science licensure fields. These students should complete the entire 5-12 methods course just like those seeking 5-12 licensure, but their field experiences should be at the high school level.

General Course Information and Policies:

- **Required Text**

Science Instruction in the Middle and Secondary Schools, fifth edition, By Eugene L. Chiappetta and Thomas R. Koballa, Jr.; copyright 2002

You are expected to read the entire text. Selected chapters will be emphasized based upon the background and goals of the students.

- **Course Requirements**

Students will:

- Reflect on the nature of science and Science Education: the new “basic” in the classroom.
- Examine the scope of middle school and high school science curricula.
- Facilitate conceptual development as it relates to 12-18 year-old learners.
- Experience hands-on science methods in laboratory sessions.
- Apply the fundamentals of scientific inquiry and discovery.
- Demonstrate a command of instructional strategies by designing, constructing and presenting a variety of science demonstrations, activities, and electronic tutorials.
- Acquire a level of comfort and confidence with making real-world connections to science content.
- Practice and demonstrate appropriate safety techniques.

- **Assignments/Assessments:**

Assignments and assessments	Approximate % of course grade
Science Lessons (design, develop, demonstrate)	40%
Formal and informal assessments	30%
Reflections, participation, and attendance	30%

The interactive class format requires active participation in the learning process. You will be divided into study groups that work together in class, during labs, and if you choose, out of class. We will have discussions of material, oral presentations, written assignments, demonstrations etc. To achieve success, timely completion of homework and assigned readings is critical. Work one week late earns 1/2 credit.

Review of Web sites:

You will need to browse the Internet for information in the preparation of your science demonstrations, activities, and tutorials. Further instructions will be forthcoming in class.

Science Lessons:

You will research the web and our library for information and ideas for science lessons that will meet the needs and abilities of the students with whom you plan to teach someday. You will develop lessons around science concepts of your choice and teach the material to your peers. You will make multiple copies of your plans for each classmate and then exchange each other’s plans at the end of the course. All work must be typed and proofed for errors. You will reflect on these lessons, your teaching, and the impact the instruction had on learning. Specific information will be made available in class.

- **Grading:**

- **A** = Outstanding, exceptional understanding and performance. Able to recall, understand, and apply instructional strategies and science concepts on par with successful practitioners in the field.
- **B** = above average understanding and performance. Able to recall, understand, and apply instructional strategies and science concepts in most situations.
- **C** = Average understanding and performance. Able to recall, understand, and apply instructional strategies and science concepts at least 50% of the time.
- Course grades falling below 2.0 will not be accepted toward licensure in education. Students must earn a grade of 2.0 to pass this course.

There is no curve for this course, and you are not in competition with each other for grades.

- **Academic Honesty:**

You are expected to comply with Augsburg's policy on Academic Honesty. In addition:

- Attempts to present work that one has not actually prepared as one's own; plagiarism and paraphrasing are cheating and will not earn credit.
- Much of the lab work and some in-class assignments will be done in groups. If you fail to put in a fair share of the work, yet claim equal participation through group merit, this will constitute dishonesty.

- **Attendance:**

- Due to the nature of hands-on lab work, 100% attendance and appropriate participation are expected. Safety concerns and practical reasons do not permit lab make up work. Absence and tardiness will affect your opportunity to maximize learning and your final course grade. Final decisions about how an absence/tardy affects the course grade rest with the instructor.

Tentative Schedule – fall, 2003

Week of:	Topics	Readings and assignments (Due on the day of class)
Sept. 8 **	Introductions, course overview, goals Syllabus review What is science? Experiencing science	Chapters 1 and 2
Set. 15 **	The nature of learning Strategies for teaching science Experiencing science	Chapter 4
Sept. 22 **	Diverse learners and their needs Factors affecting success in learning science Experiencing science	Chapter 3
Sept. 29 **	Inquiry science teaching Contest vs. process Experiencing science	Chapter 5 Discrepant event due
Oct. 6 **	Lecturing, demonstrations, discussions The “art of questioning” Experiencing science	Chapter 6
Oct 13 **	No class on Monday, Oct. 13 th . Instead attend either The Education MN workshop on 16 th or the MN Science Teachers workshops on the 17 th	Chapters 8 and 9
Oct.20 **	Safety in the lab and science classroom Managing the learning environment Video taping	Chapter 11 Science lesson due
Oct. 27 *	Planning larger science lessons Short and long range planning Experiencing science	Chapter 12
Nov. 3 *	Planning a science unit of study Instructional objectives Experiencing science	Chapter 13
Nov. 10 *	Assessment methods Developing rubrics, grading, and conferencing Experiencing science	Chapter 14
Nov. 17 *	Technology in the classroom PowerPoint presentations Experiencing science	Chapter 10 PowerPoint presentations due
Nov. 24 *	Catch up day if we get behind No class if we stay on track Thanksgiving break	-----
Dec. 1 *	Professional development In-service training and board certification Experiencing science	Chapter 15
Dec.8 *	Unit presentations Peer reviews and self-evaluations Video taping	-----