

# SOUTHEAST MISSOURI STATE UNIVERSITY

## COURSE SYLLABUS

Department of Science Education

Course No. ST 601

Title of Course: Introduction to Science Education

New: Spring, 1999

### I. Catalog Description and Credit Hours of the Course

Overview of current thinking and trends in science education, focusing on issues in science teaching, learning and learners, curriculum, and assessment. Emphasis on application of the ideas to science in the classroom, including practical software and multimedia strategies for science teaching and learning. Three hours in class, plus one hour on-line (must have Internet access), and two Saturday meetings for multimedia work; eight weeks. (3 credits)

### II. Prerequisites

Consent of instructor.

### Purposes or Objectives of the Course

The purpose of this course is to acquaint students with the current status of the science education field. Students will attain content background and experience in various approaches to science curriculum design, assessment, and pedagogy that will enhance them as science educators. Pragmatic techniques will be used and modeled as a vehicle to acquire knowledge about science education. The student will be able to:

- a. Demonstrate familiarity with the National Science Education Standards and Missouri's Show Me Standards and Science Curriculum Frameworks
- b. Analyze a unit or curriculum regarding alignment to the Standards
- c. Design classroom activities for performance assessment
- d. Design classroom activities incorporating inquiry-based techniques
- e. Develop familiarity with current learning theories and their impact on science teaching and learning
- f. Use web-based conferencing (e.g., Web Board) as a mode of communication of information and assignments
- g. Employ multimedia in activity and curriculum design

### Expectations of Students

1. Students will use the primary science education literature to prepare a paper and oral presentation of a topic related to the major topics of the course. The presentation will
  - provide science education background and science content.
  - include classroom/multimedia applications appropriate for a chosen grade level.
2. Students will review assigned articles relating to science education topics, posting analysis and comments on the Web Board in preparation for class discussion.
3. Students will develop a plan in instruction using the Internet as an interactive resource for investigative science learning and teaching.

4. Students will demonstrate and critique at least one software program suitable for science teaching and learning.
5. Students will use the Web Board to share reactions to the topics, ideas for classroom applications of ideas under discussion, and other commentary.
6. Students will participate in weekly exchanges/assignments on the Web Board.
7. Students will attend all classes and actively participate in class activities.

## V. Course Content or Outline

<u>Week</u>	<u>Topic</u>	<u>Hours</u>
1	<p><u>Introduction</u></p> <p>An overview of the discipline to include design of the course, presentation of National Standards (NSES) and Missouri Frameworks. We will provide computer lab time to introduce students to the Web Board.</p> <p>Web Board: Self analysis of Frameworks used in teachers' own classrooms.</p>	3 1
2	<p><u>Assessment</u></p> <p>Overview of changing testing (new Missouri Assessment Program: MAP) and introduction to scoring procedures. Active learning will include</p> <ul style="list-style-type: none"> <li>- doing an activity appropriate for preparing students for the tests</li> <li>- revising standard test questions into performance-based items</li> <li>- teaching students self-assessment</li> </ul> <p><b>Web Board:</b> Pre-reading and e-mail exchange on discovery/inquiry techniques.</p>	3 1
3	<p><u>Inquiry</u></p> <p>Students will encounter 6 stations representing both inquiry and non-inquiry activities. After doing the activities they will critique each and class discussion will lead to concepts of various Inquiry modes.</p> <p><b>eb Board:</b> Post comments/feedback from reading assignment</p> <p><b>aturday meeting:</b> Students will engage in a lesson using the Internet as an interactive resource for investigative science learning and teaching. They will begin the design of an interactive lesson due on the next Saturday meeting.</p>	3 1 4
4	<p><u>Inquiry</u></p> <p>Students will practice transforming non-inquiry lessons into inquiry forms.</p> <p><b>Web Board:</b> Applications of inquiry in your classrooms</p>	3 1
5	<p><u>Learning Theories</u></p> <p>Overview of major theories shaping science education. Students will construct a concept map in class and experience V mapping.</p>	3
5(cont)	<p><b>Web Board:</b> Questions and comments on concept theories</p> <p><b>Saturday Meeting:</b> Students will have hands-on experience with several software programs in their discipline. They will choose, demonstrate and critique one software program for the class.</p>	1 4

6	<u>The Science Learner: Misconceptions – alternative concepts</u> What are they? Examples from physical, biological and earth sciences. What do they mean for the teacher? What do they mean for the learner? <b>Web Board:</b> Post reflective comments about 1) How they think about science, 2) What is the effect of past teachers on their own view of science, and 3) how students respond to their attitude towards science.	3  1
7	<u>The Science Learner: Variations and Learning Styles</u> Students will present the key ideas in their reading. Possible topics: how learning science is influenced by cognitive abilities, attitudes towards science, cultural differences, and learning styles. In-class analysis of several activities to find appropriate teaching strategies for helping people understand the meaning of, for example, a graph, images, rotation of molecules. <b>Web Board:</b> Reflective analysis of a student having difficulty learning and how the ideas discussed in class might relate	3      1
8	Student presentations	4

**Textbook and/or Other Materials or Equipment Required**

Mintzes, J. J., J. H. Wandersee and J. D. Novak (eds.). Teaching Science for Understanding. NY: Academic Press, 1998.

MO Department of Elementary and Secondary Education. 1996. Missouri Frameworks for Curriculum Development: Science. Columbia, MO: Instructional Materials Laboratory, UM-C. *This book is available at Books and Things for about \$16.*

Articles and other readings will be supplied or are on-line.

**VII. Basis of Student Evaluation (grades)**

Communications on Web Board	25%
Final Paper and presentation	20%
Final Presentation	10%
Class participation	25%
Homework assignments	20%

**VIII. Programs Served by this Course**

Required core course of the MNS in Science Education degree option.  
 Students in the MNS in Biology, Chemistry or Geoscience with an interest in education.