

Sci 495

SCI 495: Teaching Science in the 21st Century

Credits: 3

Meeting times: Twice weekly for total of 3 hours Activity: Lecture/Discussion

Instructor information:

Instructor:

Office:

Office hours:

Phone:

Email:

If there are students in this class who have special needs because of learning or physical disabilities, please contact the Office of Academic Support (OAS), at 895-2490.

Course Description

SCI 495 is the capstone for the Integrated Science Major and will synthesize and integrate all the subject areas of the major. SCI 495 will use key biological science concepts to demonstrate integration of important physical, chemical, and geological concepts as would be necessary in a K-8 teaching environment. Through performance assessment activities, developed using the *National Science Education Standards* and the *Michigan Curriculum Framework*, students will also have ample opportunities to put the theory of the curriculum into practice. The course focuses on science as inquiry and provides a bridge for the transition into the teaching profession.

Objectives

Students will refined their scientific understanding of genetics, ecology, plant and animal life cycles.

Students will integrate all the sciences into the teaching and learning of biological sciences concepts in K-8 classrooms.

Students will use the Michigan Curriculum Framework as a guide in developing science teaching materials as a group or individually.

Evaluation

At the end of each of the four units, students will present and submit unit plans. They will also participate in service learning activities and maintain a journal. Class discussion is an integral part of the learning experience; therefore, students will be assigned points based on their involvement in class and small group exercises.

Points will be assigned as follows:

Unit plans	70
Group and class participation	10
Journals	10
Service Learning	10

Grades will be assigned as follows:

A	95-100	A-	92-94
B ⁺	87-91	B	83-86
C	73-75	C ⁻	70-72
D	65-71	F	< 65

SCI. 495 Teaching Schedule

<i>Date</i>	<i>Topic</i>	<i>Readings/Discussions/Journal</i>
Week 1	Introductions Conceptions of Science Science and culture Science and philosophy <i>Review of the mechanics of transmission of heredity DNA structure. Variation in populations</i>	Review our conceptions of science and the scientific method. ¹
Week 2	Science knowledge for K-8 National Science Education Standards Michigan Curriculum Framework. <i>Chromosomes and gene expression. The mechanics of genetic engineering and gene therapy.</i>	Integrating science topics.
Week 3	Science in the school curriculum, yesterday, today and tomorrow. The Human genome project. <i>Ethics of gene therapy, cloning, stem cell research.</i> ²	Importance of science in K-8 classrooms. Teaching science for value claims.
Week 4	Psychological foundations of science teaching. Children's Science and Constructivism Facilitating Conceptual Development Presentation and discussion of 1 st unit plan.	Different ways of knowing science. The constructivist approach to teaching and learning science. ³
Week 5	<i>Eliciting Children's Conceptions about Science.</i> B. <i>Principles of Ecology</i>	Interviews Types of knowledge systems. Children's views of scientific knowledge.
Week 6	Developing the skills of the natural investigator Food chains and energy flow with in the ecosystem. Fossil fuel vs. renewable energy sources.	The inquiry approach Basic science process skills
Week 7	Investigations in science B. <i>Biological diversity, pollution, acid rain, global warming and other human impacts on the environment.</i>	Trial and error, predicting, experimenting, reflecting
Week 8	Designing Science Lessons. Discovery Learning	The Learning cycle

¹ Guideline 2.11 The use of scientific processes to investigate phenomena.

² Guideline 2.10 Relationships among science, technology, society, human issues and cultural issues.

³ Guideline 2.2 Plan instruction based o the students' prior knowledge and conceptualizations.

	<i>Presentation and discussion of 2nd unit plan</i>	
Week 9	Making real world connections. Nontraditional educational opportunities <i>Cycles of Nature</i> <i>Plant life cycles</i>	Individual investigations.
Week 10	Science, technology and society <i>Review of photosynthesis and its impact as a renewable energy source.</i> <i>Animal life cycles</i>	The relationship of students to science, technology, and society. Problem solving models for STS teaching. ⁴ Women and minorities in science. Multicultural science education issues. ⁵
Week 11	Planning and Managing a Science Classroom Organs and organ systems <i>C. Human population growth</i>	Space and time Planning a safe environment for teaching science.
Week 12	Assessment of student learning B. <i>Presentation and discussion of 3rd unit plan</i>	Assessment as outlined in the National Science Education Standards. Assessment within a constructivist framework, performance assessment, and rubrics for scoring assessment items. ⁶
Week 13	A. Transformation from student to teacher professional	Resources for teachers of science. the role of the teacher as researcher and the importance of membership in professional organizations. ⁷
Week 14	<i>Presentation and discussion of final unit plans</i>	
Week 15	<i>Presentation and discussion of final unit plans</i>	

⁴ Guideline 2.5 Electronic educational technology.

⁵ Guideline 1.1 Engage all students in the study of science.

⁶ Guideline 2.6 Using appropriate assessment techniques.

⁷ Guideline 2.3 Fulfilling the professional obligations of teaching.