ST631  Teaching Science to Elementary Students: A Content-Based Science Methodology

Catalog Description: This is a content-based science methods course for teachers of elementary science. This course will examine the various methods and techniques of teaching elementary science content as reflected in the Show-Me State Standards. It will focus on the view that science can best be described as both a process and a set of ideas, and that it is the science process skills that generate understandings about the natural world and science itself. Only students in the On-Line Masters Program in Teaching and Learning in Elementary Education may enroll in this course. Prerequisite: Successful completion of the program’s core courses. (3)

Course Description: The focus of this course will be on the Science Methodology using the different domains of science based on Missouri State Frameworks. This course will use various constructivist teaching strategies to support student understandings necessary to teach science in contemporary ways tied to reform-based science education program. Inquiry-oriented hands-on activities for example, will be used to demonstrate how processes of science generate broad connections among the ideas or the themes, like pattern, structure, interaction, change and system involving a phenomenon. The course will help the participants to conceptualize the inquiry in both a way to teach and a way for students to investigate the world and construct science knowledge. The journey through the course will thus promote the concept that science content or ideas are not isolated facts. Rather, they make sense when these themes help construct the knowledge of natural events. This course will thus facilitate participants to develop unit and lesson plans to let their students take charge of their own science learning process.

Rationale: Science in traditional classrooms is taught in ways that promote rote learning and not the conceptualization of the science ideas. This method of teaching science content or the science ideas does not support the constructivist concept of teaching and learning science. So, the content should be taught to demonstrate that ideas of science are generated from the process of scientific inquiry. This course will help prepare teachers to teach elementary science in ways that will allow their students to take charge of their own learning and construct their own science knowledge.

Credit Hours: 3

Prerequisites: Successful completion of the program’s core courses.

Conceptual Framework:

Course Objectives: The student will:
A. develop the understanding of the science content Standards given in the Missouri state Framework for curriculum development in science for K-5.
B. demonstrate knowledge of Piaget’s, Brunner’s and Vygotskyan theories of learning and their implications on teaching science in the elementary schools.

C. demonstrate knowledge of inquiry and collaborative science learning formats and planning activities.

D. know the conceptual approach to organizing science learning, including the use of concepts and generalizations--weaving the process and ideas of science.

E. participate actively in authentic and performance-based assessment methods and scoring guide designing technique.

F. be able to write objectives, lesson plans, and unit plans based on inquiry-based cooperating science learning technique aligned with the Missouri-Science Framework for curriculum development and Show-Me Standards.

G. reflect upon effects of implementation and practice to provide ongoing adaptation toward best teaching practice in the teacher’s classroom.

**Course Content:** This course was developed in an outcomes-based format and was designed to conform to the 45 contact hour expectation common for three credit hour courses. The specific course content, outlined in the course objectives, will be delineated by the instructional design team and the instructor of record.

1) National Science Education Standards
2) State Frameworks
3) Piaget, Brunner and Vygotskyan theories of learning and their implications of teaching science
4) How Students Learn
5) Various science teaching methods and techniques
6) Bringing and facilitating inquiry model into classroom
7) Science Unit & Lesson planning and implementation
8) Development of various formal and informal assessment tools
9) Developing scoring guides
10) An Action Research project blending or weaving ideas and process to construct knowledge
11) Will be able to teach the content identified by the MO Frameworks implementing the above methods and techniques

**Methods of Instruction:** E-mail, chat, search, document sharing, journals, webliographies, threaded discussions, online assessments, narrated presentations, interactive assignments and activities; using online resources (graphics) to conceptualize science concepts; identifying web sites and quality lesson adaptation.

**Portfolio Requirement:** A portfolio module will be developed to give evidence of competencies addressed in this class. Possible suggestions for the portfolio module for this course are:

1) Philosophy of science instruction paper #1 – Consideration of current practice and beliefs
2) Reading and reflections from text
3) Identifying and reflecting on articles on teaching science from science journals and periodicals
4) Answering questions from video case studies
5) Unit and lesson planning, implementation, assessment, and reflection upon success with students
6) Science project – implementing the view that science knowledge is the product of a set of ideas and process skills
7) Philosophy of science instruction paper #2
8) Ongoing discussion on discussion board about reflections on each and every session, as per schedule.

Research Component: The students will research instructional strategies that best meet the identified needs.

Grading Policy: Specifics to be determined by the instructional design team and the instructor of record

- Philosophy papers 20%
- Reading reflections 10%
- Video case studies reports 10%
- Article reviews 10%
- Unit and lesson plans 20%
- Science project 20%
- Threaded discussion participation 10%

Course Schedule: To be determined by the instructional design team and the instructor of record.

Textbooks (title, Author, ISBN): Selected by the instructional team and the instructor of record. Suggested text:


Six video case studies that accompany this textbook

Library Review: A review of literature will be required to support the action research project.

*Journal of Research in Science Teaching*
*Science and Children*
*The Science Teacher*

Other Required software, Materials and Equipment: Additional materials may be selected by the instructional design team and the instructor of record.

Statement on Non-Discrimination: Missouri’s public universities are equal-opportunity educational institutions and do not discriminate on the basis of race, color, national or ethnic origin, religion, sex, or sexual orientation for programs, activities, or employment, in accordance with the Civil rights Act of 1964 and Title IX of the Educational Amendments.

Statement on Academic Honesty: Missouri’s public universities are committed to intellectual integrity in their academic pursuits. Academic dishonesty constitutes unacceptable behavior and includes unauthorized assistance in completing required course assignments or testing. Unauthorized assistance includes electronic transfer. Plagiarism, that is, submitting someone else’s work or part there of, as your own, is considered to be cheating.
Breaches of intellectual integrity will result in disciplinary measures, based on the policies and procedures of the student’s home institution. These may include:
1) a failing grade for a particular assignment;
2) a failing grade for the course;
3) suspension for various lengths of time from the university, and/or
4) permanent expulsion from the university.

Statement on Student Disabilities: Reasonable accommodations will be provided upon request for persons with disabilities in accordance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act of 1990. If you are a person with a disability, either learning related or physical, who requires an accommodation to participate in university programs, services, or activities please contact the disability services staff at your university of record.

Expected Enrollments: 20-25

Special Fees: None

Bibliography: To be determined by the instructional design team and the instructor of record.