Syllabus
EDU 314

Methods of Teaching Science in the Elementary School

Office: 330, John Miller Dickey Hall
Office Hours: T, Th, 11:00 A.M. – 4:00 P.M.

Course Description:

This course is designed as a presentation of current teaching methods as well as relevant approaches for teaching science in the elementary school. Materials, methods, and strategies for teaching life, physical, and earth sciences will be presented. The course will seek to help pre-service teachers to develop an understanding and appreciation of science that hopefully will make an impression to help children acquire knowledge, attitudes, and skills essential to science literacy.

Required Text:

Prerequisite:
BIO 101 – Human Biology, PHY 101 – Elementary Astronomy

Course Objectives:

Through reading assignments, discussions, and class activities, pre-service teachers will:

- Participate in skills and strategies used in hands-on science approaches.
- Be provided with opportunities to design and conduct investigations and experiments.
- Be able to utilize appropriate instructional formats for teaching science in the elementary classroom.
- Identify and demonstrate evaluative procedures for assessing science learning.
- Plan, organize, teach, and critique science lessons.
- Enhance their science knowledge base as it relates to content.
- Examine ways to integrate science with other disciplines.

Learning Outcomes:

- Recognize that all students have the ability to be science learners.
- Design science lesson plans and a science unit plan that may be utilized in a personal teaching experience.
- Plan and implement a functional science lesson, which includes experimentation.
- Assemble a resource packet, which includes materials provided by NASA, (National Aeronautics and Space Administration).
- Examine the Pennsylvania Department of Education Academic Standards for Science and Technology.
➢ Familiarize themselves with elementary science curriculum as it relates to the various elementary grade levels.
➢ Develop and present a science project in small group format.
➢ Make preparation for the Praxis II – Elementary Education Content Knowledge Exam and Elementary Education – Curriculum Instruction, and assessment Exam.

➢ **Course Requirements:**

➢ Textbook
➢ Class attendance at every session and full participation
➢ Satisfactory completion of five examinations, (including the Mid-Term and Final Exam), quizzes, and assignments
➢ Submission of a Unit Plan in elementary science
➢ Submission of 6 Lesson Plans in elementary science
➢ In-Class Presentation
➢ Science project presentation

**Expectations:**

➢ Students are expected to attend all classes.
➢ Students are expected to arrive for class on time.
➢ Students are expected to submit all assignments on time.
➢ Students are expected to come to class having read all assignments and to participate in class discussions.
➢ Students are expected to word process all assignments.

**Evaluation:**

Grades will be determined by the following:

➢ Attendance and active participation
➢ Completion of 6 science lesson plans
➢ Completion of 1 science unit plan
➢ Completion of 5 exams including Mid-Term and Final
➢ Completion of quizzes
➢ Satisfactory presentation of a science lesson
➢ Satisfactory presentation of a science project

**Course Outline:**

Week 1: Effective Science Teaching/Students’ Conception of the World
Students will identify and discuss the elements of effective science instruction. The importance of science literacy in the elementary program will also be considered. A working definition of science will be developed by students.
Week 2: The Learning Cycle
The essential parts of the science learning cycle and its connection to science lesson planning will be described. Sample science lesson plans with appropriate format will be presented. Following this discussion, students will begin to develop their own functional science lesson plans, which will include an activity involving experimentation.

Week 3: Science As Inquiry
In this section, students will examine science inquiry skills. Effective instruction and assessment as it relates to science inquiry will be discussed.

Week 4: The Content of Science: Conceptual Learning
Students will identify and classify different types of concepts. Construction of concept maps and concept webs will be presented as a strategy for concept development.

Week 5: The Content of Science: Constructing Generalizations
Students will describe the role of generalizations in science content. The importance of generalizations will be examined as it relates to prediction and the phases of the learning cycle.

Week 6: Teaching Science Meaningfully
Students will describe the dimensions of effective science teaching. This discussion will include the effective use of cooperative group learning in a science lesson. Instructional activities, which are useful for the exploration phase, invention phase and expansion phase of the learning cycle, will be presented.

Week 7: Assessing and Evaluating Science Learning
In this section, students will differentiate traditional assessment from alternative assessment for meaningful learning. Students will also identify and describe types of assessment. Portfolio assessment will also be an element of this discussion.

Week 8: Planning Science Units
Students will describe techniques for planning an integrated science unit. Criteria for determining appropriate topics of an integrated science unit will be described. Following this discussion, students will begin the development of their own functional science unit plans.

Week 9: Science for All Students
Factors to be considered for adapting science instruction for children with special needs will be presented. Strategies needed to teach meaningful science to students of both genders and diverse cultural heritages will also be examined.

Week 10: Developing an Effective Classroom Science Program
Students will identify the criteria useful in designing a yearlong plan for science. Utilization of software programs and the Internet to support the classroom science program will also be discussed. The importance of advanced long-range planning will be emphasized.
Week 11: Starting Points in Teaching Science
Students will discover in this section of the course that in order to plan and implement a sequence of meaningful learning activities, teachers must understand students’ alternative conceptions. The importance of allowing children to express their ideas as they relate to the teaching process will be emphasized.

Week 12: Physical Science Starting Points
In this section, students will develop a working definition of the physical sciences. Students will also be introduced to a range of alternative conceptions found among elementary students in the broader areas of physical science.

Week 13: Biological Science Starting Points
Students will develop a working definition of the biological sciences. Students will also be introduced to a range of alternative conceptions found among elementary students in the broader areas of biological science.

Week 14: Earth and Space Science Starting Points
Students will develop a working definition of the earth and space sciences. Students will also be introduced to a range of alternative conceptions found among elementary students in the broader areas of earth and space science.