DISCIPLINE: EDUC  
COURSE: 506  

A. Catalogue Entry:  
EDUC 506 Teaching and Learning Science  
Prerequisites: None  
Credit Hours: (3) Three hours lecture  

Brief Description:  
Students will engage in critical analysis and research related to developmentally appropriate, research-based teaching content area methods for the science classroom. Building upon the previous academic and experiential backgrounds of the students, the course is designed to provide concrete experiences for appropriate implementation and incorporation of national and state standards in planning, instruction and assessment within the educational setting.  

B. Detailed Description of Course  
I. National and State Science Standards:  
   a. National Science Education Standards  
   b. Virginia Standards of Learning for Science  

2. Appropriate Teaching and Learning Strategies for Science to include:  
   a. The Nature of Science  
   b. How Students Learn Science  
   c. Multiple Instructional Strategies for Diverse Learners  

3. Inquiry Learning and Instruction  
   a. Concept development  
   b. Vocabulary development  
   c. Applications of concepts, skills and vocabulary  

4. Science Themes  
   a. Best Practices related to Safety in the Teaching of Science  
   b. Integration of Technology in the Teaching of Science
c. Investigation and Reasoning

d. Force, Motion, Energy

e. Life Processes and Living Systems

f. Interrelationships in Earth and Space Systems

g. Instrumentation

5. Scientific Process Skills

a. Observing

b. Classifying

c. Inferring

d. Communicating

e. Explaining

f. Measuring

g. Predicting

h. Hypothesizing

i. Experimenting

j. Analyzing


a. Large and Small Group Instruction

b. Cooperative Work

c. Questioning Skills

d. Problem Based Learning

e. Materials Management

f. Classroom Organization for Effective Science Instruction

7. Integration of Literacy Strategies in Science Contexts
8. Varied Assessment of Learning
   a. Performance assessment
   b. Rubrics
   c. Checklists

C. Detailed Description of Conduct of Course

This course is designed to offer concrete experiences for classroom application. Students will use everyday materials to explore and practice effective science pedagogy. Discussion and application of learning theories to science content will be implemented. These practices will utilize the National Science Education Standards and the Virginia Department of Education standards in planning and instruction.

D. Student Goals and Objectives of the Course

The goals and assessments for this course address: Association for Childhood Education International (ACEI); Virginia Department of Education General Content (VGC); Virginia Department of Education Professional Studies (VPS); Strategic Instructional Model (SIM); Technology Standards for Instructional Personnel (TSIP); National Science Teachers Association (NSTA); National Council for Accreditation of Teacher Education (NCATE) -- standards 1b-Pedagogical content knowledge; 1c-Professional and pedagogical knowledge and skills for teacher candidates; 1g-General dispositions.

By successfully completing this course, pre-service elementary teachers will be able to:

1. Incorporate state and national standards in planning and instruction. (ACEI 2c, 3a, NSTA 6 a and b, VGC 1a, 2.d3a, 2.d3c, VPS 2, TSIP V, NCATE 1b)

2. Use the processes of science to sustain intellectual curiosity and problem solving. (ACEI 2c, 3c, 3d, VGC 1d, VPS 2, NCATE 1b)

3. Apply theories of learning and integration to science instruction and incorporating technologies in learning. (ACEI 1, 3a, VGC 1b, 2.d5b, 2.d5f, VPS 2, TSIP I, II, III, NCATE 1b, 1c)

4. Plan instruction and assessments based on research of how children learn to include differentiated instruction for learners at different stages of development, abilities and achievement. (ACEI 1, 3a, 3b, NSTA 6 a and b, VGC 1c, 1g, VPS 2, TSIP VII, NCATE 1g, SIM)

6. Use concrete manipulative materials effectively in instruction to demonstrate comprehension skills. (ACEI 3b, VGC 2.3e, VPS 2, NCATE 1b, 1c)

7. Integrate effective strategies for facilitating the learning of standard English by speakers of other languages as well as strategies to increase vocabulary/concept
development while fostering an appreciation of literature in the science curriculum. (ACEI 2b, 3a 3b, 3d, 3e, NSTA 5 c and d, VGC 2.2c, 2.3b, 2.3f, VPS 2, NCATE 1g, SIM)

8. Select appropriate objectives, activities and teaching materials for science instruction while modifying the experiences to meet the individual needs of children, including children with disabilities, gifted children, and children with limited proficiency in English and children with diverse cultural needs. (ACEI 3a, 3b, 3c, 3d, NSTA 5 a, b, and c, VGC 1a, 1f, VPS 2, TSIP I, SIM)

9. Effectively manage materials and behavior through methods that build responsibility and self-discipline during hands-on learning activities. (ACEI 3c, 3d, VGC 1e, 1f, 2.d3b, VPS 2, NSTA 9 a, b, c and d, NCATE 1b)

10. Demonstrate an understanding of the nature of science and their unifying concepts of science such as: scale and model, form and function, organization, interactions, change and conservation. (ACEI 2c, 3c, 3d, VGC 2.d1, 2.d2b, VPS 2, NSTA 8a, b and c, NCATE 1b)

11. Assess both formally and informally to diagnose needs, plan and modify instruction, and record student progress as well as children’s conceptual understanding and communication of science. (ACEI 4, VCG 1g, NSTA 8 a, b and c, NCATE 1g, SIM)

12. Understanding the nature of science and scientific inquiry and assess children’s use of science process skills to include prediction, graphical representations. (ACEI 4, VGC 2.4e, 2.4, 2.d2, VPS 2, NSTA 2 a, b and c, NSTA 3 a and b, NCATE 1b)

The Strategic Instructional Model (SIM) is referenced within the above goals and objectives. Their strategies are incorporated throughout the course to address instruction for modifying the experiences to meet the individual needs of children, including children with disabilities, gifted children, and children with limited proficiency in English and children with diverse cultural needs.

**E. Assessment Measures**

Students will demonstrate understandings and the ability to apply course content through assessment in the form of: class participation, quizzes on content and readings, performance based assessment, science pedagogy, task analysis and lesson plans based on Virginia Science Standards of Learning. In order to pass this course, students must meet the technology competencies listed in this official syllabus.

Task Analysis project is assigned for this course as used for the NCATE accreditation of the Elementary Education program.

The SmartBoard project is assigned for this course and as a technology competency for the Elementary Education program.

Students will be assessed on their understanding of course content and their ability to apply principles and best practices in the teaching of science to various student populations to include but not limited to second language learners, limited English proficient students, gifted and students with disabling conditions by multiple indicators,
including the following: class participation, informal and formal evaluation strategies, written assessments on content and readings, performance based assessment, science pedagogy, task analysis of grade level content as well as short and long term planning based on Virginia Science Standards of Learning.

F. Other Course Information

N/A