EDEE 670
Elementary Science Instruction
Fall 2011
T 5:00-7:45 Education Center 216

Instructor: Dr. William Veal
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School of Education, Health, and Human Performance
Contact information: vealw@cofc.edu 953-8045 (office)
Please use email as a primary form of contact
Office hours: T 1:00-4:30 and By Appointment

Course Description:
This is an advanced course in teaching science at the 2-6 grade levels. In this course you will
study the nature of science, inquiry methods of teaching, curriculum development, assessment,
and lesson planning focused within the context of science. As a result, the organization, content,
and delivery of this course will focus on scientific processes and inquiry-based instruction.

Course Goals and Objectives:
The successful student will be able to:
• Plan Science Activities
• Understand Scientific Content
• Recognize Inquiry Teaching and Learning
• Comprehend Content Pedagogy
• Appreciate Learner Diversity
It is not the intent of the instructor to make students teach in an inquiry fashion; rather this
class will teach the components of inquiry teaching and constructivist learning using an
inquiry approach. Ultimately each student must develop their own style of teaching.

National and State Objectives:

National Middle School Association Standards

Standard 3. Middle Level Curriculum and Assessment
Middle level teacher candidates understand the major concepts, principles, theories, standards, and research
related to middle level curriculum and assessment, and they use this knowledge in their practice.

Standard 4. Middle Level Teaching Fields
Middle level teacher candidates understand and use the central concepts, tools of inquiry, standards, and
structures of content in their chosen teaching fields, and they create meaningful learning experiences that
develop all young adolescents’ competence in subject matter and skills.

Standard 5. Middle Level Instruction and Assessment
Middle level teacher candidates understand and use the major concepts, principles, theories, and research
related to effective instruction and assessment, and they employ a variety of strategies for a
developmentally appropriate climate to meet the varying abilities and learning styles of all young
adolescents.
National Science Teachers Association Standards

NSTA-2  NATURE OF SCIENCE: The program prepares teachers to engage students in activities to define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community, and contrast science to other ways of knowing.

NSTA-3  INQUIRY: The program prepares candidates to engage students regularly and effectively in science inquiry and facilitate understanding of the role inquiry plays in the development of scientific knowledge.

NSTA-4  CONTENT OF SCIENCE: The program prepares candidates to relate science to the daily lives and interests of students and to a larger framework of human endeavor and understanding.

NSTA-6  CURRICULUM: The program prepares candidates to develop and apply a coherent, focused science curriculum that is consistent with state and national standards for science education and appropriate for addressing the needs, abilities and interests of students.

NSTA-7  SOCIAL CONTEXT: The program prepares candidates to relate science to the community and to use human and institutional resources in the community to advance the education of their students in science.

NSTA-8  ASSESSMENT: The program prepares candidates to use a variety of contemporary assessment strategies to evaluate the intellectual, social, and personal development of the learner in all aspects of science.

National Science Education Standards for Teachers

NSES-T-A  STANDARD: Teachers of science plan an inquiry-based science program for their students.
NSES-T-F  STANDARD: Teachers of science actively participate in the ongoing planning and development of the school science program.

Required texts:

Additional articles will be located on WebCT.

DUE DATES:
Due dates for course assignments, as well as scheduled quizzes and assignments, are listed in the course calendar or are announced in class. No LATE assignments will be accepted. If there is a problem with submitting the assignment on time, please contact the professor ahead of time to ask for an extension (only extenuating circumstances will be allowed). All assignments will be submitted in OAKS via the Drop Box.

Grading and Assignments
Late submissions of assignments are unacceptable under normal circumstances. Please do not attempt to submit any assignments after the due date. I will NOT accept any late work.

Any written assignment submitted is considered a final product that will be graded on both what is written (clarity, depth, and insight) and how it is written (the form of the written work). Therefore, it is crucial to realize that correct grammar and spelling, proper punctuation, adherence to assignment guidelines, and neatness will affect your grade. As an educator, you will be expected to demonstrate competency not only in verbal but also in written communication with parents, administrators, and other educators. Please use the resources around you to proofread and to edit your work. Rubrics for all assignments are provided on WebCT to assist
you. The Writing Lab provides FREE, INDIVIDUALIZED help on all parts of the writing process. See [www.cofc.edu/~csl/](http://www.cofc.edu/~csl/) for further information.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Science Reform Document PPt.</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Summary of Best Practices PPt.</td>
<td></td>
<td>25</td>
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<tr>
<td>Summary of Science Best Practices PPt.</td>
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<td>25</td>
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<tr>
<td>Curriculum Topic Study (25 pts. Each)</td>
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<td>50</td>
</tr>
<tr>
<td>Assessment Instrument Development</td>
<td></td>
<td>50</td>
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<tr>
<td>Inquiry Lesson Plans for topic in a grade</td>
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<td>100</td>
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<tr>
<td>New Science Standards Framework Analysis</td>
<td></td>
<td>50</td>
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<tr>
<td>Final Presentation</td>
<td></td>
<td>100</td>
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</table>

### GRADING SCALE:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100</td>
</tr>
<tr>
<td>B+</td>
<td>89-92</td>
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<tr>
<td>C+</td>
<td>81-84</td>
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<tr>
<td>D+</td>
<td>73-76</td>
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<tr>
<td>B</td>
<td>85-88</td>
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<td>C</td>
<td>77-80</td>
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<tr>
<td>D</td>
<td>69-72</td>
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<tr>
<td>F</td>
<td>0-68</td>
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</tbody>
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### Internet Resources:

- Benchmarks for Science Literacy
- Science For All Americans
  - [http://www.project2061.org/publications/sfaa/online/sfaatoc.htm](http://www.project2061.org/publications/sfaa/online/sfaatoc.htm)
- Atlas of Science Literacy, Vol. 1 (sample maps)
  - [http://www.project2061.org/publications/atlas/sample/toc.htm](http://www.project2061.org/publications/atlas/sample/toc.htm)
- Atlas of Science Literacy, Vol. 2 (sample maps)
  - [http://www.project2061.org/publications/atlas/sample/toc2.htm](http://www.project2061.org/publications/atlas/sample/toc2.htm)
- National Science Education Standards
- Making Sense of secondary science: Research into children’s ideas
- Science Matters: Achieving scientific literacy

### Assignments:

**Science Reform Document Summary** – In this assignment you will be given a document or two chapters within a document. You must summarize the document in a PPlt. presentation, which will be given in the next class. Due August 30.

- National Science Education Standards: Introduction and Chapter 1, Chapters 2-3, Chapters 4-5.
- Benchmarks for Science Literacy: Any 3 chapters.
- Atlases of Science Literacy: Any 3 chapters.
- Science Matters: Any 2 chapters.

**Summary of Research** – You must search the web for a National Organization or Education periodicals (e.g., Education Week) or go to the National Association of Independent Schools website and read the reviews on research. [http://www.nais.org](http://www.nais.org) and click on the Resources & Statistics button. Once in this page you will find a listing of topics. You all will be assigned one of the following topics (Teaching, Teachers, Learning, Classroom Structure, or Trends). You will have to read the research and summarize the findings in a PPT. to present to all of us in the following class. Due September 6.

- Academic Practices and Outcomes
  - Faculty Effectiveness
  - School and Class Size
  - Teaching Methods
- Administration and Management of Schools
  - School Size and Structure
- Research on Trends
  - K-12 Trends

**Summary of Science Research** – You must now search any book, web resource, or research publication and summarize the identical research, but with the application to science. This paper should present the science aspects and then compare the results to the generic items from the previous week. You will have to read the research and summarize the findings in a PPT. to present to all of us in the following class. Due September 13

**Curriculum Topic Study** – You will complete a curriculum topic study for two topics. The topics will come from the SC Science Standards for a certain grade. Each student will be assigned a grade level and asked to complete 2 CTS for two topics in that grade level. Sample CTS’s are available online in OAKS. Due October 4.

**Inquiry Lesson Plan** – You will have to develop two inquiry lesson plans in pairs. You and your partner will complete one lesson plan from each other’s science standard and grade level. Due October 25.

**Assessment Instrument Development** – You will learn how to develop different assessment items and instruments. You will have to develop a specific instrument to match your inquiry lesson plan. The instrument will include directions, a key, rubric, and explanation as to why it is proper for an inquiry lesson. Due November 8.

**New Science Standards Framework Analysis** – You will have to read a minimum of two sections of the framework and comment on the sections based upon your previous work in this course (e.g., best practices and best practices in science, science reform documents, CTS, assessment, and inquiry teaching). Due December 6.
Course Readings and Assignments:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Readings/Assignments</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug. 23</td>
<td>Introductions</td>
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<td>Expert Teachers</td>
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<td></td>
<td>Science Reform - Intro</td>
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<tr>
<td>2</td>
<td>Aug. 30</td>
<td>Science Reform - Pieces</td>
<td>NSES, Benchmarks, Atlas</td>
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<td>Students Present – Reform documents</td>
<td>Students Present – Reform documents</td>
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<tr>
<td>3</td>
<td>Sept. 6</td>
<td>Best Practices in Teaching and Learning for Science</td>
<td>Students Present – Best Practices</td>
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<tr>
<td>5</td>
<td>Sept. 20</td>
<td>Curriculum Topic Study – Vignettes 2,3,6,8</td>
<td>Science Topic Study: Chap. 3</td>
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<tr>
<td>6</td>
<td>Sept. 27</td>
<td>Curriculum Topic Study – Develop in Class</td>
<td>Science Topic Study: Chap. 4</td>
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<td>7</td>
<td>Oct. 4</td>
<td>Inquiry</td>
<td>Cartesian Diver</td>
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<td>Candle Activity</td>
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<td>Ppt.: Inquiry</td>
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<td>Kidnapped Kitty Cougar</td>
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<td>Ppt.: Chromatography</td>
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<td>Ppt.: Group Learning</td>
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<tr>
<td>8</td>
<td>Oct. 11</td>
<td>NO CLASS</td>
<td>FALL BREAK</td>
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<tr>
<td>9</td>
<td>Oct. 18</td>
<td>Inquiry</td>
<td>Wt. of Air</td>
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<td>Parachute Construction</td>
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<td>Ppt. Parachutes</td>
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<td>Cleaning Tarnished Pennies</td>
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<tr>
<td>10</td>
<td>Oct. 25</td>
<td>Assessment</td>
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<tr>
<td>11</td>
<td>Nov. 1</td>
<td>Assessment</td>
<td></td>
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<tr>
<td>12</td>
<td>Nov. 8</td>
<td>Inquiry Lessons and Assessments</td>
<td>Project Presentations</td>
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<tr>
<td>13</td>
<td>Nov. 15</td>
<td>New National Science Framework</td>
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<tr>
<td>14</td>
<td>Nov. 24</td>
<td>NO CLASS</td>
<td>NO CLASS</td>
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<tr>
<td>15</td>
<td>Nov. 29</td>
<td>New National Science Framework</td>
<td>Analysis due.</td>
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<tr>
<td>16</td>
<td>Dec. 13</td>
<td>FINAL</td>
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</tbody>
</table>
PROFESSIONAL BEHAVIOR/DISPOSITIONS: Students are responsible for all content and assignments for each class. They will be expected to demonstrate professional behaviors consistent with the following dispositions:

- The belief that all students can learn.
- Value and respect for difference.
- Value of positive human interaction.
- Intellectual curiosity and willingness to learn new knowledge.
- A commitment to inquiry, reflection and self-assessment.
- Value of responsible, collaborative, and cooperative work.
- Sensitivity to community and cultural context.
- Responsible and ethical practice

ATTENDANCE:
Class attendance and punctuality are expected professional behaviors. Specific attendance requirements for each course are outlined in the syllabus. A candidate may be dropped from a course for excessive absences. Two absences for ANY reason will be allowed; however, you may not submit assignments if you are absent. Upon the third absence, a course participation grade will take into effect and reduce the candidate’s score by 3% points. Upon a fourth absence, the candidate will automatically be withdrawn from a course with the grade of WA/F. I will work with you, but it is your responsibility to contact me by phone or email ahead of time.

Students should not arrive to class late. Persistent infringement of tardies will result in the reduction of a candidate’s score by 5%. Leaving class is accepted only if prior approval is accepted by the professor.

ABSENCES:
- Go to 67 George Street (white house next to Stern Center) to discuss absences and fill out the appropriate forms.
- Forms are online at: http://www.cofc.edu/studentaffairs/general_info/absence and they also can be faxed to the office at 953-2290.
- You will need documentation for health, personal or emergency situations.

MAKE-UP EXAMINATIONS, PRESENTATIONS, AND QUIZZES:
If an examination, presentation, or quiz (other than the final examination) was missed for a legitimate reason, as determined by the professor, the professor has the discretion to administer a make-up session. It is the responsibility of the student to contact the professor within 48 hours and make arrangements for the make-up. This is to be done as soon as possible after the missed examination, presentation, or quiz.

FINAL EXAMS: The final exam for each course (which may be in the form of an examination, performance, or project) will only take place during the period scheduled for the final exam for that course. (Students who have more than two finals scheduled on the same day may arrange for an alternate time for one final exam through the Office of the Undergraduate Dean).
PAPERS: Papers will be word processed using the style of the Publication Manual of the American Psychological Association (Fifth Edition, 2001). The College of Charleston does have a writing lab that can help you. They have a useful handout for using the APA Handbook. The hours of the lab are M-H 9-9 and F 9-12.

HONOR SYSTEM:
Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student’s actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed by both the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration—working together without permission— is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information stored on a cell phone), copying from others’ exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at http://www.cofc.edu/generaldocuments/handbook.pdf

ADA Accommodations:
In compliance with the American with Disabilities Act (ADA), all qualified students are entitled to “reasonable accommodations.” Please notify the instructor during the first week of class of any accommodations needed.

Required Technology:
Enrollment in this course requires you to utilize the following computer applications: PowerPoint, Excel, Internet/WWW, WebCT via Internet, e-mail, and Word Processing.
It is expected that you can utilize the above listed computer applications. These computer applications are available in the College of Charleston managed computer labs located in JC Long, the Library, and various other campus locations. If you do not have reliable access to these applications you should plan to use the campus computer laboratories.

**School of Education Mission:**
The mission of the School of Education at the College of Charleston is the development of educators and health professionals to lead a diverse community of learners toward an understanding of and active participation in a highly complex world. In pursuit of this mission, faculty and students will demonstrate:

- intellectual curiosity and rigor;
- reflective, research-based practice;
- collaboration and consensus building;
- field-oriented service and community outreach;
- and cultural sensitivity and understanding.

**MAKE THE TEACHING AND LEARNING CONNECTION**

This vision is further defined through elements of teacher competency that organize standards of effective teaching.

**Element of Teacher Competency 1: Understand and value the learner.**
  Standard I: Evidence theoretical and practical understanding of the ways learners develop.

**Element of Teacher Competency 2: Know what and how to teach and assess and how to create an environment in which learning occurs.**
  Standard II: Demonstrate understanding and application of the critical attributes and pedagogy of the major content area.
  Standard III: Evidence a variety of strategies that optimize student learning.
  Standard VI: Demonstrate an understanding of the continuous nature of assessment and its role in facilitating learning.

**Element of Teacher Competency 3: Understand oneself as a professional**
  Standard IV: Participate in informed personal and shared decision making that has as its focus the enhancement of schooling and the profession.
  Standard V: Communicate effectively with students, parents, colleagues, and the community.
  Standard VII: Show an understanding of the culture and organization of schools and school systems and their connection to the larger society.
## Science Education Reform

Develop a PowerPoint (to be presented in class). Candidates, in groups of 2 or 3, will be responsible for one of the following science education reform documents:

- **Benchmarks for Science Literacy**

- **Science For All Americans**
  - [http://www.project2061.org/publications/sfaa/online/sfaatoc.htm](http://www.project2061.org/publications/sfaa/online/sfaatoc.htm)

- **National Science Education Standards**

- **Science Matters: Achieving scientific literacy**

### Helpful Hints

<table>
<thead>
<tr>
<th>Document</th>
<th>Hint</th>
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<tbody>
<tr>
<td>Science for All Americans</td>
<td>This is a book and can be split up. The most important chapters are the introduction, and chapters 1-6. Decide how to split up the workload. You could just do three chapters per student.</td>
</tr>
<tr>
<td>Benchmarks for Science Literacy</td>
<td>This lengthy book can be split up into chapters and sections. The most important chapters are 1-6. Decide how to split up the workload. You could just do three chapters per student.</td>
</tr>
<tr>
<td>National Science Education Standards</td>
<td>Split the workload up so that the Introduction and Chapters 1-2 are covered. That means one person for each chapter. This also means that the summary will be longer than other documents.</td>
</tr>
<tr>
<td>Making Sense of Secondary Science: Research into Children’s Ideas</td>
<td>Divide this book up into sections or chapters. Focus on the first 4 chapters and any other one or two chapters that may be of interest to you all.</td>
</tr>
<tr>
<td>Science Matters: Achieving Scientific Literacy</td>
<td>Find what is interesting to you all and present on the basic structure of the book, the purpose of the book and several content examples that you learned. Be explicit and detailed when it comes to the content examples you give.</td>
</tr>
</tbody>
</table>