

College of Education and Human Resources, University of North Florida

Room 843

Mondays 9-11:50 AM

Instructor: Dr. Cathy Cavanaugh

Office: 9/2249 Office Hours: Monday 12-3 PM; Wednesday 12-4 PM; and by appointment

Phone: 904-620-2610 Email: ccavanau@unf.edu Web: <http://www.unf.edu/~ccavanau>

Required text: Martin, Sexton and Gerlovich (2002). Science for All Children: Methods for Constructing

Understanding, 2nd edition. Boston: Allyn & Bacon.

The Florida Pre-K to 12 Curriculum Frameworks: Science. (1996). State of Florida, Department of Education. Online in Blackboard.

Science for All Americans. Online at <http://www.project2061.org/tools/sfaaol/sfaatoc.htm>

Course website: at <http://blackboard.unf.edu>

Purpose: This course is designed to develop competencies in selecting methods, resources, and assessment strategies for teaching elementary science. The purpose of this course is to prepare elementary education students to become teachers of science to elementary students, through:

- Developing an understanding of child development related to constructing scientific knowledge
- Enhancing subject matter knowledge, emphasizing science concepts taught in elementary classrooms
- Developing pedagogical knowledge: how to teach science, plan lessons, select strategies and activities, organize the classroom, connect science to other content areas, assess learning, integrate technology
- Teaching and observing science in action, confidently and enthusiastically
- Managing hands-on, minds-on science successfully and safely

The following concepts are a framework for the course.

- Teachers are committed to students and their learning.
- Science is important for all students.
- Teachers know the subjects they teach and how to lead students in learning those subjects.
- There are many ways to teach elementary science well, but learning science has to be an active process: children learn science by doing science.
- There are principles based on theory, research and experience to guide elementary science teaching.
- Teachers are responsible for managing student learning.
- Teachers think systematically about their practice and learn from experience.
- Teachers are members of learning communities.

Course objectives:

- Demonstrate knowledge, comprehension, application, and evaluation of appropriate strategies and models for the teaching of science.
- Demonstrate understanding of the problem-solving process, knowledge of problem-solving skills and strategies, their application in teaching, and an awareness of one's own problem-solving abilities.
- Demonstrate proficiency in performance of basic and integrated science process skills and analyze the results of a process-oriented approach.
- Demonstrate knowledge of various forms of assessment in science education, and an understanding of assessment strategies to use with students with special needs including language minority students.
- Demonstrate knowledge and application of technology as tools in the learning process.
- Demonstrate a variety of instructional strategies for teaching selected topics in the elementary curriculum.
- Demonstrate knowledge of the impact of state and national standards on the teaching of science.
- Demonstrate cross-curricular integration of science with other disciplines.
- Demonstrate an understanding of how children, including special needs students and language minority students learn science.
- Examine trends in approaches to science learning and teaching.
- Explore and use resources, which enhance the teaching and learning of science.

Please notify the instructor within the first week if a reasonable accommodation to a disability is needed for this course. A letter from the Student Disability Office must accompany this request.

Assignments and Course Requirements

Professional Conduct

Read assignments and engage in a positive way in all class discussions and activities. On-time attendance is required. Know and follow university policy regarding academic honesty. Demonstrate safe practices. In your online work, follow standards of netiquette: be accountable for what you send, acknowledge online sources you reference.

2. Concept Mapping Activity

Because science is conceptual subject, it is important for learners to have tools for developing concepts. Concept mapping is a valuable tool in determining a student's current cognitive status, and for helping students' concepts to mature. Create a concept map that illustrates a concept taught at the elementary level in science. You will work with model concept maps in class and in your text.

3. Lesson Plan, Unit Plan, Mini-Lesson

Your lesson plans should be developed as described in the lesson plan guidelines. Plans may focus on any science concept. The formal lesson plan must include a hands-on component. An important step in the formal lesson process will be reflection on teaching. The lesson plan is an individual project. The thematic unit plan is a group project focused on a set of science concepts. You will teach one activity from the unit plan in class as a mini-lesson.

4. Field Experience

Field experience enables you to observe and interact with students and teachers and to reflect on the effectiveness of curricula and methods explored during this course. Make arrangements to observe elementary classroom science lessons. You will be expected to maintain the highest level of professional conduct in all dealings with the schools. Use the Field Experience Notes form to document your visit. Turn in your notes form with a one-page summary/response for the classroom visit.

5. Science Education Issue Paper

Science and education, as human endeavors, change constantly. In order to develop skills in investigating current trends in science education, you will choose an issue in science education to explore in depth. Use a range of current sources to research the issue, synthesize your findings into a paper, and include your analytical reflections on the issue. Your response to the issue will include three categories of thought, similar to Bloom's taxonomy: cognitive, affective, and psychomotor. Include the following:

- a) **Reaction** (*Affective domain, feeling*). What was your emotional response to the information you read about the issue? Provide citations from the texts that illustrate your response.
- b) **Relevance** (*Cognitive domain, thinking*). How do your sources treat the issue, and how do they compare and contrast? Is the issue meaningful, and for whom? What are the alternate points of view on the issue? Provide citations to support your perspective and others.
- c) **Responsibility** (*Psychomotor domain, doing*). How will the knowledge and perspectives gained from this reading be used in your professional practice? Give examples of possible applications in your personal or professional life. Discuss questions you still have about the issue.

Alternate Issue Assignment: As a way of spending time with teachers and students who are very involved with science, work a shift (4 hours) assisting at the North Florida Regional **Science Fair** the week of February 24. Turn in a one-page reaction to your experience with a copy of a document from the science fair or a picture of you at the science fair.

For 5 points extra credit, attend the state science fair in Jacksonville the week of April 7, and turn in a one-page reaction and documentation of your attendance.

6. Portfolio

Your course portfolio is a reflective tool that integrates and describes your experiences with course activities in and out of class. Keep a regular log describing your reactions, analysis, self-evaluation, and wonder about science and teaching. Record responses to class activities as soon as possible after class. The length of portfolio entries will vary. Also include summary statements that unify themes in your portfolio. See the attached portfolio guide for more information about portfolio structure and assessment.

7. Forum Discussion and Online Participation

You are expected to stay current with the online portion of the class and take part regularly in the discussions and other online activities, at <http://blackboard.unf.edu>. New discussion topics will be added weekly.

Grading Structure

Professional Conduct is necessary to earn an excellent or good grade.

Concept Mapping	5
Lesson Plan	15
Thematic Unit Plan and Mini-Lesson	20
Field Experience	15
Issue Paper/Science fair	15
Portfolio	20
Forum	10

Optional extra credit for participating in and reporting on Saturday professional development workshops

All written work must be typed or word-processed, except for forms.

Late work will only be accepted with a medical or legal excuse.

A = 90-100	A: Excellent performance; no more than one unexcused absence
B = 80-89	B: Good performance; no more than two unexcused absences
C = 70-79	C: Fair performance; fulfillment of basic requirements
D = 60-69	D: Poor performance; lack of basic criteria

Florida Accomplished Practices for Preprofessional Educators of the 21st Century

ASSESSMENT: Uses assessment strategies (traditional and alternate) to assist the continuous development of the learner.

COMMUNICATION: Uses effective communication techniques with students and all other stakeholders.

CONTINUOUS IMPROVEMENT: Engages in continuous professional quality improvement for self and school.

CRITICAL THINKING: Uses appropriate techniques and strategies that promote and enhance critical, creative, and evaluative thinking capabilities of students.

DIVERSITY: Uses teaching and learning strategies that reflect each student's culture, learning styles, special needs, and socio-economic background.

ETHICS: Adheres to Code of Ethics and Principles of Professional Conduct of the Education.

HUMAN DEVELOPMENT AND LEARNING: Uses an understanding of learning and human development to provide a positive learning environment that supports the intellectual, personal, and social development of all students.

KNOWLEDGE SUBJECT MATTER: Demonstrates knowledge and understanding of the subject matter.

LEARNING ENVIRONMENTS: Creates and maintains positive learning environments in which students are actively engaged in learning, social interaction, cooperative learning and self-motivation.

PLANNING: Plans, implements, and evaluates effective instruction in a variety of learning environments.

ROLE OF THE TEACHER: Works with various education professionals, parents, and other stakeholders in the continuous improvement of the educational experiences of students.

TECHNOLOGY: Uses appropriate technology in teaching and learning processes.

Class Schedule

Date	Topic	Reading Assignment	Assignment Due
Jan. 13	Introductions, Nature of Science and the Science Teacher, Science Literacy and Habits of Mind, Learning Cycle	SFAC 1 & 3 SFAA 1 & 12	
<i>Jan. 20</i>	<i>Holiday</i>		
Jan. 27	Grouping, Misconceptions, Brain Research, Constructivism	SFAC 4 FCF Intro & 1	Online forum 1 Bring an item for teaching science
Feb. 3	Discrepant Events Demonstrations, Play SFAC 2 FCF 3		<i>Groundhog Day February 2</i> <i>National Heart Month</i> Online forum 2
Feb. 10	Media: Literature & More Concept Maps	SFAC 7 SFAA 12	
Feb. 17	Adapting Instruction for Inclusion and Exceptional Education Science Goals, Standards, Benchmarks	SFAC 5 & 6 FCF 3 & 4 <i>February 16-23</i> <i>National Engineers Week</i> Concept map due	
Feb. 24	FCAT Science <i>ACEE 9-11</i> Lesson Planning	SFAC 7	<i>February 25 NE FL science fair</i>
Mar. 3	Assessing Science Learning	SFAC 7 FCF 6 Issue paper due	
Mar. 10	Questioning, Inquiry Moral, Legal and Ethical Issues, Safety <i>Sawmill Slough 10-11</i>	SFAC 8 & 9 SFAA 13 FCF 7 Lesson plan due Online forum 3	
<i>Mar. 24</i>	<i>No class: work on field observation or science fair paper, and unit plan</i>		<i>March 21 Vernal Equinox</i>
Mar. 31	Interdisciplinary Teaching Thematic Units <i>ACEE 9-11:30</i>	FCF 5 SFAC 10 Field Experience Notes or Science Fair Reaction due	
Apr. 7	Resources: Resource Fair Technology. Visit to <i>Ed Tech Center</i>	SFAC 11 Bring science teaching materials Online forum 4 <i>April 10 State Science Fair</i>	
Apr. 14	Professional Development <i>MOSH 9:30-11</i>	FCF 8	

Apr. 21	Mini-lesson presentations		Thematic Unit due Online forum 5 <i>April 22 Earth Day, Lyrid Meteor Shower Arbor Day April 25</i>
Apr. 28 9-10:50	Mini-lesson presentations		Portfolio due <i>Space Day May 1 Astronomy Day May 10</i>

SFAA=Science for All Americans; SFAC=Science for All Children; FCF=Florida Curriculum Frameworks

Optional Saturday workshops:

- Florida Black Bear
- Project WILD
- Jacksonville Zoo

To learn about the February Northeast Florida Regional Science Fair, and to volunteer, visit <http://www.kiwanissciencefair.org>. Volunteers are needed between February 6 and 27. To choose the science fair option, sign up on the science fair web site to volunteer, and then turn in your one-page reaction.

The Florida State Science Fair is April 9-11. <http://www.fffs.ucf.edu/New%20Site/2003tentagen.html>

Concept Map Assignment:

Your concept map illustrates visually the topics that relate to a broad science concept. The illustration shows details about the relationships among the topics. Choose a main concept from the list here, and organize topics below. Rank topics from general to more specific. Connect topics with links that describe their relationship. Because your lesson plan will require a concept map, it is recommended that you begin learning about your lesson plan topic with this concept map assignment.

Elementary science concepts:

Physical Science:

Matter—properties, measurement, states, chemical reactions, elements

Motion—force, machines, gravity, speed, sound

Energy—light, heat, electricity, magnetism, transfer of energy

Life Science:

Characteristics of organisms—classification, environments, structures, cells, disease

Life cycles—heredity, reproduction, genetics, adaptations, evolution, extinction

Environments—food webs, resources, change, energy sources, populations

Earth and Space Science:

Earth—land, landforms, water, sky, change, geologic history, climate

Sky—solar system, motion, gravity, solar energy, weather

Concept Map Rubric: (5 points)

Value	0	1	2
Concepts Incomplete, illogical	Complete, logical	Complete, logical, appropriate connections	
Creativity Not evident	Exhibited		
Presentation Errors of spelling and language	Largely free of errors of spelling and language	Easily read, free of errors of language and spelling	

Lesson Plan and Unit Plan Guide:

As a member of a group, you will develop a unit of learning experiences centered around a common theme. Each group member will be evaluated on the unit as a whole and on the group's presentation of an example mini-lesson from the unit. You will choose one lesson from the unit which you've had primary responsibility for writing, and you will be evaluated on that lesson.

The unit plan will include:

- A rationale for the theme
- An overview of the audience, scope and sequence of lessons
- A concept map
- A visual activity organizer map or chart
- At least 6 lessons fully outlined and including handout sheets. At least one lesson has special needs adaptations. At least two lessons integrate content from nonscience subjects. At least three lessons have hands-on activities. At least one lesson uses a site outside the classroom: schoolyard, MOSH, zoo, park, or other field trip site.
- A range of student assessment strategies, including at least one rubric
- A list of the contributions of each group member

Lesson Plan Checklist:

1. Lesson title
2. Purpose paragraph describing lesson conceptual objectives, importance, rationale, sequence, and intended learning outcomes
3. Connections to Sunshine State Standards
4. Materials needed by teacher and students
5. Safety and management guidelines
6. Lesson introduction specifying expected duration of events, important questions for discussion, relation to prior knowledge and how knowledge in this lesson will be developed in future lessons
7. Development of lesson, including hook or invitation, description of events, the teacher's role and student activities, application of the learning cycle
8. Lesson closure, detailing how lesson will conclude, and connections to other content
9. Assessments of learning, demonstrating how you will know that the intended learning outcome has been achieved.

Unit and Mini-Lesson Evaluation Rubric: (20 points)

Value	0 Meets none of the criteria	1 Meets few of the criteria	2 Meets most of the criteria	3 Meets almost all of the criteria	4 Meets or exceeds all criteria
Completeness, includes all elements					
Theme represented across lessons					
Appropriate and varied activities					
Appropriate and varied assessments					
Organized and effective presentation					

Lesson Plan Evaluation Rubric: 15 Points

Value	1 Meets few of the criteria	2 Meets most of the criteria 3 Meets or exceeds all criteria
Complete, includes all elements: <ul style="list-style-type: none"> • Lesson title • Objectives, importance, rationale, sequence, and learning outcomes • Materials • Safety and management guidelines • Duration of events, questions for discussion, relation to prior knowledge and how knowledge in this lesson will be developed in future lessons • Hook or invitation, description of events, the teacher's role and student activities, application of the learning cycle • How lesson will conclude, and connections to other content • Assessments of learning 		
Linked to appropriate standards		
Lesson provides challenging, relevant, and exciting learning experiences		
Professionally written		
Effective and creative use of materials		

Before you begin planning the lesson ask yourself:

Is the lesson I have selected, student centered or teacher centered? If it is teacher centered, how can I revise it to be more student centered?

What knowledge, skills or attitudes do I want the students to have as a result of experiencing this lesson?

What materials are needed to accomplish this lesson: ideally, practically?

How will I hook students? What strategy will be my invitation to learn or motivation?

As you plan think about the following:

How will this lesson relate to students' every day experiences? How will this lesson relate to what they already know and understand so that knowledge construction will be facilitated?

How much time is needed for students to complete the lesson, inquire, experiment, and reflect?

What choices will the children have in the materials they use or what they do with them?

What kind of data will be collected - do the children know how to collect data of this sort or is a direct instruction mini-lesson needed before they can begin?

Exactly what can I say to the children to challenge them to be scientists and explore the problem?

How will I assist children to make sense of knowledge they have generated from their experience?

What questions can I ask to encourage children to think about what they have done, how they have organized their data and how the data can be interpreted?

What questions can I ask to encourage children to analyze, synthesize and critically reflect on what they have done and what they have learned?

How will I assess whether the students have achieved the goals set for the lesson?

Field Observation Assignment

During a visit to an elementary school, you will observe a science lesson and talk with students and teachers. Your written summary will be turned in.

Field Observation Note Format

Name _____ Date of observation _____
 Students in the class: Regular ESOL ESE Other _____
 School Name and Address _____
 Teacher _____s _____ Grades and Subjects _____
 Start and end time of observation _____
 Topic or concept observed _____
 Activities and processes observed _____
 State Science standards addressed _____
 Materials used (technology, handouts, books, assessments, manipulatives, other) _____
 Assessment methods used _____
 Management techniques related to safety, adaptations for diverse learners, interdisciplinary connections _____
 Reflections and other notes _____
 Analysis of instructional strategies and effectiveness of lesson for students _____

Interview with at least two teachers about:

- Their beliefs about teaching science
- The strategies they use to teach science

Interview at least two children to find out:

- What they believe science is
- What they believe people do when they do science
- How they'd like to learn science in school

Field Observation Evaluation Rubric: (15 points)

Header: school, teacher, lesson title, audience Lesson overview: concepts taught Analysis: strategies, management, reflections Connections: standards, interdisciplinary Interviews: teachers and students Presentation: your written work					
2 All present	3 Clear overview	3 Very descriptive	2 Connections listed, with others possible	3 4 interviews summarized	2 Organized, few errors
1 Most present	2 Somewhat clear	2 Few descriptions	1 Connections listed only	2 Interview or description missing	1 Organized, some errors
0 Most absent	1 Vague overview	1 Superficial mention	0 Missing or absent	1 Little summary, or few interviews summarized	0 Poor flow, many errors
	0 Confusing overview	0 Missing or absent		0 Missing or absent	

Issue Paper Assignment:

Your issue paper will describe an issue in science education. Possible issues may be:

- Gender differences in science interest and achievement
- Authentic assessment of science learning
- Safety concerns in science classrooms
- Adaptation of science lessons for diverse learners
- Current and future trends in elementary science education
- Status of standardized high-stakes tests for science
- Review of science education programs internationally
- Features of highly effective science teachers/programs
- Altering misconceptions in science
- What is science literacy?
- The role of concept maps in learning science
- How science standards impact science teaching
- The value of learning science outside the classroom
- Effective technology for learning science

In a 4-6 page double-spaced paper using 12-point font, define the issue you are investigating. Discuss the importance of the issue to children, teachers, parents, and society. Read reports from a variety of current sources, including a balance of print and electronic media. Make sense of the different viewpoints on the issue and communicate them clearly. Use the information you've read to make recommendations about how the issue should be handled, including your own viewpoint. Use standard APA or MLA style to list at least four references for the paper.

- Reaction (*Affective domain, feeling*). What was your emotional response to the information you read about the issue? Provide citations from the texts that illustrate your response.
- Relevance (*Cognitive domain, thinking*). How do your sources treat the issue, and how do they compare and contrast? Is the issue meaningful, and for whom? What are the alternate points of view on the issue? Provide citations to support your perspective and others.
- Responsibility (*Psychomotor domain, doing*). How will the knowledge and perspectives gained from this reading be used in your professional practice? Give examples of possible applications in your personal or professional life. Discuss questions you still have about the issue.

Alternate Issue Assignment: As a way of spending time with teachers and students who are very involved with science, work a shift (4 hours) assisting at the North Florida Regional Science Fair the week of February 24. Turn in a one-page reaction to your experience with a copy of a document from the science fair or a picture of you at the science fair.

For 5 points extra credit, attend the state science fair in Jacksonville the week of April 7, and turn in a one-page reaction and documentation of your attendance.

Issue Paper Evaluation Rubric: (15 points)

Value	Meets or exceeds all criteria: 3	Meets most criteria: 2	Meets few criteria: 1
Professional appearance and structure: 4-6 page, Double-spaced, 12-point font			
Cohesive organization: Make sense of the different viewpoints Communicate them clearly			
Important and clear issue: Children, Teachers, Parents, Society			
Addresses Reaction: your own viewpoint Relevance: importance of the issue Responsibility: recommendations about how the issue should be handled			
Appropriate references: Variety of sources, Balance of print and electronic media, Standard APA or MLA style, At least four references			

Portfolio Assignment:

Your portfolio will be a systematic collection of evidence presented to demonstrate what you have learned and how you learned it. At the end of the course, decide what to include and what it means for you as a science teacher. Some evidence will be responses to your experiences. The main purpose of this portfolio is for you to show your evolving knowledge of how you can guide successful student learning of science concepts. Using the portfolio, you will show your emerging understanding of the complexities of science teaching, and you will link theory to practice.

At the completion of the course, your task will be to select items that show your initial understanding of student science learning, and how your understanding has grown. Evidence can include discussions, forum entries, assignments, classroom observations, responses to readings, interviews, your mini-lesson, and observations of children at play.

Types of Evidence:

Artifacts are documents produced as part of your normal course work, such as papers, field notes, or recordings. Reproductions are documents about course events, such as transcripts or tapes of discussions. Attestations are documents about your course work written by someone else, such as comments by the instructor, classmates, or forum participants. Document is used loosely here, and can include notes, drafts, journals, drawings, photos, recordings, and digital files.

The Importance of a Teaching Portfolio

The main reason to assemble a portfolio is for your personal growth and development as a teacher. The evidence contained in the portfolio will show you where your strengths are, and will reveal areas where your teaching would benefit from more work. Another important purpose of a portfolio is to demonstrate to others the kind of teacher you have become. Your portfolio is the best voice you have in job interviews, certification reviews, grant applications, and award nominations. Increasingly, states and districts require portfolios for teacher evaluation. When working on National Board certification, the portfolio is essential.

Entries can include:

papers, field notes, or recordings.
transcripts or tapes of discussions.
comments by the instructor, classmates, or forum participants.
notes, drafts, journals, drawings, photos, recordings, and digital files.

Each entry must be accompanied by a rationale that explains why the material was chosen and why it serves as evidence of your skill. Each entry must also include a reflection, a written statement about each example that answers some of the following questions:

What did you learn from this experience?
What do you understand now that you did not understand before?
What impact will this have on your teaching?
What obstacles did you encounter and overcome?
How did others respond?

Criteria for Developing and Assessing a Professional Portfolio

Your name and the title Portfolio must appear on the cover.

Written documents must be word-processed.

Appropriate grammar, spelling, and sentence structure must be used.

A Table of Contents must be included.

A journal article relating to elementary science teaching.

A sample of work that shows your awareness of standards and standards-based teaching.

A sample of work that demonstrates your skill using technology as a tool for teaching science.

A sample of work that shows significant growth or change as a teacher of science to children.

A statement of your personal philosophy of teaching science: What is good science teaching and why? What are your strengths and challenges, and how can you address them? How do you identify science learning? How do you envision yourself as a science teacher?

A rationale and reflection must accompany each entry.

The appropriate Accomplished Practice must be identified for each entry.

Examples of rationale:

This ___ was selected to represent ___ because ...

It is an innovative approach.

It was effective at accomplishing ___

It demonstrated the instructional strategies of ____
It is a real-world application of ____
It shows why a science teacher should/should not ____

Examples of reflection:

From this experience, I learned ____ about students/education/teaching.

I now understand more clearly ____.

Using this approach has made me decide to ____ or change ____.

A challenge facing me was ____.

The students benefited because ____.

My colleagues felt _____, and now they _____.

Resources for Elementary Science:

Activities:

Bosak, S. 1991. *Science Is...* Ontario, Canada: The Communication Project.
AIMS: Activities Integrating Mathematics and Science. <http://www.aimsed.org> 888-733-2467.
GEMS: Great Explorations in Math and Science. <http://www.lhs.berkeley.edu/gems/GEMS.html>

Journals:

Elementary School Science Journal of Elementary Science Education, <http://science.coe.uwf.edu/JESE/JESE.HTM>
School Science and Mathematics, School Science and Mathematics Association, Department of Curriculum and Foundations, Bloomsburg University, 400 E. Second St., Bloomsburg, PA 17815-1301 (717) 389-4915
Science and Children, NSTA, 1840 Wilson Blvd., Arlington, VA 22201-3000 (703) 243-7100 <http://www.nsta.org>
Science Education Directory of Periodicals: <http://www.nap.edu/readingroom/books/rtess/8.html>

Professional Organizations:

American Association for the Advancement of Science (AAAS), publishers of *Science Education News* and *Science for All Americans*. <http://www.aaas.org> 1333 H St., NW, Washington, DC 20005 (202) 326-6400
Florida Association of Science Teachers (FAST)
National Science Foundation, Directorate for Education and Human Resources, <http://www.nsf.org> 4201 Wilson Blvd., Arlington, VA 22230 (703) 306-1600
National Science Teachers Association (NSTA), 1840 Wilson Blvd., Arlington, VA 22201-3000 (703) 243-7100 <http://www.nsta.org>
Directory of Organizations and Resources: <http://www.nap.edu/readingroom/books/rtess/10.html>

Web:

Resources for Teaching Elementary Science, National Academy Press, <http://bob.nap.edu/readingroom/books/rtess>
Also at National Academy Press <http://www.nap.edu>
Science for All Children, Every Child a Scientist, National Science Education Standards, How People Learn
Ask ERIC Lesson Plans <http://ericir.syr.edu/Virtual/Lessons>
Ask the Experts at Scientific American <http://www.sciam.com/askexpert/index.html>
Assessing the Whole Child, CRESST <http://www.cse.ucla.edu/CRESST/pages/products.htm>
Beakman's World <http://www.beakman.com>
Eisenhower National Clearinghouse, for K-12 math and science <http://www.enc.org>
ERIC Clearinghouse for Science, Math, and Environmental Education, <http://www.ericse.org/>
Mad Scientist Network <http://www.madsci.org>
NASA Observatorium for Earth and Space <http://www.observe.ivv.nasa.gov/nasa/core.shtml>
NASA Spacelink <http://spacelink.nasa.gov/index.html>
Newton's Apple <http://www.pbs.org/ktca/newtons>
Science Questions and Answers <http://www.last-word.com>
Science Technology Daily Review <http://SciTech.com>
Science Toys <http://scitoys.com/net4kids.html>
Sunshine State Standards <http://www.firn.edu/doe/menu/sss.htm>
US Geological Survey education site <http://www.usgs.gov/education>
Volcano World <http://volcano.und.nodak.edu>
Weather Classroom <http://www.weather.com/education>
Yucky Page <http://www.yucky.com>

Spring science holidays

February 2: Groundhog Day <http://www.groundhog.org>
February: National Heart Month <http://www.americanheart.org>
February 16-23: National Engineers Week <http://www.eweek.org/>
March 21: Vernal Equinox http://www.equinox-and-solstice.com/html/vernal_equinox.html
April 22: Earth Day <http://www.earthday.net/>
April 22: Lyrid meteor shower <http://comets.amsmeteors.org/meteors/showers/lyrids.html>
April 25: Arbor Day <http://www.arborday.org/>
May 1: Space Day <http://www.spaceday.com/>
May 10: Astronomy Day <http://www.astroleague.org/al/astroday/astroday.html> *Portfolio Assessment Rubric*

Criterion

	Excellent 4	Good 3	Fair 2	Poor 1	Unacceptable 0	Score	
1 Presentation	Arranged attractively, typed, easy to read. Well organized with table of contents. Includes rationale and reflection for each item. High quality materials. Sections clearly marked	Arranged well, typed, fairly easy to read. Some rationale provided, most sections well-organized. Good quality materials. Sections are clear	Typed, easy to read in most places. Adequately organized. Poor quality of materials. Rationale absent or unclear.	Typed, not arranged well. Poorly organized. No illustrations. Rationale for inclusion is absent.	Not typed. Disorganized. Difficult to follow.		
2. Language	Clear, correct language. Interesting and engaging writing helps reader to understand details. Sufficient detail to guide future decisions.	Clear, correct language. Interesting writing clearly conveys meaning. Some detail to guide future decisions.	Overall clear correct language. Occasional minor errors. Little details to guide future decisions.	Consistent minor errors in structure.	Major errors in language use.		
3. Contents	All required contents. At least 3 distinct sections of evidence. A variety of evidence is presented in each section. Many additional materials enhance primary purpose. Includes technology evidence.	All required contents. Some variety of evidence is presented in each section. Some supplemental material related to primary purpose is included.	All required contents. Little to no variety of evidence included. No supplemental material, or purpose not made clear.	Missing some required contents. No variety of evidence.	Missing or incomplete contents.		
4. Reflective statement	Evidence that the student has sought connections between theory and practice for different sections. Evidence of analysis, synthesis and evaluation	Evidence that some connections between theory and practice has been made. Elements of analysis, synthesis, or evaluation used in most of the reflection. Creativity and self-reflection generally present.	Summaries of what has been previously stated. Little evidence of theory application is present. The evidence does not support self-reflection.	Restatement of what has been stated before. No evidence of theory application. Has the "put together the night before" look.	Section is missing.		
5. Standards and integration	Evidence that clear connections to state standards, Goal 3 standards, benchmarks, and Habits of Mind has been made.	Evidence that some connection to state and national standards have been made.	Awareness of state and national standards, connections not clearly communicated.	Acknowledgement of state or national standards. Connections are absent.	Absent from portfolio.		

Your name and the title Portfolio must appear on the cover.

Written documents must be word-processed.

Appropriate grammar, spelling, and sentence structure must be used.

A Table of Contents must be included.

A journal article relating to elementary science teaching.

A sample of work that shows your awareness of standards and standards-based teaching.

A sample of work that demonstrates your skill using technology as a tool for teaching science.

A sample of work that shows significant growth or change as a teacher of science to children.

A statement of your personal philosophy of teaching science: What is good science teaching and why? What are your strengths and challenges, and how can you address them? How do you identify science learning? How do you envision yourself as a science teacher?

A rationale and reflection must accompany each entry.

The appropriate Accomplished Practice must be identified for each entry.

Wee k	Topics	Activities	Accomplished Practices ESOL Competencies
1	Nature of Science and the Science Teacher, Science Literacy and Habits of Mind	Course overview Draw a scientist Discuss: Who does science? What is science? How do you feel about science now? How do children you know feel about science? Why learn science? The role of the science teacher Student memories of learning science Basic science processes Activity: Glurch and Oobleck, emphasizing skills, knowledge and attitudes	AP 1, 2, 4, 7, 11
2	Misconceptions, Discrepant Events, Predict-Observe-Explain	Discuss: common items to teach science Children's ideas and misconceptions Addressing misconceptions Predict-Observe-Explain Learning cycle Teaching with demonstrations NASA moon survival activity Radiant energy activity: observation Visit to MOSH	AP 1, 2, 4, 7, 9
3	Critical Thinking, Problem Solving, Concept Maps	Discrepant event demo Discussion: Concept Mapping and graphic organizers Visual assessment tools Developing problem solving lessons Electric circuit activity	AP 1, 2, 3, 4, 12
4	National and State Science Goals, Standards, and Benchmarks, Lesson Correlations	Discuss: Goals and standards for scientific literacy Design of standards-based instruction Lesson planning and unit planning Activity: Earthquakes Activities from ACEE integrating FCAT items	AP 1, 8, 10
5	Strategies: Constructivism, Projects, Field Trips	Discuss: Constructivist teaching Multiple intelligences Designing hands-on activities Projects and field trips Activities: themed lessons Math/science theme Extensions to other areas Standards correlations Map concepts	AP 1, 4, 5, 9, 11
6	Strategies: Discipline, Questioning, Inquiry, Grouping	Discuss: Inquiry Play as inquiry Questioning Developing inquiry lessons Managing groups in the active science classroom Activities: Flight Chem & Physics with Toys, Toys in Space Balloon Static Visit to MOSH	AP 2, 4, 11
7	Thematic Units	Discuss: Thematic Units Developing interdisciplinary lessons Models: infusion, parallel instruction, multidisciplinary, transdisciplinary. Activity: Reaction Time Data analysis: graphing checklist Peer evaluation, Manager report Activities from ACEE on <i>Math & Watersheds</i> Groups develop example from unit plans in progress. Steps: 1. Standards from each content area 2. Unifying question, issue, hook Student products addressing benchmarks	AP 1, 2, 8, 10, 11

8	Technology	<p>Activity: web resources Software evaluation</p> <p>Discuss: legal and ethical uses of technology Software with features for students with language and learning disabilities</p>	AP 2, 5, 6, 10, 12 ESOL 8a, 8b, 12, 15, 17
9	Science in Video and Children's Literature	<p>Discuss: Teaching with media Advantages: multisensory, engaging, uses stories, concrete Video advantages, examples, lessons Children's Literature advantages, examples, lessons</p> <p>Activity: children's book review and lesson design Activities from ACEE on <i>Reading and Writing Naturally</i></p>	AP 2, 4, 5, 9, 10, 12 ESOL 15, 17
10	Planning: Science/Technology/Society, Moral and ethical issues, Safety and legal issues	<p>Activity: Rock & Roll Geology: classification</p> <p>Discuss: Legal and safety guidelines Activity: group scenarios Discuss: Steps in the planning process</p>	AP 1, 6, 9, 10
11	Planning: Adapting Instruction for Inclusion and Exceptional Education	<p>Discuss: Characteristics and needs of diverse learners Strategies for diverse learners</p> <p>Activity: Examine lesson plans and propose modifications/adaptations for special needs Examine textbooks and list features included to help teachers address special needs. Tag & Recapture for population estimation</p>	AP 1, 2, 5, 6, 10, 11 ESOL 2, 4, 6, 8a, 8b, 12, 15, 16, 17, 18
12	Teaching and Assessing Authentically	<p>Discuss: Assessment with examples Journal, rubrics, graphic organizers, performance based assessment</p> <p>Activity: choose a SSS benchmark, develop performance criterion, and describe an assessment method PMI organizer: plus, minus and interesting aspects Birthday party rubric Science go round group brainstorm for theme topic, process skills, interdisciplinary connections, assessments AP 1, 2, 3, 4, 8, 10, 11 ESOL 20, 21</p>	
13	Professional Development and Organizations Resource Fair	<p>Discuss: Professional development, associations, publications, conferences, web, workshops and courses Activity: Resource fair materials sharing AP 2, 3, 8, 10, 11</p>	
14 & 15	Mini-Lesson Presentations/Portfolio	Activities: student mini-lessons	AP 1, 2, 3, 4, 5, 8, 10, 12