University of North Florida

Active leaders and responsive partners within diverse learning communities

SCE 4320-006 Middle Grades Science Methods
SCE 4330-044 Special Methods: Secondary Science

Candidate dispositions for the development and demonstration of ethical and professional attitudes and beliefs.

On-going, active reflection on professional practice.

Multiculturalism through educators who value diversity and advocate for the success of all students within diverse learning communities.

Professional growth of pre-service and experienced educations and other helping professionals.

Academic programs that are rigorous, standards-based, and model and apply innovative and enduring ideas about teaching and learning.

Scholarship for advancement of the professional knowledge base.

Service to the University, P-12 schools, the profession, and the community.

Science Methods Syllabus

Course Number:	SCE4320-007 & SCE4330-045
Course Title:	Middle Grades Science Methods & Special Methods: Secondary Science
Credit Hours:	3 - required for all middle/secondary science teachers
Term:	Fall 2004
Day and Time:	Saturday 8-10:45 AM
Location:	Portable 843

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Prerequisites

For SCE 4320: EDG 3323 and EDF 3151.
For SCE 4330: Three related courses in biological science or three related courses in physical science, plus one advanced science course to include laboratory.

Required Texts

- National Research Council (2000). **Inquiry and the National Science Standards**. Washington, D.C., National Academy Press. Available online at http://www.nap.edu/catalog/9596.html and as a PDF file (pages 1-20) in Blackboard.
- The **Florida Pre-K to 12 Curriculum Frameworks: Science**. (1996). State of Florida, Department of Education. Online at http://www.firn.edu/doe/curric/prek12/frame2.htm, available on CD-ROM from the instructor.
- Cavanaugh, T. & Cavanaugh, C. 1996. **Learning Science with Science Fiction Film**. Dubuque, IA: Kendall-Hunt. Also see: http://www.unf.edu/~tcavanau/scifi/si_fi.htm

Recommended Texts

- Project 2061 (1989), Science for All Americans. Oxford University Press. Available online at: http://www.project2061.org/tools/sfaaol/sfaatoc.htm, and as MS Reader eBook in Blackboard.
- Bransford, Brown & Rodney editors (1999). How People Learn:Brain, Mind, Experience, and School: Expanded Edition. National Academy Press. On-line version at http://www.nap.edu/catalog/9853.html
- J. Myron Atkin, Paul Black, Janet Coffey, Editors *(2001)* Classroom Assessment and the *National Science Education Standards.* Committee on Classroom Assessment and the *National Science Education Standards*, Center for Education, National Research Council. National Academy Press. On-line version athttp://www.nap.edu/catalog/9847.html
- *National Committee on Science Education Standards and Assessment, National Research Council (1996).*National Science Education Standards.National Academy Press. On-line version at http://www.nap.edu/catalog/4962.html
- *Center for Science, Mathematics, and Engineering Education, National Research Council*(1997). Introducing the National Science Education Standards, Booklet. National Academy Press. On-line version at http://www.nap.edu/catalog/5704.html

Course Description

This course examines instructional methods, materials, and curricula for teaching the science disciplines in grades 6-12. The course is designed for the autonomous, motivated learner and emphasizes how science is learned by adolescents and young adults. The view of science teaching which the course embodies is that of facilitating inquiry into the sciences (biology, chemistry, earth/space sciences, physics) by a knowledgeable, enthusiastic teacher who is aware of individual learners in multicultural contexts and uses integrative methodologies to meet their needs. Its format encourages discussion and debate and includes participation by practicing teachers and community members. The course is used in undergraduate science education programs of study and by other students seeking certification in the various sciences at the secondary school level.

SCE 4330 reflects the spirit and substance of the COEHS conceptual framework. In addition, the following rationale supports the course:
The education of future science teachers calls for the support of active communities of learners who are treated as professionals and who learn through active inquiry in holistic contexts (Bell and Gilbert, 1996; Lieberman and Miller, 1999; Loucks-Horsley, Hewson, Love, and Stiles, 1998). To prepare an ever more diverse group of students for more challenging work in today's workplace, teachers must deeply understanding learning, child development, and pedagogy, as well as the structures and modes of inquiry in the disciplines they teach (Darling-Hammond, 1997).

Candidates need special training and practice in inquiry-focused science instruction--teaching strategies involving open-ended, student-centered, hands-on activities (Colburn, 2000a), deemed foundational to science learning (Minstrell and van Zee, 2000; Mintzes, Wandersee, & Novak, 1998; NRC, 1996.) When learners feel confident and supported, teachers can better diagnose their learning needs and use scaffolding techniques to model science inquiry and coach learners to more productive science learning (Hogan and Corey, 2001). Studies point to the need for both pedagogical content knowledge and robust subject matter knowledge in successfully teaching inquiry-based science (Friedman, 1999; Hogan & Berkowitz, 2000; Loucks-Horsley, Stiles & Hewson, 1996; Stohr-Hunt, 1996). Effective science teaching strategies recognize and build upon the students' pre-instructional knowledge and learning needs--essential to facilitating learning in a constructivist learning environment (Colburn, 2000b; Driver & Oldham, 1986; NRC, 2002; Novak, 1998). Community resources and technology are used to make science meaningful and to link concepts to real-world issues, while elucidating multicultural and multilingual factors affecting science learning--recognizing that language and culture are important dimensions in students' construction of knowledge (Diaz-Rico & Weed, 1995; Lee, 2001; Lynch, 2001; NRC, 2002). Teacher educators must help prospective teachers develop a level of comfort in multicultural settings to be sensitive to and supportive of students who do not share their ethnic heritage so that they can meet the challenges of educational environments that are increasingly diverse (Jones & Sandidge, 1997).

By incorporating current national and state science standards into science methods courses, and practicing reformed teaching methods, teacher educators can help teacher candidates better understand science and what it means to teach science effectively. Teacher education students who become familiar with reform initiatives undergo changes in their conceptions of science, teaching, and learning as they learn to design, implement, and evaluate curriculum, instruction, and assessment around standards-based reform principles (Hammrich, 2000).

As teachers build their toolkits, they need access to diverse, constructivist learning environments where change-based science teaching is wedded to reflection and support (Harcombe, 2001). The importance of reflection in the course of learning and practicing science teaching--especially effective in collaborative settings, where participants build on their own experiences through writing and sharing--has been recognized in numerous studies (Barnes, Crews, Curry & Simms, 2002; Ellsworth & Buss, 2000; Nichols, Tippins & Wieseman, 1997; Ramsey, 2001; van Zee & Roberts, 2001; Yost , Sentner, & Forlenza-Bailey, 2000).

In addition to delving into educational research and completing comprehensive assignments (including lesson plan and lab station projects), the candidates in the special methods course experience the modeling of inquiry-based science teaching involving:

- participation in an inquiry project,
- reflection on reasons for using inquiry strategies,
- work in groups to design and deliver inquiry experiences, and
- group reflection on inquiry-based learning.

The main goal is to empower course participants to teach inquiry-oriented science, to provide the candidates opportunities to work with master teachers in science, and to support reflections on their experiences.

This course is designed to develop competencies in instructional methods, materials, and curriculum and in selecting methods, resources, and assessment strategies for teaching science. The purpose of this course is to prepare future science teachers for secondary schools by:

- Developing an understanding of developmental, cultural, and pedagogical issues related to constructing scientific knowledge by all students including those of varying sociocultural, economic, language, and special needs backgrounds
- Enhancing subject matter knowledge by emphasizing science concepts and skills taught in secondary science classrooms
- Developing pedagogical content knowledge: how students learn science; how to plan lessons, how to organize a safe, stimulating classroom environment, how to connect the sciences to other content areas and the community, how to assess learning authentically, how to integrate technology
- Teaching and observing science in action, confidently and enthusiastically
- Implementing inquiry-based science successfully and safely
- Using experience and research to guide personal professional development through reflection
- Becoming active participants in local, state, and national science education networks
- Accessing appropriate resources to enrich science teaching and learning

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 science well, but learning science has to be an active process: students learn science by doing science.
- There are principles based on theory, research and experience to guide 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 Goals

PROGRAM GOALS ADDRESSED IN THIS COURSE: Inquiry as the organizing theme in science teaching and learning; integration of science with other subject areas; alignment with state and national frameworks/standards; development of process skills expertise; learning about learning by diverse learners in diverse settings; lesson planning and assessment; coaching; trends analysis, and reflective practice. These course goals support the COEHS conceptual framework.

Diversity Considerations

Diversity issues, including ESE and ESOL, will be integrated through the course. Science learning by all students will be emphasized and reflected in construction of course assignments and necessary accommodations and adaptations for lesson planning, delivery, and assessment. To achieve this end, students will become familiar with the ESE Accommodations Checklist, the ESOL approved adaptations, and the testing accommodations that apply to both populations. Students will participate in field experiences in diverse settings during this course. In addition, master teachers will share their successful approaches to teaching science for all students.

Technology Considerations

- A wide variety of technology applications will be experienced in the course. The web-based university course space will be used to enhance the classroom course with handouts, reference materials, readings, web site links, and other resources. Students will also take quizzes/tests online, enabling instant feedback on their progress. An online gradebook will be used to provide students with continuous access to their progress in the course.
- Students will learn about the application of teaching science using technology. They will learn about enhancements that teachers can use in the delivery of instruction, and strategies for having students use the technology themselves as a tool for learning. Student methods will include but not be limited to items such as hand held technologies for lab work, internet sites and searching for research and student use, the application of repurposed video as an active teaching approach, and as tools for reading in the content area.

Course Objectives

The Objectives Matrix describes the learning objectives for this course in terms of the knowledge, skills, dispositions, impact on K-12 learners, and accomplished practices that each student is expected to master in this class.

Objective Matrix

Course Objective	Knowledge	Skill	Disposition	Impact on K-12 Learning	Accomplished Practice(s)
1. Candidates will understand the nature of science as a systemic search for patterns and know and use important scientific concepts, theories, and practices.	Analyzes examples and definitions of science and non-science Knows concepts, principles and ideas in relation to science content area(s) Considers unifying and	Recognizes patterns in the natural and designed world Conveys unifying concepts of science Formulates viable questions and	Exhibits healthy skepticism and open-mindedness Seeks patterns Is open to new scientific knowledge, theory, and practice	Will teach science as described in state and national science education standards	4, 8

	major conceptual themes in science	investigations using scientific knowledge base			
2. Candidates will demonstrate proficiency in performance of both the basic and integrated science process skills as ingredients of scientific inquiry.	Understands processes of observing, inferring, classifying, measuring, communicating, and predicting Incorporates hypothesizing, collecting and analyzing data, experimenting in scientific inquiry Has knowledge to engage in critiquing of science investigations	Applies process skills in design and evaluation of science investigations	Engages in objective observations and fair tests Displays curiosity	Infuses inquiry into classroom science instruction	1
3. Candidates will analyze, research, and practice related to science learning in multicultural, multilingual, and exceptional student contexts.	Knows research on learning and memory models Recognizes blocks to learning science Understands impact of pre-instructional knowledge on science learning Knows developmental, cultural, and other special needs concerns	Locates relevant research on science learning Applies research to student science learning in diverse settings	Engages in unbiased analysis of student learning needs Is open to new strategies based on research and effective practice	Includes all students in meaningful learning and understanding of science concepts and skills	4, 5, 7, 9
4. Candidates will learn and apply teaching and assessment strategies to promote meaningful science learning.	Knows research- and practice-based teaching and assessment strategies Uses effective questioning techniques Involves students in relevant science investigations Uses principles of cooperative learning	Demonstrates inquiry strategies in developing lesson plans and assessments around science concepts and skills	Displays empathy and relationship building Is open to alternative lesson planning and assessing	Enhances science achievement of all students	1, 2, 4, 5, 6, 7, 9, 10
5. Candidates will design	Knows safety guidelines	Designs and evaluates science	Attends to safety guidelines	Promotes and invites science	9, 10, 11

stimulating and safe science learning environments	endorsed by districts and professional associations Is familiar with characteristics of conducive science learning environments	learning environments	Promotes engaging science learning environments	inquiry in safe, stimulating environments	
6. Candidates will analyze, synthesize, evaluate, and apply current science education reform initiatives and strategies.	Knows international, national, state and local perspectives Understands education reform related to science teaching and learning	Connects contemporary issues in science education to teaching practices	Shows interest in reform initiatives Is open to learning from the history of science education	Implements current curricula to engage all students	3, 4
7. Candidates will explore resources and networks that enhance the teaching and learning of science	Understands the value of people and community resources to facilitate science understanding Demonstrates knowledge of instructional materials and media resources in science content areas Knows how to incorporate science learning in both informal and formal settings Is aware of professional journals and conferences	Locates and uses relevant resources for effective science teaching	Encourages contributions of scientists and other experts to enhance learning about science concepts and contemporary issues Encourages participation of parents, colleagues, and community	Enhances science instruction with relevant resources including community and others	2, 3, 6, 11
8. Candidates will define technology as the use of tools, and note the interactions of science, technology, and society.	Understands the application of technology across concepts in science Knows science, technology, and society linkages	Effectively integrates technology in student research, investigations, and reporting Uses societal contexts in science teaching	Open to learning current instructional and laboratory-based technologies Readiness to utilize technology in association with varying teaching strategies, science investigations, and assessments	Integrates district technology resources into science teaching	3, 12
9. Candidates	Understands the	Engages in	Open to	Becomes an	3, 4

will use information gained from class, readings, and the field to reflect on personal professional development and student learning	value of written and shared reflections as an avenue toward professional growth in science teaching	reflective practice Shares and internalizes insights from reading and experience as a member of a community of learners	reflecting on teaching practice and sharing with colleagues	active member of school and district-wide learning communities	

Course Assignments, Expectations and Grading Procedures

MODES OF INSTRUCTION: Discussion with analysis and synthesis; small group activities; varied educational technology; web-enhanced learning; field trips; personal reflection

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.

1. Professional conduct
The basic rules of first grade apply. "Do unto others..., If you don't have anything nice to say..., Play fair, Be nice," etc. Keep phones, pagers, and PDAs silent. Also, you may not KNOW an answer, but you are expected to THINK about a response. Guess, hypothesize, speculate, wonder, ponder, inquire, call a friend, relate to prior knowledge, tell a story -- not trying is not an option. 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. Articles on teaching/learning science
Using relevant print and/or electronic sources, you will locate 2 articles which describe strategies for teaching/learning science. Each 2-page report should include a short summary of the article followed by your discussion of the ideas in the article. (e.g., Does the strategy seem feasible? How might you modify it for your own use? Is the strategy consistent with the inquiry goals of the state and national science standards?) Submit the reports electronically on Blackboard; you may submit one for feedback before you do the others.

4. Laboratory inquiry project
Working with a partner(s), you will design a lab station which demonstrates knowledge and skills needed in planning and assessing science laboratory investigations to engage all students.

5. Community/field learning setting report
You will spend 4 hours in 1-2 community/informal and/or other field settings where science is learned. You will compile a report and submit it electronically.

6. Reflective journals
Reflection is a critical part of teacher growth and development. The main reason to write a journal is for your personal growth and development as a teacher candidate. Your journal should reveal where you strengths are and where you would benefit from further work. The goal of the reflective journal is to develop continual, reflective excellence as a guide for student learning.

7. Inquiry science lesson plan
You will design an inquiry-oriented lesson, including a concept map and assessment strategies, which reflects the Sunshine State Standards in Science in your particular area of content of interest and incorporates elements of technology. Your lesson plan should reflect the needs of a diverse group of students. You will share your lesson plan with the class in a creative format of your choosing.

8. Professional development
Attend one of the science education professional development workshops that are offered. Write a reflection of your experiences concerning what you have learned and your plan for incorporating your knowledge in your teaching.

9. Forum discussion
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 regularly.

Assignment Rubrics

Concept Map:
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.

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

Assignment Rubric: (6 points)

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

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Articles on Teaching/Learning Science
Using relevant print and/or electronic sources, you will locate 2 articles which describe strategies for teaching/learning science. At least one of the articles should pertain to your own science discipline(s). Each 2- page report (12-point font, 1-inch margins) should include a short summary of the article followed by your discussion of the ideas in the article, and a full citation for the article including web link if available. (e.g., does the strategy seem feasible? How might you modify it for your own use? Is the strategy consistent with the inquiry goals of the state and national science standards?) You can find links to science and science education journals listed at http://www.jhargis.com/journal.htm. Possible topics include:

- Gender differences in science interest and achievement
- Authentic assessment of science learning
- Adaptation of science lessons for diverse learners
- Impact of standards-based education on science learning
- Altering misconceptions in science
- The role of concept maps in learning science
- The value of learning science outside the classroom
- Effective technology for learning science

Assignment rubric: (8 points)

Value	Meets/exceeds all criteria 2	Meets some criteria 1	Meets few/no criteria 0
Professional appearance and structure	Word processed, properly formatted	Less than 2 pages, improper formatting	Requirement absent
Clear description of learning strategy	Strategy described in writer's words	Incomplete or erroneous description	Requirement absent
Quality of discussion	Relation of strategy to writer	Superficial or inappropriate discussion	Requirement absent
Appropriate reference	Full citation, properly formatted, with web link	Incomplete citation	Requirement absent

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Laboratory Inquiry Project
In a group of 1-3 members, you will create and implement a lab station for the class to use. After implementing the station, turn in your written critique/reflection on the station. The station activities should be designed to

- take students about 10 minutes to complete

- teach a concept or skill indicated in the Sunshine State Standards for the target grade level
- be grade appropriate
- include active, inquiry-based, hands-on components
- be well—organized and attractive
- include explicit measures of achievement/success so both students and teacher know how well each student accomplished the objectives
- include discussion of pre-lab preparation and prerequisite knowledge, and post-lab processing

Assignment rubric (25 points)

Quality Criterion	Exceeds the Standard 5	Meets the Standard 4	Proficient 3	Work in Progress 2	Beginner 1
Adherence to the Display Components	All components present and well organized. Layout and design are attractive.	All components present and well organized.	Most components present and organized.	Most components present, but lack coherent flow.	Display is limited to student directions for the lab.
Quality of the Project Plan	Aligned with standards, appropriate to grade level, has clear instructional information *with attention to detail*, and quality criteria for assessment.	Aligned with standards, appropriate to grade level, has clear instructional information, and quality criteria for assessment.	Contains 3 of 4: Aligned with standards, appropriate to grade level, has clear instructional information, and quality criteria for assessment.	Aligned with standards and appropriate to grade level, but lacks clear instructional information.	Standard alignment unclear, inappropriate for grade level/class, and plan lacks clear instructional focus.
Quality of the Lab Activity	Inquiry–based, appropriate for time constraints and standard, added extensions	Inquiry–based, appropriate for time constraints and standard	Cookbook lab activity with guiding questions, appropriate for time constraints and standard	Cookbook lab activity, connection to the standards unclear, and time constraints not honored	Photo copied lab activity straight from a textbook with little attention to the standards
Emphasis on Science Process/Lab Skills	Attention to prelab, student inquiry, and post lab connections to process and content.	Attention to prelab, student inquiry, and post lab content (lower cognitive level)	Attention to prelab, experimentation, and post lab content.	Attention to experimentation, but missing pre- or post-lab components.	Attention to Prelab and post lab lacking
Presentation and Critique	Clearly illustrates connections between proposed	Makes connections between proposed instruction	Presentation and discussion limited to elements in the display	Presentation and discussion partially explain proposed	Discussion does not reflect proposed instruction

	instruction and inquiry/ assessment strategies.	and inquiry.	itself.	instruction and lab.	and lab.

Community/Field Learning Setting Report
You will visit a site where science is being learned. Possible sites include grades 6-12 classrooms, science centers when student groups are present, area parks when student groups are present, the UNF slough preserve when a student group is present.

Your report should include the following: (You may attach photos, recordings, handouts or other materials)

- Your name
- Date and time of observation(s)
- Number and description of students in the group
- Site name and address
- Teacher or activity facilitator
- Grade and subject
- Topic or concept observed
- Activities and processes observed, with evidence of aspects of the inquiry process in action
- 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: factors which appeared to help learning, factors which appeared to hinder learning
- implications for classroom practice
  Analysis of instructional strategies and effectiveness of lesson for students

Interview a teacher/facilitator involved in grades 6-12 science about:

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

Interview at least two students in grades 6-12 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

Assignment 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	1 Organized, some errors

				missing	
0 Most absent	1Vague overview	1 Superficial mention	0 Missing or absent	1 Little summary, or few interviews summarized	0Poor flow, many errors
	0 Confusing overview	0Missing or absent		0 Missing or absent	

Reflective Journals (8 points)
Your journal should carefully and thoughtfully document class sessions, readings, assignments, resources, and your personal growth. Your journal will be assessed on your thoroughness, insights, and questions. You will provide written reflections of class sessions, text reading and web-based resources. You will submit your journal electronically or as a hard copy on 2 dates and be assessed on your thoroughness, insights, and questions.

Inquiry Science Lesson Plan (15 points)
As a member of a group of 1-3 members, you will develop a inquiry-oriented, standards-based lesson. Each group member will be evaluated on the lesson as a whole and on the group's presentation of a mini-lesson based on the full lesson.

Lesson plan guide:

- Title of the lesson
- Purpose paragraph describing lesson conceptual objectives, importance, rationale, sequence, and intended learning outcomes
- An overview of the audience, scope and sequence of activities
- Approximate time the lesson is expected to take in the classroom
- Connections to Sunshine State Standards Benchmark(s)
- Activity description (content and desired outcomes of lesson)
- A concept map of content addressed
- Resources needed (all materials and resources needed in the lesson)
- Sources (references and background information used in planning and/or delivering lesson)
- Preparation (tasks to prepare for teaching the lesson)
- Procedure:
- 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
- **How inquiry is supported in the lesson?** Describe clearly with sufficient detail to show how students' attention will be focused, background knowledge will be used, students will be engaged. Address the stages of the learning cycle.
- Sequence of activities specified, along with safety precautions and any special needs adaptations
- Knowledge/skills (concepts and skills students will learn)
- Assessments of learning, demonstrating how you will know that the intended learning outcome has been achieved. Assessments must be **matched to lesson objectives and to inquiry goal**.
- Technology incorporated into lesson
- A visual activity organizer map or chart for student use

- A list of the contributions of each group member

Assignment 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			
Linked to appropriate standards, learning cycle stages			
Lesson provides challenging, relevant, and exciting learning experiences			
Professionally written			
Organized and effective presentation			

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 learning goals do I want the students to accomplish 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 students have in the materials they use or what they do with them?
- What kind of data will be collected - do the students 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 students to challenge them to be scientists and explore the problem?
- How will I assist students to make sense of knowledge they have generated from their experience?
- What questions can I ask to encourage students 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 students to analyze, synthesize and critically reflect on what they have done and what they have learned?
- How will I assess whether the goals set for the lesson have been achieved by the students?

Professional Development Assignment

Following a professional development activity in science education, a written summary will be turned in. An activity will be scheduled at UNF during the semester. You may attend an activity sponsored by another organization. Pelotes Island Preserve schedules activities frequently. You can find their schedule at http://pelotes.jea.com/. Click on "For Teachers" and then click on "Educator Workshops."

Professional development note format and grading checklist (15 points)

Item	Value
☑ Date, time, and location of activity	1
☑ Title of activity	1
☑ Presenter name and affiliation	1
☑ Topic or concept of the activity	1
☑ Learning activities observed	1
☑ State Science standards addressed	2
☑ Florida Educator Accomplished Practices addressed	2
☑ Materials used (technology, handouts, books, assessments, manipulatives, other)	1
☑ Assessment methods used	1
☑ Management techniques used by the facilitator to handle materials, timing, and participants	2
☑ Reflections and other notes	2

GRADING PROCEDURES

Tentative Grading Structure

1. Professional Conduct is necessary to earn an excellent or good grade.	
2. Concept map	6
3. Article reports	8
4. Lab inquiry project	25
5. Field setting visit	15
6. Reflective journals	8
7. Inquiry lesson plan	15
8. Professional development notes	15
9. Forum discussions	8
TOTAL	*100*

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

Course Policies and Guidelines

COLLEGEOF EDUCATIONAND HUMAN SERVICES POLICIES

1. Americans with Disabilities Act (ADA) Policy . The College of Education and Human Services complies with ADA requirements in making reasonable accommodations for qualified students with disabilities. Students desiring reasonable accommodations should contact the UNF Office of Disabled Services (Founders Hall 2120; telephone: 904/620-2769) and are encouraged to inform the instructor as early in the semester as possible regarding desired accommodations.

2. College Undergraduate Admission Policy. In order to earn credit toward an undergraduate degree in the College of Education and Human Services, students must be admitted to a COEHS undergraduate program of study. Admission to the University does NOT in and of itself constitute admission to a given

program of study. Transfer students cannot take more than 14 UNF hours toward any COEHS undergraduate degree without first having been fully admitted into a program of study.

Prior to being considered for full admission into an undergraduate program of study, students must (a) submit acceptable scores on all parts of the College-Level Academic Skills Test (CLAST) and (b) present official transcripts documenting a cumulative undergraduate GPA of 2.5 or better on a minimum of 60 semester hours from a regionally accredited college or university. Students are encouraged to consult the *Undergraduate Catalog* and/or contact the College's Office of Student Services (Schultz Hall 2305; telephone: 904/620-2530) for information regarding admission to a specific undergraduate program of study.

3. University Enrollment Policy. Only those students who are admitted to the University are entitled to enroll in classes, and only those students who are enrolled in a given course are permitted to attend class meetings for that course. Sitting through a class without registering does not constitute enrollment. Instructors are authorized to bar students who are not enrolled in a course from attending class sessions until evidence of enrollment is presented to the instructor. Even if unenrolled students are allowed via the instructor's oversight to remain in a class, university policy prohibits students from being added to a class roster after the reinstatement deadline. The primary responsibility for assuring that a student is enrolled in a course belongs to the student. Students are therefore encouraged to check their enrollment status several times during each semester with an advisor or via the UNF website.

4. Policies Governing Student Conduct. The University of North Florida has adopted a Student Conduct Code in order to promote responsible behavior for all students and to assure a physically, emotionally, and intellectually safe university community. This code addresses issues that may threaten the safety and order of the university environment and provides procedures and remedies for addressing these issues. Specific issues addressed include, but are not limited to, sexual misconduct; endangerment; harassment; hazing; possession/use of weapons, alcohol, and illegal drugs; damage or destruction of property; malicious mischief; computer misuse; and falsification/fraud. Students who are aware of and/or feel they are victims of any activity in violation of the Student Conduct Code should report the activity to the University Police or the appropriate campus administrator. The conduct code is available in its entirety on the University website at web address http://www.unf.edu/studentaffairs/handbook/HB2002-2003.pdf

5. Academic Integrity Policy. The University of North Florida has adopted a strict policy on academic integrity. As noted in the UNF 2003-2004 *Undergraduate Catalog* (p. 35) and the UNF 2001-2002 *Student Handbook* (p. 23), violations to academic integrity include, but are not limited to cheating; fabricating and falsifying information or citations; submitting the same work for credit in more than one course; plagiarizing; providing another student with access to one's own work to submit under this person's name or signature; destroying, stealing, or making inaccessible library or other academic resource material; and helping or attempting to help another person commit an act of academic dishonesty. The full policy on academic integrity is available on the University website at web address http://www.unf.edu/studentaffairs/handbook/HB2002-2003.pdf

   The Academic Integrity Policy affords University instructors authority to assign penalties for these offenses. For example, the instructor may assign a grade of F on the assignment in question or for the course. In the case of flagrant violations of the Academic Integrity Policy, the instructor may recommend additional specific penalties to the university administration, including referral for academic counseling, expulsion from a program of study, denying of degree, expulsion from the University, or revocation of a degree already granted.

6. E-mail Policy. The University of North Florida ?s policy on student e-mail allows academic and service units of the University to use e-mail as the primary means for communicating certain types of information to students. Although individual instructors may determine that external (i.e., non-University-provided) e-mail accounts are a suitable means for communicating with students, the University policy specifies that the University-provided e-mail address serve as the official e-mail address for purposes of formal electronic communication with students. All students should become knowledgeable of their University-provided e-mail address and either check their account regularly or arrange for all e-mail delivered to

their account to be forwarded to an external e-mail account of their choice. Students can find out their e-mail account username, reset their password, and set forwarding options by visiting http://www.unf.edu/compserv/guidelines/glemail.html.

INSTRUCTOR POLICIES

A variety of learning/instructional activities will be incorporated into this course. Every effort will be made to meet the diverse needs of learners who have different learning styles. **As a student, you will be ultimately responsible to read the textbook and other associated readings**. Although much of the content in the textbook(s) will be incorporated into class discussions and activities, *please do not assume the instructor will simply lecture from the book*.

Professionalism in class behavior and in carrying out assignments is expected. Assignments submitted for evaluation must be word processed unless otherwise specified, and electronically submitted, where indicated. Students are expected to demonstrate appropriate oral and written communication skills for successful course completion. *Please silence cell phones in class*.

Attendance at each class meeting is required because of the practical, hands-on nature of instruction. After 3 absences from class, the student's course grade will be reduced by 1%, with a 1% reduction for each absence thereafter.

Completion of all assignments is expected on the day indicated. Assignments submitted after the due dates are considered late, and a 10% reduction in grade will occur for each week the assignment is late. No late work is accepted after 2 weeks beyond the due date. If you foresee problems for the day that assignments are due, arrange to complete and turn them in early. A grade for the course will not be given if all assignments are not completed as directed. In the spirit of inquiry, you should feel free to meet and electronically communicate with your instructor to share and clarify your ideas. Alternatives to assignments may be discussed with course instructor.

Fall 2004 Science Holidays

International Coastal Cleanup, September 18, **http://www.coastalcleanup.org/index.cfm**

Autumnal Equinox	September 22, 12:30 PM EDT	
Fire Prevention Week	October 3-9	**http://www.nfpa.org/FPW/index.asp**
World Space Week	October 4-10	**http://www.spaceweek.org/**
Metric Week	October 10-16	**http://lamar.colostate.edu/~hillger/**
Earth Science Week	October 10-16	**http://www.earthsciweek.org/**

Florida Association of Science Teachers conference, Oct. 14-16, **http://www.fastscience.org/**

Safe Schools Week	October 17-23	**http://www.nssc1.org/safeweek/safe.htm**
Chemistry Week	October 17-23	**http://www.chemistry.org/portal/a/c/s/1/acsdisplay.html?DOC=ncw%5Cncw_index.html**
World Rain Forest Week	October 18-25	**http://www.ran.org/**
Meteor Showers	Orionid October 21, Leonid November 17	**http://stardate.org/**
Lunar Eclipse	Total: October 27-28	**http://sunearth.gsfc.nasa.gov/eclipse/lunar.html**

For more health related observances, see
http://www.healthfinder.gov/library/nho/nho.asp?year=2004#85

Tentative Course Schedule

INSES: Inquiry and the National Science Standards; FCF: Florida Curriculum Frameworks; LSF: Learning Science with Film

CLASS MEETING		TOPIC	READINGS DUE	ASSIGNMENTS DUE
1	8/28	Who are we and what are our needs? What are our experiences with science learning and teaching? What is science literacy? How does inquiry learning help students think scientifically? What are the habits of mind associated with inquiry, and how are they developed?	INSES Forward, Preface, and 1	
2	9/4	What are our visions for science education? What is the role of the standards in inquiry teaching? How does Brain Research inform teaching? How do misconceptions affect learning? What is the Learning Cycle? How can grouping be used to improve learning?	INSES 2 FCF Intro, 1, 3	Forum 1
3	9/11	*Share article reports.* What does inquiry learning look like? How do concept maps and graphic organizers help concept development? How do discrepant events generate inquiry? How do questions guide inquiry?	INSES 6 Appendix A FCF 4	Forum 2 Article reports
4	9/18	*Review concept maps.* How are effective science learning experiences planned? What assessment methods are used to demonstrate and document learning? How do assessments such as FCAT influence teaching?	INSES 4 FCF 6	Concept map
5	9/25	How are multimedia and technology used in inquiry-oriented science learning?	LSF	Reflective journal #1
6	10/2	*Inquiry lab stations.* How are science demonstrations planned and implemented?	INSES 3	Lab inquiry station
7	10/9	What role to field-based learning experiences play in a comprehensive science education program? How do teachers remain current with content and pedagogy, and maintain collegial relationships?	INSES 5 FCF 8	Forum 3
8	10/16	*Share field setting experiences.* How does project-based learning enhance science learning?		Field setting visit
9	10/23	What moral, legal and ethical issues influence science teaching? What safety practices are followed in successful science classrooms? How is instruction adapted for inclusion and special needs learners?	FCF 4, 7	
10	10/30	*Workshop*	INSES 7, Appendix B	Reflective journal #2
11	11/6	*Professional development sharing.* How does reading in the content area meet broad student needs? What resources and curricula are available and how are they selected and used?	INSES 7, 8, Appendix B FCF 6	Professional development report Forum 4
12	*11/13*	*No class.*		
13	11/20	*Lesson plan peer review.* How are interdisciplinary instruction and thematic units used in science education?	FCF 5	Lesson plan
14	*11/27*	*Holiday: no class.*		
15	12/4	*Lesson Presentations.*		Mini-lesson

Bibliography

Activities:

- 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 , VA22201-3000 (703) 243-7100 http://www.nsta.org
- Science Education Directory of Periodicals: http://www.nap.edu/readingroom/books/rtess/8.html
- Science Teacher, NSTA, 1840 Wilson Blvd., Arlington, VA22201-3000 (703) 243-7100 http://www.nsta.org

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 , DC20005 (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 , VA22230 (703) 306-1600
- National Science Teachers Association (NSTA), 1840 Wilson Blvd. , Arlington , VA22201-3000 (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

Website resources for Special Methods in Science students, directly accessible via "Blackboard":

Science Education Desk (http://www.ericse.org/sciedport.html)
This is a comprehensive site with many links for science teaching and searching.
National Science Teachers Association (http://www.nsta.org)
This site is sponsored by the largest science teachers' organization in the US.
Florida Department of Education (http://www.fldoe.org)
This is the official Florida Department of Education webpage with links to Sunshine State Standards and DOE information.
National Science Education Standards (http://books.nap.edu/html/nses/html)
These standards helped to inform our State Standards and indicate curricular approaches to teaching science effectively in K-12.
Glenn Commission report (http://ed.gov/americacounts/glenn/toolate-execsum.html)
The most current report on mathematics and science teaching speaks to factors which support good teachers and teaching.
National Academy Press (http://www.nap.edu)
This site links to relevant publications, including Inquiry and the National Science Education Standards
Third International Science and mathematics Study (TIMMS) (http://nces.ed.gov/timss/)
This report has had profound impact on policy and proposed practice in science and mathematics education.
Eisenhower National Clearinghouse (http://enc.org)
An excellent link to lesson plans and other resources.
NASA Space Science news (http://spacescience.com/default.htm)
Get news, activities, and even subscribe to a free email update on space science.
NAEP reports (http://nces.ed.gov/nationsreportcard/site/home.asp)
The National Assessment of Educational Progress site is a nation's report card and also gives sample items, including science items.
SCANS 2000 website (http://www.scans.jhu.edu/default.htm)
Here is information about projects and materials related to the SCANS report on workplace skills.
Earth Science Resources (http://www.earthsciweek.org/)
The site includes information about water and water resources, listings of Earth Science Week activities planned across the country, and contact information for Earth science resources in each state. In addition, visitors can join in a discussion forum or a listserve to share ideas for planning Earth Science Week events, and they can find links to ideas for Earth Science Week activities for the classroom that comply with the National Science Education Standards.
Project PAER (http://www.unf.edu/coehs/trda/)
Partnership to Access Educational Resources received external funding to develop a new teacher development model in science teaching.
Inquiry and learning (http://www.unf.edu/coehs/inquiry/index.html)
Here are lessons and links to stimulate inquiry.
scilinks (http://www.scilinks.org)
This is sponsored by NSTA and offers background on a variety of topics and ways to connect to one another.
Nature of science materials (http://www.nuffieldfoundation.org/aboutscience)
These sources are used with secondary students in England.
CNN teacher page (http://www.cnn.com/fyi/teachers/index.html)
Updated news and lesson plans and resources for teachers.
A learning cycle model (http://www.science.seattleschools.org/teacher/cycle.asp)
A model of the learning cycle used in the Seattle schools
PBS --Inquiry Series (http://www.pbs.org)
Access the PBS resources, especially the Inquiry series.
How Stuff Works (http://www.howstuffworks.com/index.htm)
A great site to explore how things work and stimulate curiosity.
Thursday's Classroom (http://www.thursdaysclassroom.com/)
This site connects NASA research to classrooms and provides lesson plans.
Webquest site (http://edweb.sdsu.edu/webquest/matrix.html)
This site involves you in WebQuests, inquiry-oriented activities in which most or all of the information

used by learners is drawn from the Web. WebQuests are designed to use learners' time well, to focus on using information rather than looking for it. The model was developed in 1995 at San Diego State University.

Stormy Weather (http://www.educationcentral.org/stormy)
Site constructed by Stephanie Stevenson; discussed in our class

Evolution Companion (http://www.ericse.org/evolution.html)
Here are resources ti help you plan ways to approach evolution in the classroom.

NSTA Position Statement on Evolution (http://www.nsta.org/159&psid=10)
This statement gives the official position of the NSTA about the teaching of evolution; also includes background information.

NSTA Safety Position Statement (http://www.nsta.org/159&psid=32)
This summary highlights the important safety issues which must be addressed in schools.

Flinn Safety resources (http://www.flinnsci.com/homepage/sindex.html)
Guidelines and procedures for science classroom safety are presented.

Carolina Biological Safety Resources (http://www.carolina.com/labsafety/Default.htm)
Here are safety tips and other links to sites which can help you to design and monitor safe labs.

Science and Safety (http://scied.unl.edu/pages/preser/sec/safety/safetybroch.pdf)
Endorsed by Council of State Science Supervisors

Inspiration (http://www.inspiration.com)
This site provides examples and a free 30 day download of the software, Inspiration, which allows you to construct concept maps.

Concept mapping homepage (http://users.edte.utwente.nl/lanzing/cm_home.htm)
This page offers background information, links, and examples related to concept mapping.

Exploratorium (http://www.exploratorium.org)
This is the ultimate hands-on museum in San Francisco; houses the Institute for Inquiry.

Rob Krampf's site (http://www.krampf.com/)
This site provides information from "Mr. Electricity"; Rob resides in St. Augustine and does programs throughout the country. Get on his free "experiment of the week" email.

Kennedy Space Center (http://www.kennedyspacecenter.com/html/space_links.html)
See this page for links to education resources associated with the space program.

Electronic Journal of Science Education
(http://unr.edu/homepage/jcannon/ejse/ejse.html)
This journal publishes research and idea articles related to science teaching and learning--sponsored by the Association for the Education of Teachers in Science (AETS).

Journal List (http://www.ericse.org/journals.html#anchor765878)
This list is from the ERIC Clearinghouse. Check our Library holdings to locate the journal of interest.

Chemical Educator (http://chemed.boisestate.edu)
Information and access to articles pertaining to chemistry teaching.

Protein Crystals in Space (http://florida-protein-crystals-in-space.org/)
This is a partnership project with Terry Parker High School and the Florida Space Grant Consortium.

Duval County Schools (http://www.educationcentral.org)
This is the site to access information and resources connected with Duval County Public Schools.

Jacksonville Urban Systemic Initiative (http://www.educationcentral.org/usi/)
The USI is supported by the National Science Foundation to improve science and mathematics teaching and learning. UNF is a partner institution.

PAER: Partnership to Access Educational Resources
(http://www.unf.edu/coehs/trda/index.html)
PAER is a teacher professional development project at UNF. This site is a gateway to many resources and student electronic projects.

National Weather Service
(http://iwin.nws.noaa.gov/iwin/graphicsversion/rbigmain.html)
This is a site with useful weather-related graphics and information.

Terry Parker High School (http://www.terryparker.duval.k12.fl.us/main.htm)
A good example of a school website designed with students in mind!

Duval County Science Curricula
(http://www.educationcentral.org/usi/curricula_available_from_this_si.htm)
Updated versions of the Duval County Science Curricula, some in draft form.

Project CRISS (http://www.projectcriss.com/)
Creating Independence through Student-Owned Strategies Homepage -background information and workshop overviews
National Information Center for Children and Youth with Disabilities Center for (http://www.nichcy.org/)
IDEA 97 Training Package On-line! This training package focuses on some of the legal requirements and provisions of the Individuals with Disabilities Education Act Amendments of 1997-IDEA 97, for short. The package consists of two binders: the Curriculum binder, which contains nearly 500 pages of background information, resources, handouts, and training scripts on the law; and the Overheads binder, which contains a series of 145 overhead transparencies in English that you can use when providing training on the law.
ESL Resources (http://www.cal.org/ericcll/ncbe/esldirectory/about.html)
Don Metz website (http://www.uwinnipeg.ca/~metz/home/hpsst/hpsst.html)
An excellent overall site developed by a Canadian colleague.
Regional site (http://www.nefec.org/envedu)
This site contains lessons about watersheds; compiled by Cindy Cranford.
Pelotes Island (http://pelotes.jea.com/)
This site contains resources and lessons keyed in to the Florida Sunshine State Standards.
Northeast Florida Environmental Education Information (http://www.dep.state.fl.us/northeast/admweb/outreach/education.htm)
Find current information on environmental education resources.
Owl Pellets (http://www.owlpages.com/physiology/digestion.html)
A site with description of owl digestion and other relevant links.
Humane Genome Project Resources (http://www.nhgri.nih.gov/educationkit/)
The Human Genome Project is offering a FREE multimedia educational tool on genetics, designed for high school students, teachers, and the general public. Go to http://www.nhgri.nih.gov/educationkit/
Personal educational press (http://www.educationalpress.org/educationalpress/)
Free educational materials, games, puzzles, organized by subject area
Web Elements (http://www.webelements.com/)
This is an interactive periodic table of the elements which gives background information on each element.
FCAT Homepage (http://www.firn.edu/doe/sas/fcat.htm)
Everything you have ever wanted to know about the Florida Comprehensive Assessment Test
PALS (http://www.ctl.sri.com/pals/)
Performance assessment links in science coded by national science standards--join free online!
Exemplary and promising science programs (http://www.ed.gov/offices/OERI/ORAD/KAD/expert_panel/newscience_progs.html)
These programs have been deemed exemplary by a panel of experts.
Chem Com (http://www.whfreeman.com/chemcom)
This is an innovative chemistry program which is in use in Duval County.
Bilology: A Community Context (http://www.sra-4kids.com/everydaylearning/bcc/infofor/bcc-pages.html)
BioCom is a curriculum to help students connect biology with their lives. It is being studied and used in Duval County.
Selecting Instructional Materials in Science (http://search.nap.edu/nap-cgi/napsearch.cgi?term=selecting+instructional+materials+in+science)
A guide to choosing materials to support science instruction (National Academy Press)

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American Association for the Advancement of Science. (1989). *Science for All Americans*. New York: Oxford University Press.

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Assignment Standards Reference Boxes

Research articles on teaching/learning science.

Course Objective(s): 3 Florida Educator Accomplished Practice(s): 4, 5, 7, 9 Subject Area Competency(ies): Nature of science; nature of scientific inquiry ESOL Competency(ies): 2, 14 ISTE Competency(ies): V Learned Society Competency(ies)*: 3, 4

Laboratory Inquiry Project

Course Objective(s): 2, 4, 5 Florida Educator Accomplished Practice(s): 1, 2, 4, 8, 9, 10, Subject Area Competency(ies): Vary according to topic within discipline; nature of scientific inquiry; nature of science ESOL Competency(ies): 6, 12, 16, 18 ISTE Competency(ies): Learned Society Competency(ies)*: 1, 3, 5, 6, 8, 9,

Community/Field Learning Setting Report

Course Objective(s): 1, 2, 3, 4, 5, 7, Florida Educator Accomplished Practice(s): 2, 4, 5, 7, 8, 9 Subject Area Competency(ies): Nature of scientific inquiry ESOL Competency(ies): 14, 22 ISTE Competency(ies): Learned Society Competency(ies)*: 3, 7

Reflective Journals

Course Objective(s): 9, 1-8 Florida Educator Accomplished Practice(s): 2, 3, 4, 6, 7, 9, 11 Subject Area Competency(ies): Nature of scientific inquiry ESOL Competency(ies): 18 ISTE Competency(ies): V Learned Society Competency(ies)*: 2, 3, 4, 9, 10

Inquiry Science Lesson Plan

Course Objective(s): 2, 4, 5, 6, 7, 8, 10, 12 Florida Educator Accomplished Practice(s): 1, 2, 4, 5, 7, 8, 10, 12

Subject Area Competency(ies): Vary according to topic within discipline; nature of scientific inquiry ESOL Competency(ies): 2, 6, 12, 16, 17 ISTE Competency(ies): II Learned Society Competency(ies)*: 1, 3, 5, 6, 8, 9,

* (Revised 2003) NSTA Standards