

Course Syllabus (Fall, 2012)**SCE-4310 Teaching Science in the Elementary School (K-6)****Credit:** 3 credit hours**Dates/Times:** Online. Plan for approximately 7 to 9 hours/week.**Instructor:** John L. Pecore, Ph.D.**Office:** 85/176, UWF Campus**Email:** jpecore@uwf.edu**Phone:** 850-474-2303**Office Hours:** Tuesday-Thursday 9:00-11:00, 1:30-3:30, and by appointment or virtually through eLearning chat.

Course Description: Welcome to science methods! This course is an introduction to teach science in K-6 level settings. It is designed to address three basic goals. Our first goal is to examine the *practice of science* by determining what it means to understand science and be scientifically literate, recognizing the importance of teaching scientific inquiry and process skills, and learning to create 5E inquiry lessons to promote meaningful science instruction. The second goal is to identify *disciplinary core ideas* by learning some science together, engaging in scientific inquiry, just as you might do with your students, and considering inaccurate thinking children (and adults) have about specific science concepts. The third goal is to use *crosscutting concepts* when designing thematic lessons. The focus is to examine methods of teaching over longer periods of time by thinking about: crosscutting ideas/themes, driving projects and citizen science, resources necessary to teach science, scientific skills to reinforce, and best practices to teach science. Part of studying best practices to teach science includes how to: create a thoughtful trajectory, establish a community of learners, promote communication, choose and use representations and technology effectively, and assess learners' understanding. Throughout the course we will design and evaluate instruction, materials, and curriculum in terms of how they effectively move student thinking toward meaningful understanding of 1) science and engineering practices, 2) disciplinary core ideas, and 3) crosscutting concepts.

If you are approaching this course with mixed feelings, you are not alone. Many new teachers are both apprehensive and eager to learn more science so that they may feel more competent as science teachers than they might have felt in their own schooling. Whatever your feelings, I hope this course can help you use them positively and productively for becoming a lifelong science learner, and for helping your students become lifelong science learners too.

Program Goals and Student Learning Outcomes: The Empowered Professional Making a Difference is the theme of the Professional Education Unit's conceptual framework. This theme focuses learning experiences on activities that permit the candidate to examine what he/she does and to make a difference in the instructional process. The subject matter, class activities, and skill development of this course were selected to assist your professional growth in one or more of the following Empowered Professional Making a Difference characteristics: a) critical thinker, b) lifelong learner, c) counselor/mentor, d) decision maker, e) problem solver, and f) ethical/moral professional.

Course Goals

I. Problem Solver: Demonstrate knowledge of science education reform, both past and present, with an emphasis on innovative science programs and of current trends in science education.

II. Critical Thinker: Gain an understanding of and appreciation for nature of science, philosophy, and scientists in science education.

Student Learning Outcomes

A) Examine and evaluate scientific skills and ideas through the lens of research and best practices

B) Examine knowledge of science concepts and processes.

III. Decision Maker: Understand how children learn science and effective teaching practices. Develop skills in planning activity-based lessons that account for children’s prior knowledge.

C) Become acquainted with various strategies and instruments to accurately develop and assess science learning, and to plan further instruction in a safe environment with developmentally appropriate inquiry-based lessons that integrate science into other curricular areas.

IV. Mentor: Demonstrate an ability to design lessons that incorporate Florida Educator Accomplished Practices (FEAPs) (e.g., instructional design & lesson planning, learning environment, instructional delivery & facilitation, assessment).

D) Demonstrate an understanding of assessment in science education and assessing students in multiple ways.

V. Ethical Professional: Understand the importance of planning, implementing and reflecting on lessons as a teacher of English for speakers of other languages (TESOL) to ensure that the needs of diverse learners are addressed.

E) Plan integrated science lessons/units that address learning disabilities, especially hearing & language impairment, & limited English proficiency (TESOL) and Appreciate the role of women and minorities in science by designing lessons that account for individual/cultural differences.

VI. Lifelong Learner: Demonstrate an appreciation for the importance of professional growth by analyzing teaching practice, understanding national and state science education standards, and becoming familiar with elementary science education resources.

F) Meaningfully apply education research that incorporates Florida Educator Accomplished Practices (FEAPs) (e.g., continuous professional development, and professional responsibility & ethical conduct).

Course Alignments by Assessments, Outcomes, and Standards: The State of Florida has responded to national and state initiatives in education reform and accountability by creating legislative policies relative to the preparation of teachers. Florida's Accomplished Practices, Sunshine State Standards, and Curriculum Frameworks outline the knowledge, skills, dispositions, and knowledge-base that teachers and students require to be successful in Florida's educational system.

Accomplished Practices: # 1.5, 2.8, 4.1, 4.2, 4.4, 5.5, 5.6, 7.2, 7.3, 7.5, 7.7, 8.1, 8.3, 10.1, 10.2, 10.6, 10.7, 10.13, 12.3

Subject Area Competencies & Skills: 1.3, 4.1, 7.2, 7.3, 8.2, 8.4, 8.5, 10.1, 10.2, 10.3, 14.2

NCATE: 1b

ESOL Competencies: # 5.4, 12.5, 16.2, 17.1; 17.5

Psychological Foundations Competencies: # 1, 2, 3, 4

Sociological Foundations Competencies: # 4

NMSAPBS: 5.4, 12.5, 16.2, 17.1; 17.5

Project Name and Assessment Tool	Conceptual Framework Outcomes (Characteristics)	Course SLOs	NCATE Standards	FEAPs	Comps & Skills	TESOL Performance Standards
Science Education Thematic Unit Plan	Critical Thinker Decision Maker	1, 2, 3	1, 4	1.5, 2.8, 4.1, 4.2, 4.4, 5.5, 5.6, 7.2, 7.3, 7.5, 7.7, 8.1, 8.3, 10.1, 10.2, 10.6, 10.7, 10.13, 12.3	PEC 1, 4, 7, 8, 10, 14	2, 3, 4, 5, 6, 16, 17, and 25

Key Assignments and Critical Tasks: To monitor your progress in this teacher preparation program, Key Assignments are required. Key Assignments are specific learning activities that directly relate to the course and program learning outcomes. A passing grade (70% or higher) is required on each of the student learning outcomes identified on the assignment in order to receive a grade for the course and advance in the teacher education program. (Specific details are provided in your Teacher Education Handbook.) The Thematic Science Unit is a Key Assignment/Critical Task for this course.

Expectations and Grading Policy

Prepare to spend seven (7) to nine (9) hours per week for this online course 1) regularly logging in and actively participating in discussions and asynchronous sessions, 2) watching, processing, and analyzing videos , 3) reading and analyzing books and articles, and 4) preparing and timely submitting assignments and activities.

Course Evaluation & Grading will be based upon a student's performance as evidenced by the course requirements. The grading structure of this course is arranged according to a point structure. You earn a letter grade for each component or requirement of the class that you meet, and your overall grade is weighted so that the final grade represents a stated portion of different types of work. This is elucidated in further detail on the assignments table below.

Assignment	Date	Value	Grading
<u>Quick Writes, Activities, & Discussions</u>	Ongoing	15 %	
<u>Quiz 1 (teaching science)</u>	Weeks 5	15 %	A = 4.00 (97) 93 – 100 % A- = 3.67 (91) 90 – 92 % B+ = 3.33 (88) 87 – 89 %
<u>Converted Inquiry Lesson</u>	Week 7	10 %	B = 3.00 (84.5) 83 – 86 % B- = 2.67 (81) 80 – 82 % C+ = 2.33 (78) 77 – 79 %
<u>Quiz 2 (science content)</u>	Week 9	15 %	C = 2.00 (74.5) 73 – 76 % C- = 1.67 (71) 70 – 72 % D+ = 1.33 (68) 67 – 69 %
<u>Multiday Guided Inquiry Lesson</u>	Week 13	15 %	D = 1.00 (64.5) 63 – 66 % D- = 1.00 (61) 60 – 62 % F = 0.00 (50) below 60 %
<u>Science Education Thematic Unit Plan</u>	Ongoing	30 %	
FINAL GRADE	Out of	100 points	

NOTE: Students who complete each assignment should not assume full credit will be given. The *quality* of the assignment will be considered during the evaluation process. Quality refers, but is not necessarily limited, to the following: Standard English usage (punctuation, spelling, grammar, etc.), neatness, manner of presentation, organization, and APA guidelines.

Assignment	Description
<u>Quick Writes, Activities, & Discussions</u>	You are expected to have read the assigned readings each week. This is essential for demonstrating evidence that you have read and thought about the main ideas presented in the readings. Quick writes consist of responses to questions about the readings and other thoughts you might have about them. It is your responsibility to ask specific questions about any readings that are not clear to you. You will conduct several science activities (experiments or investigations) and then reflect on experiencing learning science through inquiry activities. The expectation is that you demonstrate active learning through quick writes, activities, & discussions by making connections to assigned readings and learning experiences, and tying together theory and field experiences to online discussions.
<u>Quiz 1</u>	The first quiz covers mainly pedagogy in the science classroom.

<u>Converted Inquiry Lessons</u>	Convert a lesson into a 5E inquiry lesson.
<u>Quiz 2</u>	The second quiz covers mostly science content and teaching strategies.
<u>Multi-day Guided Inquiry Lesson</u>	Prepare a science lesson using the Backward Design framework and 6E principles that meet curricular objectives and state and national standards from some ideas elementary students learn within the lesson. The lessons include components as described on the assessment rubric. Lessons contain such elements as: objectives (mapped to state or national standards), a project rationale, the theoretical basis for the project, a learning progression, assessment strategies, related resources, differentiation for students with special needs, technological tools, and background/conceptual content understanding.
<u>Science Education Thematic Unit Plan</u>	Design a thematic science unit that includes components as described on a separate rubric. Generally, this is a plan for teaching a big idea in a minimum of two weeks (and maximum of six weeks). This assignment contains such elements as a detailed summary of the unit, weekly schedule, resource list, a detailed learning progression, an essential or driving question, an inquiry lesson plan, 4 centers (1 connected to language arts, 1 to mathematics, and 1 incorporating technology), and suggestions for diverse learners. The unit should be designed around a project that drives student learning.

Academic Integrity

Expectations for Academic Conduct/Plagiarism Policy: The University of West Florida is dedicated to the highest principles and standards of academic integrity. An academic violation by a student can negatively impact a class, program and/or college in ways that are unique to each discipline. . . . Academic integrity is closely related to professional ethics and requires that students honestly acknowledge their use of the ideas, words, and written work produced by any other individual, institution or source. Failure to acknowledge properly the use of another’s intellectual output constitutes a form of academic misconduct.

Note: [Academic Conduct Policy](#) is located on page 46 of the Student Life Handbook: ([Web Site](#)) | ([PDF Format](#)). A helpful plagiarism brochure is located online at <http://uwf.edu/StudentAffairs/division/publications/PlagBroch.pdf> and the plagiarism policy can be found online at <http://uwf.edu/cas/aasr/Plagiarism.pdf>.

Accommodations, Communication, Class Participation and Attendance

Students with Disabilities: The [Student Disability Resource Center \(SDRC\)](#) at the University of West Florida supports an inclusive learning environment for all students. If there are aspects of the instruction or design of this course that hinder your full participation, such as time-limited exams, inaccessible web content, or the use of non-captioned videos and podcasts, please notify the instructor or the SDRC as soon as possible. You may contact the SDRC office by e-mail at sdrc@uwf.edu or by phone at (850) 474-2387. Appropriate academic accommodations will be determined based on the documented needs of the individual.

Email & Proper E-mail Netiquette: *Use UWF e-mail* for all correspondence. Students are expected to check e-mail on a frequent and regular basis (a minimum of two to three times weekly) in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that e-mail be checked daily. Students are expected to check the eLearning daily for announcements. Please identify yourself by first and last name and indicate the nature of your email (i.e. concerns, questions, comments, assignments or grades).

Class participation is a factor in this course, and you are expected to actively participate in discussion boards. Treat your classmates and your instructor respectfully. As a student in this course you are expected to

participate as an active member of the learning community. As such, we all need to help each other with general questions by posting and responding to the and post helpful responses to the Discussion Forum (Questions Answer and Suggestions) – QAS. Everyone in our class should access and read discussion postings several times a week.

The two class rules are 1) You can do anything you want as long as you do not cause a problem for anyone (including me and you) in the class. If there is a problem, I will do something. What I do will depend on you, the problem, and what you are willing to do to solve the problem. 2) Any concerns or issues should first be brought to the attention of your instructor/professor. If you have a concern or issue, make me aware by politely communicating the nature of the problem. For instance, you could email "I would like to speak with you about my grade on the first assignment." I am confident that through open communication we can resolve any problems that may arise during this course.

Attendance is expected and assumed. To do well in this course, you must complete your assignments fully and submit as requested. Unless otherwise noted, all assignments must be completed individually. Weekly assignments are described and outlined in the content pages for each session. To comply with course requirements and be credited for assignments, you will need to read through all components of each session.

- Attendance is defined as the act of attending and is active not passive. To attend in this class implies being prepared for and participating in virtual discussions on course web site in a timely fashion, collaborating with classmates and completing various aspects of class assignments, and demonstrating a positive disposition.
- Excused Absences are not necessary since this course is fully online. Plan out your week in advance so that you can dedicate 7 to 9 hours/week around your other weekly obligations. Since a two (2) day (48 hour) grace period is provided on assignments, no excuses are granted due to sickness, jury duty, religious holiday's, technical difficulties, etc.
- Extended Excused Absences and Incompletes are granted on a very limited basis. Students must notify course instructor prior to or immediately after any incident to be considered for a standard three day extended excused absence (i.e. hospital stay, death of an immediate family member, etc.) or an incomplete.

Pandemic and Severe Weather Policy: In the event of a weather related (i.e. hurricane), pandemic or similar emergency, the university may still require professors to go ahead with their courses, in which case we will continue class over the internet using eLearning, email, etc. Official closures and delays are announced on the UWF website and broadcast on WUWF-FM (88.1 MHz).

Late Work Policy: I grade for full points when assignments are turned in on time, and with the exception of assignments submitted late, seek to provide feedback within one week. Unless otherwise indicated, all deliverables are due by Sunday at noon central standard time. That is, homework in Week 2 is due before noon the Sunday that begins Week 3, and so on going forward. Late assignments will begin to incur a penalty if submitted after 48 hours. The purpose of providing a 48 hour grace period for submitting assignments is to prevent requests for extensions for sickness, jury duty, religious holiday, technical difficulties, etc. Students must notify course instructor prior to or immediately after any incident to be considered for a standard three day extended excused absence (i.e. long deployment military duty, hospital stay, death of an immediate family member, etc.). Extended excused documentation is required and should be uploaded to the "Medical Excuses/Military Leave" dropbox. Unexcused late assignments, if accepted at instructor's discretion, will incur at least a 30% and no more than 50% late penalty.

Grades of Incomplete will be granted only on rare occasions. This must be initiated by the student and prearranged prior to the twelfth week of class. A formal contract will have to be written that outlines the conditions for completing what incomplete work and how it will be scored to calculate the final grade. The instructor may at his discretion file an "I" (Incomplete) when a student has not completed the work of a course by the time grades must be submitted, but has completed the majority of the work at a passing level and has a written agreement with the instructor and the department regarding completion of the work, including the nature of the work to be completed, the means by which the final grade will be determined, and the date by

which the work must be completed. The completion date may be no later than one year from the end of the semester in which the student took the course. The agreement shall also specify a default grade to be received if the work is not completed by the date indicated. One copy of the agreement shall be retained by the instructor, one shall be given to the student, and one shall be filed with the department office.

Dropping the Course: The last day to drop a course from this semester is 1/11/13. The last day to withdraw from a course this semester with a partial refund and a grade of “WR” is 2/1/13. The last day to withdraw from a course this semester with no refund of tuition or fees and a grade of “W” is 3/22/13.

Tentative Schedule

Revisions may be required - please check eLearning regularly for updates and changes!

- **Flexible Syllabus:** This syllabus is a tentative agreement between the professor and the student enrolled in the course and in no way represents a binding contract. The professor reserves the right to make changes to this document if needed. Students are responsible for recording any changes on their syllabi.
- A *tentative* semester overview is provided with this handout. Every attempt will be made to adhere to the schedule provided, but the instructor reserves the right to make changes as needed. Announcements about these changes will be made in class and posted to the course web site.

Class	Date	Topic of Focus	Assignments Due	Readings Due
Week 1	1/7	Introduction Nature of Science & Literacy	Syllabus Review Discussion 1	Syllabus; Pecore2013 Ch1, 2, 3; Hanusein2009; Schwartz2007
Week 2	1/14	Inquiry	Quick Write 1	Pecore2013 Ch4; Harris2008; Banchi2008
Week 3	1/22	Scientific Skills	Activity 1	Pecore2013 Ch13; Finson2010
Week 4	1/28	Learning Plan	Discussion 2	Pecore2013 Ch 5; Wiggins2001; Zemelman1998 Ch5
Week 5	2/4	Assessment and Questioning	Quiz 1	Pecore2013 Ch6; Hodges2005; Furtak2005; Newton2002
Week 6	2/11	Life Science	Quick Write 2	Pecore2013 Ch7, 8; Lowery2000 p.59-67
Week 7	2/19	Earth Space Science	Activity 2	Pecore2013 Ch9, 10; Lowery2000 p.71-77
Week 8	2/25	Physical Science	Converted Inquiry Lesson	Pecore2013 Ch11; Lowery2000 p.45-51
Week 9	3/4	Cross Cutting Ideas	Quiz 2	Michaels2007Ch4
Week 10	3/18	Unit Planning	SETUP OVERVIEW	Shepardson2000; Olson2008
Week 11	3/25	Diverse Learners	Discussion 3	Pecore2013 Ch 14; Hogan2001
Week 12	4/1	Safe Classroom	Quick Write 3	Pecore2013 Ch15; Wolfgang2009; Poon2009; Davis
Week 13	4/8	Citizen Science	Guided Inquiry Lesson	Pecore2013Ch16
Week 14	4/15	Resources and Technology	Citizen Science Center	Pecore2013Ch12
Week 15	4/22	Professional Development	Activity 3	Pecore2013 Ch17, 18
	4/29	Final	Final SETUP	

Study Suggestions: At the end of each chapter there is a summary, which will help you focus on what is important in the chapter. Reviewing the Chapter is helpful because it will provide you with the subject matter and reference it to the page(s) in the chapter where it can be found.

Course Materials:

A number of the assigned course readings are from the journals *Science and Children* and *Science Scope* published by the National Science Teachers Association (NSTA). Hopefully, you will find these journals a valuable resource and will consider joining the NSTA as a *student member*. Go to https://secure.nsta.org/membership/new_member.aspx. Fill in and submit the on-line form. Be sure to select “Student” for the \$35 membership rate.

Course Website: In this class we use eLearning – a Web-based course management system with password-protected access through MyUWF.edu – to distribute course materials, to communicate and collaborate online, to post grades, to submit assignments, and to give you online quizzes and surveys. You can get support for using eLearning from the “technology Self-help Resources” folder at MyUWF.edu and from <http://uwf.edu/helpdesk>.

Required Material

Special Technology Utilized by Students: This course is totally online. All instructional content and interaction takes place over the WWW. In addition to baseline word processing skills and sending/receiving email with attachments, students will be expected to search the Internet and upload / download files. Students may also need one or more plug-ins, please refer to the content in the first week of class for details.

- TK20 Subscription available directly at <http://uwf.tk20.com> or through the UWF campus bookstore
- Student Access Kits (ISBN 0-9774408-1-8)
- Word processor. Consider using Evernote (downloadable for free at evernote.com) for your Journal
- eLearning access

Accessibility Resources: Follow this link for information on [accessibility settings in eLearning](#). Follow this link for information on [accessibility features in UWF's Learning Management System \(LMS\), Desire2Learn](#).

Required Text

Pecore, J. L. (2013). *Teaching Science in the Elementary School (K-6)*. Pearson Learning Solutions.
ISBN: 978-1-26-90663-27

Readings

- Banchi, H & Bell, R. (2008). The many levels of inquiry. *Science and Children*, 46(2), 26-29.
- Davis, B., Firebaugh, J., Harding, D., Lundgren, K., Mecca P., & Schoen, L. Science and Safety: It's Elementary! Calendar. Council of State Science Supervisors. http://www.csss-science.org/downloads/scisaf_cal.pdf
- Finson, K. D. (2010). Inference or observation? *Science and Children*, 48(2), 44-47.
- Furtak, E.M. & Ruiz-Primo, M.A. (2005). The questioning cycle. *Science Scope*, 28(4), 22-25.
- Hanuscin, D. L. & Lee, E. J. (2009). Helping students understand the nature of science. *Science and Children*, 46(7), 64-65.
- Harris, R. & Burke, K. (2008). Developing the essential features of inquiry. *Science Scope*, 32(1), 40-46.
- Hess, K. (2010, February). Using Learning Progressions to Monitor Progress Across Grades. *Science and Children*, 47(6), 57-61.
- Hodges, W., Lamb, P., Brown, H., & Foy, D. (2005). Assessment for all. *Science Scope*, 28(4), 44-45.
- Hogan, K. & Corey, C. (2001). Viewing classrooms as cultural contexts for fostering scientific literacy. *Anthropology & Education Quarterly*, 32(2), 214-243.
- Lowery, L. F. (Ed.). (2000). Selected chapters in *Pathways to the science standards: Elementary school edition*. Arlington, VA: NSTA Press.
- Michaels, S., Shouse, A. W., Schweingruber, H. A. (2007). Chapter 4: Organizing Science Education Around Core Concepts. *Ready, Set, Science!: Putting Research to Work in K-8 Science Classrooms*, (59- 86). Arlington, VA: NSTA Press.
- Newton, L. (2002). Questions that help children understand elementary science. *Investigating*, 18(2), 6-9.
- Olson, J. (2008). Concept-focused teaching: Using big ideas to guide instruction in science. *Science and Children*,

- (46)1, 45-49.
- Olson, J. (2008). The science representation continuum. *Science and Children*, (46)1, 52-55.
- Poon, C., Tan, D., & Tan, A. (2009). Classroom management and inquiry-based learning: Finding the balance. *Science Scope* 32(9), 18-21.
- Schwartz, R. (2007). What's in a word? How word choice can develop (mis)conceptions about the nature of science. *Science Scope* 31(2), 42-47.
- Shepardson, D. P., Britsch, S. J. (2000). Analyzing children's science journals. *Science and Children*, (38)3, 29-33.
- Wiggins, G. and McTighe, T. (2001). Selected readings in *Understanding by Design*. 1st edition, Upper Saddle River, NJ: Merrill Prentice Hall.
- Wolfgang, C. (2009). Managing science classrooms. *Science Scope*, 32(9), 14-17.
- Zemelman, S., Daniels, H., Hyde, A., Varner, W. (1998). Chapter 5: Best practice in science. In *Best Practice: New Standards for Teaching and Learning in America's Schools*. Portsmouth, New Hampshire: Heinemann.