

EED 435 Science in the Elementary School  
 Required course for EC—4 & 4—8 Science Certification



College of Education

Department of Curriculum & Instruction

Fall 2007

**Enhancing the Future**

Through Educator Preparation

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Section .05 on Monday & Wednesday from 9:00 - 11:00 a.m. @ TUC

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**Dr. Hammer's Daily Schedule & Office Hours**

Monday	Tuesday	Wednesday	Thursday	Friday
EED 435.05 9:00 a.m. – 11:00 a.m. Room 314 <b>TUC</b>	EED 435.01 9:00 a.m. – 11:00 a.m. Room 251 TEC	EED 435.05 9:00 a.m. – 11:00 a.m. Room 314 <b>TUC</b>	EED 435.01 9:00 a.m. – 11:00 a.m. Room 251 TEC	Research & Writing 
DRIVE TIME & LUNCH Toastmasters 12:00 - 1:00	EED 435.02 11:00 a.m. - 1:00 p.m. Room 251 TEC	DRIVE TIME 	EED 435.02 11:00 a.m. - 1:00 p.m. Room 251 TEC	Research & Writing 
Faculty & Committee Meetings 2:00 -	Lunch 1:00 – 2:00	Lunch 1:00 - 2:00	Lunch 1:00- 2:00	Research & Writing
▼ ▼ ▼	Office Hours 5:00 p.m. – 6 p.m. @ TUC	Office Hours @ SHSU 2:00 – 4:00	Office Hours @ SHSU 2:00 – 4:00	Research & Writing
▼ ▼ ▼	SED 374.04 6:00 p.m. – 8:50 p.m. <b>TUC</b> Room			Research & Writing 

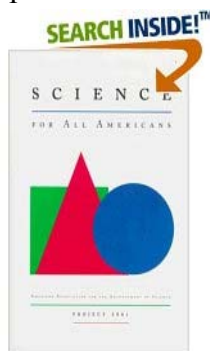
## A REDESIGN OF SCHOOL Factory Model vs. Information Age Model

"We need a complete re-design of the way we teach our children. This means we cannot begin with the system we now have. When Edison invented electric illumination, he didn't tinker with candles to make them burn better. Instead he created something brilliantly new: the light bulb.

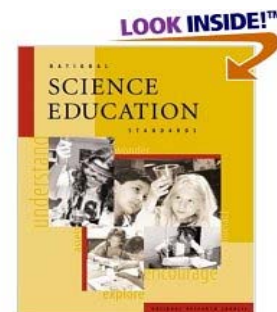
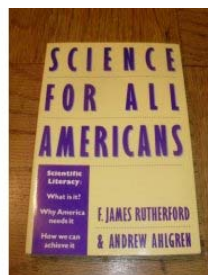
Chris Whittle  
Chairman, Whittle Communications, Tennessee

### Text/Readings

*Science for all Americans* has been published under two different covers. Both contain the same information. Older copies that you might buy second hand will look like the cream colored cover with blue lettering. More recent copies will have the geometric shapes on the cover. Both are the same inside.



*Science for all Americans*



*National Science Education Standards*

National Research Council. (1996). National science education standards. NSTA.  
<http://www.nap.edu/readingroom/books/nse/html/>  
ISBN: 0-309-05326-9

Rutherford, F. J. & Ahlgren A. (1990). Science for all Americans. AAAS/Oxford University Press: NY  
ISBN: 0-19-506771-1

*Project Learning Tree* (11<sup>th</sup> edition) America Forest Foundation. Available at a later date from professor.

Science TEKS Charts – Available from your professor

## RECOMMENDED TEXTBOOKS/RESOURCES

American Association for the Advancement of Science. (1993). *Benchmarks for science literacy*. New York. Oxford University Press. ISBN #0-19-58986.

Ostlund, K., & Mercier, S. (1996). *Rising to the challenge of the National Science Education Standards: The processes of science inquiry*. Primary or Elementary Edition. S&K Associates  
[http://www.sciencesbookreview.com/Rising\\_to\\_the\\_Challenge\\_of\\_the\\_National\\_Science\\_Education\\_Standards\\_The\\_Processes\\_of\\_Science\\_Inquiry\\_0965876802.html](http://www.sciencesbookreview.com/Rising_to_the_Challenge_of_the_National_Science_Education_Standards_The_Processes_of_Science_Inquiry_0965876802.html)

Nath, J. & Ramsey, J. (2004). *Preparing for the Texas PreK-4 Teacher Certification: A guide to the comprehensive TExES content areas exam*. Pearson Education, Inc.

National Research Council. (1996). National science education standards. NSTA. <http://www.nap.edu/readingroom/books/nses/html/>

National Science Teachers Association. (1997). *Pathways to the standards: Elementary school edition*. Lowery, L. (Ed.) NSTA. ISBN #0-87355-161.

## RECOMMENDED SCIENCE EDUCATION WEBSITES

Texas Council of Elementary Science	<a href="http://statweb.org/TCES/">http://statweb.org/TCES/</a>
National Science Foundation	<a href="http://stis.nsf.gov/start.htm">http://stis.nsf.gov/start.htm</a>
National Science Teachers Association	<a href="http://www.nsta.org">www.nsta.org</a>
Science Framework Toolkit	<a href="http://tenet.edu/teks/science">http://tenet.edu/teks/science</a>
Texas Education Agency	<a href="http://tea.state.tx">http://tea.state.tx</a>

## COURSE DESCRIPTION

This unique classroom and field-based experience is designed to acquaint the pre-service elementary teacher with a variety of instructional principles and practices for engaging children in the learning of relevant science concepts and skills. This course is intended to help you develop the knowledge, attitudes, and skills required for you, as a new teacher, to effectively nurture children's curiosity and guide them in exploring and learning about the fascinating world around them.

The nature of science as a discipline and the scope and sequence of appropriate content for each grade level will be explored. Active involvement in class projects and assignments will enable you to develop an understanding of curriculum, instructional methods and materials, and evaluation techniques for elementary science based upon educational research, contemporary practice, and state and national standards for science education. You will have opportunities to demonstrate your knowledge, attitudes, and skills both in class with your peers and with elementary students during your field placement. Personal reflection on class experiences and your learning is an expected component of your participation in this course.

The intent of this course is to immerse pre-service teachers in the culture and context of the elementary/middle school with the idea that both confidence and competence in science teaching is key. The role of the pre-service teacher throughout this experience is that of a learner and a teacher. The pre-service teacher works collaboratively with practicing EC-4 or 4-8 teachers.

### **IDEA Objectives**

#### **PROFESSIONAL DEVELOPMENT STANDARDS**

- Standards I.        The teacher designs instruction appropriate for all students that reflects an understanding of relevant content and is based on continuous and appropriate assessment.
- Standard II.        The teacher creates a classroom environment of respect and rapport that fosters a positive climate for learning, equity, and excellence.
- Standard III.        The teacher promotes student learning by providing responsive instruction that makes use of effective communication techniques, instructional strategies that actively engage students in the learning process, and timely, high quality feedback.

Standard IV. The teacher fulfills professional roles and responsibilities and adheres to legal and ethical requirements of the profession.

**Standards Matrix:**

**EED 435 Standards Matrix**

Objectives/Learning Outcomes	Activities *Indicate Field Based	Assessment	Standards
<ul style="list-style-type: none"> <li>• Understands the significance of the Texas Essential Knowledge and Skills (TEKS) and of prerequisite knowledge and skills in determining instructional goals and objectives.</li> <li>• Develops and understanding of historic events and documents instrumental in the development of science curriculum.</li> <li>• Become continuous, collaborative learners who demonstrate knowledgeable, reflective, and critical perspectives on their work, making informed decisions that integrate knowledge from a variety of sources.</li> <li>• Become informed advocates for sound educational practices.</li> </ul>	<p>History of Science Education (Where have we been? Where are we now? And Where are we going?)</p> <ul style="list-style-type: none"> <li>• “Alphabet Soup” Programs</li> <li>• SAPA</li> <li>• SCIS</li> <li>• ESS</li> <li>• FOSS</li> <li>• <i>Science for All Americans</i></li> <li>• <i>Project 2061</i></li> <li>• <i>National Science Education Standards</i></li> <li>• <i>Texas Essential Knowledge &amp; Skills for Science</i></li> <li>• Nature of Science, Science as Inquiry, and What it means to be scientifically literate (Power Points.)</li> </ul>	<p>Discussions and presentations using the collaborative Jigsaw Technique</p>	<p>PPR: 003, 007, 008 NAEYC: 5 NSTA:</p>

<ul style="list-style-type: none"> <li>Describe and identify appropriate components of science instruction.</li> <li>Identify examples of different instructional strategies.</li> </ul>	<p><b>Preparing for Inquiry Instruction</b></p> <p>Managing the science classroom:</p> <ul style="list-style-type: none"> <li>Lab safety</li> <li>Cooperative grouping</li> <li>Assigning lab jobs and responsibilities</li> <li>Handling equipment</li> </ul>	<p>Performance Lab Activity Sheets</p>	<p>PPR: 003, 007, 008  NAEYC: 1a, 1b, 1c, 2c, 4a, 4b, 4c, 4d  ACEI: 2c, 5a, 5c  TEXES: 020, 021, 022, 023  NSTA: 1, 8</p>
<ul style="list-style-type: none"> <li>Demonstrate ability to plan science-centered, thematic, inquiry-based, hands-on science lessons.</li> <li>Identify examples of different instructional strategies.</li> <li>Build meaningful curriculum</li> <li>Using developmentally effective approaches</li> </ul>	<p><b>Preparing for Inquiry Instruction &amp; Processes of Science</b></p> <p>In-class mini-labs</p> <ul style="list-style-type: none"> <li>Unknown Substances</li> <li>Using a Microscope</li> <li>Electro Magnets</li> <li>Squawking Cups</li> <li>Packing a Liquid Punch</li> <li>Classification Bags</li> </ul>	<p>Performance Lab Activity Sheets</p>	<p>PPR 003, 007, 008  NAEYC: 1a, 1b, 1c, 2c, 4a, 4b, 4c, 4d  TEXES: 020, 021, 022, 023  ACEI: 2c, 3e  NSTA: 1, 3, 5, 6, 9</p>
<ul style="list-style-type: none"> <li>Develop a scope and sequence based on state mandates (TEKS) for a grade level for one school year.</li> <li>Allocates time appropriately within lessons and units, and yearly plans including providing adequate opportunities for students to engage in reflection, self-assessment, and closure.</li> <li>Understands the connection between various</li> </ul>	<p><b>Planning</b>  Scope &amp; Sequence</p>	<p>Product Rubric-analytic rating scale</p>	<p>PPR: 003, 007, 008  NAEYC: 1a, 1b, 1c, 2c, 4a, 4b, 4c, 4d  TEXES: 020, 022, 023  ACEI: 1, 2c  NSTA: 6, 10</p>

<p>components of the Texas statewide assessment program, the TEKS, and instruction</p> <ul style="list-style-type: none"> <li>Using developmentally effective approaches</li> </ul>			
<ul style="list-style-type: none"> <li>Shows evidence of accurate qualitative and quantitative observations.</li> <li>Maintains data collection over extended period of time.</li> <li>Data presented in an organized fashion</li> <li>Relates personal experience to applications to the classroom; correlation with TEKS, and management issues with children.</li> </ul>	<p>Teaching Science through Inquiry</p> <p>Long Term Thematic Observations (Change over time) Activities: <u>Metamorphosis of Mealworms</u>, <u>Phases of the Moon</u>, or <u>Wisconsin Fast Plants™</u></p>	<p>Product Performance Rubric</p>	<p>PPR: 003, 007, 008 NAEYC TExES: 020, 022, 023 ACEI: 2c NSTA: 1, 3, 5, 6, 9</p>
	<p>*Assessment Science Eyes</p>	<p>Reflective Paper &amp; Science Eyes Glasses (Product)</p>	<p>PPR: 003, 007, 008 NAEYC: 5 TExES: 020, 021, 022, 023 NSTA</p>
<ul style="list-style-type: none"> <li>Plans lessons and structures units so that activities progress in a logical sequence and support stated instructional goals.</li> <li>Demonstrate ability to plan a science-centered thematic unit utilizing applicable science knowledge, skills,</li> </ul>	<p>Planning Creating a Science Unit</p>	<p>Rubric Product</p>	<p>PPR: 003, 007, 008 NAEYC: 1a, 1b, 1c, 2c, 4a, 4b, 4c, 4d TExES: 020, 021, 022, 023</p>

<p>and assessment.</p> <ul style="list-style-type: none"> <li>• Recognize the value of integrated lessons.</li> <li>• Allocates time appropriately within lessons and units, including providing adequate opportunities for students to engage in reflection, self-assessment, and closure.</li> <li>• Using developmentally effective approaches</li> </ul>			
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### **COURSE FORMAT:**

During the weekly classes, students will be involved in lecture or narrative presentations, small group discussions, virtual classroom visits through videotaped case studies, hands-on science activities (individual, paired, cooperative groups), inquiry activities, peer teaching, review of instructional resources, reflective journaling, lesson planning, supplemental professional development opportunities, etc. The field component of the course involves the student working with one or more mentor teachers at an assigned public school campus at a grade level corresponding with student's certification goals. See the schedule in your method's student's manual. The first part of your semester will be spent in the EED classroom. After that there will be a blending of EED classes with field experience leading to total field experience for a period of time. A blending once again will occur leading to full time EED classes at the end.

### **TEXES EC-4 Generalist Standards for Science:**

You will practice teaching using a constructivist curriculum designed to provide successful learning experiences for all the children. Through this actual classroom teaching experience, you will be practicing concepts from standards on the Pedagogy and Professional Responsibilities Standards (PPR) with particular emphasis on **planning and designing instruction**, **instructional strategies**, **informal and formal assessment**, and **managing the classroom**



**environment.** The class is also designed to address the following science standards from the EC - 4 Generalist & 4-8 Science Standards:

#### **The EC-4 and 4-8 science teacher**

- manages classroom field, and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens,
- understands the process of scientific inquiry and its role in science instruction,
- has theoretical and practical knowledge about teaching science and about how students learn,
- knows the varied and appropriate assessments and assessment practices to monitor science learning,
- understands the history and nature of science,
- how science effects the daily lives of students and how science interacts with and influences personal and societal decisions,
- knows and understands the science content appropriate to teach the statewide science framework (TEKS) in **physical, life, earth, and space science**; and,
- knows the unifying concepts and processes common to all sciences - **nature of science, constancy and change, systems, and properties, patterns, & models.**

#### **COURSE PHILOSOPHY & CONCEPTUAL FRAMEWORK**

Science Education is committed to the college's "Conceptual Framework for Teacher Preparation" because of its far-reaching effects in promoting science literacy. The desired attitudes, knowledge, and skills that form the objectives of its courses are best developed through extensive interactions among faculty, pre-service teachers, practicing teachers, administrators, colleagues, business/industry personnel, scientists, curators of museum, and governmental agents. Students are made aware of this collaboration by living it and reflecting on its worth in enhancing their learning and the role they should play as Science Education leaders.

#### **COURSE GOALS**

**The Science Methods course is designed to . . .**

1. Prepare prospective EC - 4 elementary teachers and/or 4-8 teachers to draw on a rich knowledge of **science content** and **pedagogy** in order

- to provide worthwhile and meaningful learning experiences for all children.
2. Develop pedagogical practices of prospective elementary teachers to create learner-centered classroom communities that emphasize the importance of science and technology in our everyday lives.
  3. Nurture the role of the elementary teacher as a reflective practitioner who is dedicated to student achievement, professional growth, and the process of life-long learning.
  4. Gain insights into various teaching methods that facilitate the science learning process.
  5. Acquire practical experience through observation, reflection, and participation in an authentic school setting.

### **COURSE OBJECTIVES:**

Students in this course will meet the following objectives, which are supported by NCATE guidelines and the science teacher competencies. The preservice teacher will . . .

1. Become familiar with local, state, and nationally developed standards and tools that describe and enhance the teaching of science.
2. Establish practical methods of managing science instruction.
3. Experience and develop hands-on/minds-on science lessons.
4. Become familiar with basic laboratory and instructional materials, equipment, and technology used in life, earth, and physical sciences and know how to use these resources effectively and appropriately.
5. Understand safety issues and procedures related to classroom science materials, equipment, and activities.
6. Understand process skills used to gather and organize data in science and apply this knowledge to explore and describe objects, organisms, and events in the environment.
7. Use technology to locate science-teaching resources, communicate ideas, and enhance student learning.

**GRADING POLICY** (NOTE: A minimum of 50% of the grade for this class is based on field experience related activities. Please check your Common Syllabus for this information)

The correlation between total points and letter grades for the course appears below:

Please Note: Students receiving a grade less than "C" either cumulatively or in field-based activities, will either not be recommended for student teaching or will be offered a professional growth plan that must be completed during student teaching.

<b>Assignments (Non-field-based)</b>	<b>Point Value</b>
Scope & Sequence (Individual Assignment)	35
Science Unit & Presentation of Unit(Group Assignment)	75
Science Notebook/Journal (Individual Assignments) <ul style="list-style-type: none"> <li>• Cover Design (20)</li> <li>• Science Eyes (30)</li> <li>• Long-term Observation(40)</li> <li>• In class attitude &amp; participation in activities &amp; labs (40)</li> <li>• Project Learning Tree reflections (40)</li> <li>• Educational Web Sites (20)</li> </ul>	190
Total	300

### **Assignment Descriptions**

**SCIENCE JOURNAL:** You will decorate a 3-ring notebook based on the theme "Science in My World." As part of your Methods Block, you will be required to keep a reflective journal of your classroom experiences. You should also record random thoughts that occur from time to time crystallizing your own views on educational issues. This notebook is where you should keep course handouts as well.

**SCIENCE EYES:** Students will develop their own pair of science eyes using various materials and then write a short essay on the evidence you find during your field experience of science taking place in your assigned school. You will address the need for a teacher to possess science eyes.

**SCOPE & SEQUENCE:** Students will learn to plan for the school year for science using the Texas Essential Knowledge & Skills (TEKS).

**SCIENCE UNIT DESCRIPTION:** You and your team members will work together this semester to create an exciting Interdisciplinary EC - 4<sup>th</sup> or Thematic 4 - 8<sup>th</sup> grade science unit. The unit will be submitted in two formats: a polished hard copy and an electronic version (CD or web-based). The unit showcases how you and your team were able to identify a target science TEKS and develop a set of five lesson plans/learning experiences with activities that help students attain a more complete understanding of that target TEKS. The five lesson plans/learning experiences, written in the Five E Instructional Model Lesson Plan Format, will be directly tied to a Final Learning Product and assessment rubric.

**LONG-TERM OBSERVATION:** Students will be expected to observe and document long-term observations such as mealworms, plant growth or moon phases.

**WEB RESOURCES:** You and your partner will spend class time in the computer lab. With your assigned partner, locate your assigned Web site and answer the questions on your worksheet. You will present your Web site to the class in a "guided tour" fashion.

### **Expectations:**

- Complete assigned reading prior to discussion of topics in class.
- Actively participate in all class activities and discussion.
- Turn in assignments and be prepared for presentations on the due date.
- Access the Internet and possess skills to use it.
- Check your e-mail and Blackboard for the course daily.
- Use a word processor to complete written assignments unless instructed otherwise. Use an easy to read font, no smaller than 12 point. Remember to use spell-check and grammar-check features and proofread your work.
- Ask questions if you are confused.
- Talk to your instructor if something is bothering you.
- Learn as much as you can.
- Have fun.

**WRITING CENTER**

Sam Houston Writing Center, located in Wilson 114, is open from 8 a.m. until 7 p.m. Monday-Thursday, 8 a.m. until 3 p.m. Friday, and 2 p.m. until 7 p.m. Sunday. Writing tutors will work with you one-on-one to help you generate, organize, or revise a draft of any assignment. Please drop by or call 936-294-3680 to schedule an appointment.