Elementary Science Methodology for the Inclusive Classroom (SCE 4310) was designed to assist prospective teachers to develop competence and confidence needed to teach science in elementary classrooms. This competence involves a level of understanding of the subject matter, basic principles and processes underlying the nature of science along with its historical and socio-cultural construction, and related subject specific pedagogy. Furthermore, the course will foster awareness in prospective teachers of the need to purposefully include practical strategies to encourage the diverse range of learners, including gifted, ESE and ELLs, in developing an appreciation for science.

Science educators, scientists and the public in general all agree that science is a powerful enterprise that can improve people’s lives in fundamental ways. For some students, science will become a lifelong vocation but for all students, science and scientific information will be crucial to their quality of life. It is therefore very important that elementary science lays the foundation of the ideas and practices of science by engaging students and facilitating learning experiences that model in important ways how scientists do science. This may necessitate a kind of science teaching that differs substantially from how science was approached in your K-6 classroom.

In this course, we will embrace current understanding of how learning occurs, the knowledge and reasoning skills that children eventually must acquire to be proficient in science, and we will practice such in simulated teaching with our peers. Furthermore, throughout the semester, as we focus on teaching and learning science in the elementary classroom, we will explore the following proficiencies: 1) Conceptual knowledge and understanding in science, 2) Abilities to participate in scientific inquiry and 3) Understanding the nature of science and scientific inquiry. Specifically, we will address issues such as: interpretation of the standards and their translation into meaningful teaching and learning activities, integration across curriculum, science in the inclusive classroom and alternative assessment. You will be expected to demonstrate knowledge of core science content knowledge relevant to the Sunshine State Standards and appropriate for the range of diverse learners in grades K-6. A variety of science topics will therefore form the context for each lesson with explicit connections to effective pedagogy as they relate to the diverse learning population in our schools. Some science content knowledge you would have identified as being difficult for you as a learner, others will be selected because of their relatedness to the existing public schools’ curriculum or, they might emerge from science content courses in which you are presently enrolled.

Required Text:
**Required Readings:**

Florida Next Generation Sunshine State Standards  

Carrier, K. A. (2005). Key issues for teaching English Language Learners in academic classrooms. *Middle School Journal, 37*(2), 4-9


**Suggested Readings:**


Eisenhower National Clearinghouse Safety and Science: It’s elementary!


Course Goals:

The course will provide opportunities for you to:

• Construct a vision of science teaching and learning, and assist you in projecting yourself as a professional into that vision.
• Develop a level of competence in planning and implementing K-6 science learning experiences consistent with current beliefs about the nature of science, science learning, the goals of elementary science and the mandates of the New Generation Sunshine State Standards.
• Develop a repertoire of science specific pedagogical strategies appropriate for learners, including gifted, ESE and ELLs, in the inclusive elementary classroom.
• Develop positive attitudes toward learning science content appropriate to elementary science curriculum.

To accomplish these goals, this course will focus on five primary areas:

i. The nature of science
ii. Conceptual knowledge and understanding in science
iii. Issues in teaching and learning science and integrating with Mathematics, Technology and other subjects in the elementary classroom
iv. The challenges facing elementary students in learning science
v. Inquiry science and the role of the elementary school teacher in preparing appropriate activities for all students, including gifted, ESE, and ELLs, to learn science.

Throughout the semester, you will be asked to reflect on and generate answers to the following questions:

• What is science?
• How do humans do science?
• How do elementary students learn science?
• What should elementary science be like?
• Why is it important for students to learn science in ways consistent with scientists?
• What activities promote meaningful learning while achieving the local, state and national standards?
• How can we effectively teach science to accommodate all students, including gifted, ESE, and ELLs?
• What is the teachers’ role in science teaching and learning?
• How can we use technology to facilitate inquiry science in elementary classrooms?
• How can assessment be re-framed to incorporate the notion of continuous science learning?

The epistemology of constructivism will be used to develop understanding of how and what students learn. You will need to develop skills in listening to, and understanding children as they experience science. You will be expected to listen carefully to children as they make sense of their environment through the learning of science. Observations of teaching and learning in elementary classrooms and regular discussions with your colleagues will provide the forum for thinking about alternative ways of creating learning opportunities for ALL students.

Integration across curriculum is an important component of teaching and learning in elementary schools. According to Piaget’s stages of cognitive development, elementary school children are in the pre-operational and concrete operational stages and are undergoing dramatic physical, mental and emotional growth. They are also constructing knowledge about their world in both formal and non-formal learning environments. Because of the nature of our environment and the impact of technology, much of the knowledge garnered in non-formal environments is integrated. We will therefore spend some time exploring how best to achieve integration across subjects in the formal classroom setting. The interdisciplinary approach along with other strategies is designed for you to become more effective in teaching science. The microteaching activities will then allow you to demonstrate the level of competence
you have developed in planning and implementing a science lesson inclusive of strategies developed during the semester.

**The level of success this semester depends on YOU.** What you bring to the course and what you hope to learn from the interactions are very important. We will endeavor to provide many appropriate experiences based on your needs and the needs of your learners in the years to come.

**Expectations for classroom behavior** (list adapted from *Innovator*, Vol. 4, No 1, Summer 98)

Each student is expected to exhibit courteous, mature, and professional behavior. Violation of the following and other inappropriate and irresponsible behaviors will lead to a deduction in your final grade.

- Cheating or otherwise presenting another person’s work as your own*
- Turning assignments in late
- Talking when someone else - a peer or a teacher - is speaking
- Exhibiting a challenging, arrogant, or insolent manner
- Making late and noisy entrances - or exits - from the classroom
- Displaying active disinterest in class (e.g., sleeping, walking out)
- Packing up books and papers before the class officially ends
- Putting down or disrespecting other students
- Asking irrelevant questions as an annoyance
- Not being prepared for class
- Not listening to announcement or lectures and then asking others about the information presented
- Doing work for another course during class-time
- Refusing to participate in activities
- Exhibiting lack of awareness of acceptable behavior (e.g., eating or drinking in class, passing notes)
- Being slow to move into or out of groups
- Being disrespectful

**Using cell phones is not allowed during class. They MUST BE turned off during the 3-hour contact period.**

**Policy on Instructional Modifications:**

Students with disabilities, who need reasonable modifications to complete assignments successfully and otherwise satisfy course criteria, are encouraged to meet with the instructor as early in the course as possible and to identify and plan specific accommodations. Student will be asked to supply a letter from the Office for Students with Disabilities to assist in planning modifications.

**General Notes:**

I do not give incompletes, a grade of (I), except in extremely unusual circumstances. It is up to you to plan accordingly and finish all work during the scope of this course. Assignments should be presented in a neat and concise manner. The amount of time devoted to assignments is always reflected in the final product (and in your grade). Consider what you expect in terms of quality from your students when you are teaching.

You are expected to conform to all policies of the University of Florida and work within the honor code. * Procedures for academic dishonesty will be followed, see the University of Florida Honor Code [http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php](http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php). You are expected to follow the University of Florida's Acceptable Use Policy regarding the use of computing resources [http://www.it.ufl.edu/policies/aupolicy.html](http://www.it.ufl.edu/policies/aupolicy.html)
Computer Policy:

The College of Education has adopted the policy statement given below for students enrolled in education courses. One implication of this statement is that students’ work, particularly take-home assignments, should be done in a professional manner.

The College of Education (COE) requires students in its courses to be able to use a computer to perform the required tasks and assignments needed to meet course objectives and goals. The college is a multi-platform computing environment consisting of Windows and Macintosh computers. Computer requirements vary by major and will be updated as the computing environment continues to change. In general, students can expect to need access to a computer capable of generating printed output and running the most current versions of software for Internet access, word processing, database operations, computer generated slide shows, statistical analysis and multimedia authoring software. It is also expected that the computer will have video and audio capabilities. The CIRCA and Media Labs located in the basement of Norman Hall provide students with access to these services. However, due to lab hours and available resources, a computer may not always be available for every student, so access to another computer with these capabilities may be required to complete course work. You may read this policy in full at http://education.ufl.edu/technology/coe-computer-policy/
Course Requirements:

The following are requirements for successful completion of the course.

a). Regular attendance is a must for completion of this course. Points will be lost for each unexcused absence and regular lateness. Excused absences include a doctor’s note, other official documentation and, or notifying your instructor by e-mail or phone PRIOR to any class you must miss.

b). Complete course assignments in a timely and thorough manner - assignments will lose 2 points each day, after the due date. **Make-ups for missed assessments will not be allowed.**

c). In this course, the assignment, **Alternative Conceptions Lesson Plan**, has been selected as a “Key Task” that will assess your mastery of knowledge, skills, and/or dispositions that the State of Florida requires of all entry-level educators. This assignment was specifically selected as Key Task because it aligns with the 6 Florida Educator Accomplished Practices (FEAPs).

Your mastery of each Indicator will be measured by your performance on a Key Task. To pass this course, you must successfully complete the Key Task and receive a rating of “Developing,” “Accomplished,” or “Exceptional.” No exceptions will be made to this rule, even if you do not plan to practice in Florida after graduation or do not apply for state certification.

Students who receive an “Unsatisfactory” rating will be offered a chance to redo the Key Task or, in some cases, to complete a comparable task assigned by the instructor. Students who do not complete their makeup work satisfactorily will receive a failing grade at the instructor’s discretion.

**ESOL Standards and Performance Indicators:**

In this course, content and specific experiences will be provided to satisfy the following ESOL standards and performance indicators as part of the infused ESOL Program in the Unified Elementary and Early Childhood Programs (PROTEACH).

<table>
<thead>
<tr>
<th>SCE 4310</th>
<th>Standard 1</th>
<th>Standard 2</th>
<th>Standard 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain 1</td>
<td>1.1 a, 1.1c</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Domain 2</td>
<td></td>
<td>2.2c</td>
<td>2.3a, 2.3d</td>
</tr>
<tr>
<td>Domain 3</td>
<td>3.2a-f, 3.2j</td>
<td></td>
<td>3.3a-c</td>
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<tr>
<td>Domain 4</td>
<td>4.1a, 4.1c</td>
<td>4.2a-c</td>
<td>N/A</td>
</tr>
<tr>
<td>Domain 5</td>
<td>5.1b, 5.1d</td>
<td></td>
<td>5.3c</td>
</tr>
</tbody>
</table>

**Domain 1: Culture (Cross-Cultural Communications)**

**Standard 1: Culture as a Factor in ELLs’ Learning.**

Teachers will know and apply understanding of theories related to the effect of culture in language learning and school achievement for ELLs from diverse backgrounds. Teachers will identify and understand the nature and role of culture, cultural groups, and individual cultural identities.

**Performance Indicators**

1.1. a. Understand and apply knowledge about cultural values and beliefs in the context of teaching and learning of ELLs, from diverse backgrounds and at varying English proficiency levels.

1.1.c. Use a range of resources in learning about the cultural experiences of ELLs and their families to guide curriculum development and instruction.
Domain 2: Language and Literacy (Applied Linguistics)

Standard 2: Language Acquisition and Development.
Teachers will understand and apply theories and research on second language acquisition and development to support ELLs’ learning.

Performance Indicators
2.2.c. Understand and apply knowledge of sociocultural, sociopolitical, and psychological variables to facilitate ELLs’ learning of English.

Standard 3: Second Language Literacy Development.
Teachers will demonstrate an understanding of the components of literacy, and will understand and apply theories of second language literacy development to support ELLs’ learning.

Performance Indicators
2.3.a. Understand and apply current theories of second language reading and writing development for ELLs from diverse backgrounds and at varying English proficiency levels.
2.3.d. Understand and apply knowledge of sociocultural, sociopolitical, and psychological variables to facilitate ELLs’ L2 literacy development in English.

Domain 3: Methods of Teaching English to Speakers of Other Languages (ESOL)

Standard 2: Standards-Based ESL and Content Instruction.
Teachers will know, manage and implement a variety of teaching strategies and techniques for developing and integrating ELLs’ English listening, speaking, reading, and writing skills. The teacher will support ELLs’ access to the core curriculum by teaching language through academic content.

Performance Indicators
3.2.a. Organize learning around standards-based content and language learning objectives for students from diverse backgrounds and at varying English proficiency levels.
3.2.b. Develop ELLs’ L2 listening skills for a variety of academic and social purposes.
3.2.c. Develop ELLs’ L2 speaking skills for a variety of academic and social purposes.
3.2.d. Provide standards-based instruction that builds upon ELLs’ oral English to support learning to read and write in English.
3.2.e. Provide standards-based reading instruction appropriate for ELLs from diverse backgrounds and at varying English proficiency levels.
3.2.f. Provide standards-based writing instruction appropriate for ELLs from diverse backgrounds and at varying English proficiency levels.
3.2.j. Incorporate activities, tasks, and assignments that develop authentic uses of the second language and literacy to assist ELLs in learning academic vocabulary and content-area material.

Standard 3: Effective Use of Resources and Technologies.
Teachers will be familiar with and be able to select, adapt and use a wide range of standards-based materials, resources, and technologies.

Performance Indicators
3.3.a. Use culturally responsive/sensitive, age-appropriate and linguistically accessible materials for ELLs of diverse backgrounds and varying English proficiency levels.
3.3.b. Use a variety of materials and other resources, including L1 resources, for ELLs to develop language and content-area skills.
3.3.c. Use technological resources (e.g., Web, software, computers, and related media) to enhance language and content-area instruction for ELLs of diverse backgrounds and varying English proficiency levels.

**Domain 4: ESOL Curriculum and Materials Development**

**Standard 1: Planning for Standards-Based Instruction of ELLs.**
Teachers will know, understand, and apply concepts, research, best practices, and evidenced-based strategies to plan classroom instruction in a supportive learning environment for ELLs. The teacher will plan for multilevel classrooms with learners from diverse backgrounds using a standards-based ESOL curriculum.

**Performance Indicators**
4.1.a. Plan for integrated standards-based ESOL and language sensitive content instruction.
4.1.c. Plan differentiated learning experiences based on assessment of students’ English and L1 proficiency and integrating ELLs’ cultural background knowledge, learning styles, and prior formal educational experiences.

**Standard 2: Instructional Resources and Technology.**
Teachers will know, select, and adapt a wide range of standards-based materials, resources, and technologies.

**Performance Indicators**
4.2.a. Select and adapt culturally responsive/sensitive, age-appropriate, and linguistically accessible materials.
4.2.b. Select and adapt a variety of materials and other resources including L1 resources, appropriate to ELLs’ developing English language and literacy.
4.2.c. Select technological resources (e.g., Web, software, computers, and related media) to enhance instruction for ELLs of diverse backgrounds and at varying English proficiency levels.

**Domain 5: Assessment (ESOL Testing and Evaluation)**

**Standard 1: Assessment Issues for ELLs.**
Teachers will understand and apply knowledge of assessment issues as they affect the learning of ELLs from diverse backgrounds and at varying English proficiency levels. Examples include cultural and linguistic bias; testing in two languages; sociopolitical and psychological factors; special education testing and assessing giftedness; the importance of standards; the difference between formative and summative assessment; and the difference between language proficiency and other types of assessment (e.g., standardized achievement tests). Teachers will also understand issues around accountability. This includes the implications of standardized assessment as opposed to performance-based assessments, and issues of accommodations in formal testing situations.

**Performance Indicators**
5.1.b. Identify a variety of assessment procedures appropriate for ELLs of diverse backgrounds and at varying English proficiency levels.
5.1.d. Demonstrate understanding of the advantages and limitations of assessments, including the array of accommodations allowed for ELLs of diverse backgrounds and at varying English proficiency levels.

**Standard 3: Classroom-Based Assessment for ELLs.**
Teachers will identify, develop, and use a variety of standards- and performance-based, formative and summative assessment tools and techniques to inform instruction and assess student learning. Teachers
will understand their uses for identification, placement, and demonstration of language growth of ELLs from diverse backgrounds and at varying English proficiency levels. Teachers will articulate the appropriateness of ELL assessments to stakeholders.

**Performance Indicators**

5.3.c. Use various tools and techniques to assess content-area learning (e.g., math, science, social studies) for ELLs at varying levels of English language and literacy development.

**ESOL Performance Standards:**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>ESOL Performance Indicators</th>
<th>Readings</th>
<th>Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will use inquiry-based science instruction to develop appropriate activities for ALL students, including gifted, ESE, and ELLs.</td>
<td>1.1a, 1.1c, 4.1a, 4.1c, 5.1b, 5.1d</td>
<td>1.) Bass, J. E., Contant, T. L., &amp; Carin, A. A. (2009). 2.) Lawrence, M. (2007). 3.) Carrier, K. (2005).</td>
<td>Readings, class discussions</td>
<td>Microteaching lesson plans, journal entries</td>
</tr>
<tr>
<td>Students will examine the role of the elementary teacher in preparing appropriate activities for ALL students to learn science, including gifted, ESE, and ELLs.</td>
<td>2.2 c, 2.2 a-f, 3.2 j 4.2 a-c</td>
<td>1) Bass, J. E., Contant, T. L., &amp; Carin, A. A. (2009). 2.) Medina-Jerez, et. al. (2007).</td>
<td>Readings, class discussions</td>
<td>Microteaching lesson plans, journal entries, alternative conceptions lesson plans</td>
</tr>
<tr>
<td>Students will discuss and develop appropriate assessments for ALL students, including gifted, ESE, and ELLs.</td>
<td>2.3 a, d, 5.3 c</td>
<td>1.) Bass, J. E., Contant, T. L., &amp; Carin, A. A. (2009). 2.) Hanson, L. (2006).</td>
<td>Readings, class discussions</td>
<td>Microteaching lesson plans, journal entries</td>
</tr>
</tbody>
</table>
Course Assignments

1. **Professional Commitment and Class Participation (10 points)**

   To demonstrate professional commitment, you must behave in a professional manner at all times. This includes but is not limited to being on time for classes, participating respectfully during lectures, discussion, collaborative group activities, and appropriately completing in-class and homework activities. It is assumed that you will act professionally during the course, and so you start out with the full ten points. It is up to you to keep them. Points will be deducted for unexcused absences (1 point/class), tardiness (1/2 point/class), lack of respectful participation (1/2 point/class), and lack of preparation for class (1/2 point/class).

2. **FEAPs Assignment: Alternative Conceptions Lesson Plan (50 points)**

   1) **Observe class:** You will obtain the lesson’s objectives and the related science benchmarks from the teacher. You will then observe one science lesson in a K-5 classroom, and carefully record observation notes of all class activities. The notes should include descriptions of the teaching and learning activities that occurred during the period.

   2) **Develop questions to identify alternative conceptions:** You will develop five questions (multiple choice, true/false, short answer) that you will use to identify students’ understanding of the specific science content knowledge in the lesson observed. The goal of these questions is to identify students’ alternative conceptions as they relate to the specific science content in the lesson you observed.

   3) **Administer questions and analyze responses:** You will administer the questions to at least five students in this class and analyze their responses. You will make claims about the alternative conceptions identified among the group of students using evidence from the surveys (e.g., quotes from students, number of correct/incorrect responses). These alternative conceptions should be clearly stated and addressed in the lesson plan in part 4.

   4) **Develop a lesson plan targeting alternative conceptions:** You will develop a lesson plan for re-teaching the same lesson. This lesson should be a modification of the lesson observed, and should specifically target the alternative conceptions identified. The plan should have all the components as discussed in class, inclusive of objectives, applicable standards/benchmarks, materials/resources, content knowledge and scientific skills, lesson development (see Conceptual Change strategy, p. 72), and summative assessment.

3. **ESOL Assignment: Language Learning Fair (20 points)**

   On our scheduled language learning fair day, you will bring an example of a product (adapted student handout, semantic map, word wall, vocabulary organizer, etc.) AND a supplementary material (realia, pictures, or supplementary texts) that would help a specific ELL to practice using academic language and learn science content in a K-5 setting. You will briefly explain how the product and supplementary material would support the science learning of the ELL (1 page, single-spaced).

4. **Lesson Planning, Microteaching & SRP (50 points)**

   With a partner, you will jointly plan and present one hands-on, minds-on inclusive inquiry lesson that addresses a selected benchmark from Florida’s New Generation Sunshine State Standards, and utilizes the framework and pedagogies discussed in the science methods course. This lesson plan will include
appropriate accommodations/modifications for ELLs as well as for students with at least one other named exceptionality. The lesson will be taught in a 40-minute segment. You will:

• Sign up with a partner (sign-ups will be available second week of class)
• Develop a written inclusive lesson plan (20 pts) using the requirements provided. Make all the necessary arrangements to acquire the materials and technologies needed to successfully implement the lesson.
• Teach (20 pts) the lesson to your class of peers.
• Complete the Self-Reflection Profile (10 pts) and submit electronically within ONE week after microteaching. ***Electronic copy of SRP will be provided.

5. Reflective Electronic Journal (20 points)
For this assignment, you will submit weekly summaries and reflective responses to assigned readings, class activities, and other assigned tasks to the course website. The first entry will focus on your personal philosophy of science teaching. The organization and specifics will be discussed in class.

6. Final Examination (50 points)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>93-100</td>
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<tr>
<td>A-</td>
<td>90-92</td>
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<tr>
<td>B+</td>
<td>87-89</td>
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<tr>
<td>B</td>
<td>83-86</td>
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<tr>
<td>B-</td>
<td>80-82</td>
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<tr>
<td>C+</td>
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<td>C</td>
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<td>C-</td>
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<td>D+</td>
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<td>D-</td>
<td>60-62</td>
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<td>E</td>
<td>Below 59</td>
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