EDUC 5309
Advanced Instructional Strategies

Fall 2014

INSTRUCTOR INFORMATION:

Instructor: David M. Sparks, Ed.D. Phone: 817-272-0716
Office: Science Hall Room 322F Fax: 817-272-2618
E-Mail: david.sparks@uta.edu Cell Phone: 903-826-0114

Office Hours: Email or phone/
By appointment
only

Faculty Profile: http://www.uta.edu/profiles/David-Sparks

COURSE INFORMATION:

Course Title: Advanced Instructional Strategies Emphasizing Science
Course Number: EDUC 5309-005
Semester: Academic Partnership Cohort/August 11, 2014 Start
Date
Course Location and Time: Online

CATALOG DESCRIPTION:

An examination of theory and research in curriculum development, implementation, and evaluation. Emphasis on current trends in the content area of science, namely inquiry based teaching and learning, and connections to state and national standards in science.

COURSE PREREQUISITES:

EDUC 5305 Curriculum Design and Implementation
Learning Outcomes

The general structure of this course engages students in active, inquiry-based science experiences that serve the purposes of a) learning to use research-based, proven science teaching practices according to state and national standards and b) translating science concepts into meaningful science learning experiences and readily usable curricula for K-12 students. This course is an extension of the prerequisite course, EDUC 5305 and engages students in more advanced studies of science education teaching, learning, research and curriculum. The specific goals of this course are as follows.

1. To revisit and extend our understanding of the nature of science, the purpose of education, and the nature of learners to help students learn in ways consistent with these research-based foundations of teaching and learning science and mathematics.

2. To further enhance understanding of the unique qualities of students, in terms of intellectual, social and emotional development, so we may be better prepared to accommodate to their learning needs.

3. To the inquiry model known as the learning cycle by experiencing the different forms of the model that are used in practice, and by effectively embedding other techniques and models within the learning cycle.

4. To examine long term project based learning modules toward the development and implementation of project based or problem based models that engage teachers in developing appropriate and meaningful learning experiences for students.

5. To analyze and interpret previous and current research in the fields of science and mathematics education and how such research informs teaching practice.

6. To become familiar with national and state science and mathematics associations as well as research and teaching resources in science and mathematics education to begin developing a foundation for continued professional growth and enhancement.

Conceptual Framework

The work of the College of Education is grounded in constructivism as a theory of teaching and learning and is done in a spirit of expectation that all involved in the College of Education, whether candidate, faculty or administrator, will hold the following as important: Excellence, Student-Centered Environments, Research, Collaboration, Diversity, Technology, Field Experiences and Life-Long Learning.

Partners for the Future serves as the theme of the College of Education and epitomizes the understanding that it takes a village of partners to insure the future of education for all.

Course Information

Course Title: Advanced Instructional Strategies Science and Mathematics Education
Course Number: EDUC 5309
Semester: Academic Partnership Cohort
Course Location and Time: Online
**Catalog Description**

This course engages students in a study of advanced models of teaching and learning such as concept attainment, inductive thinking, inquiry, problem-based learning, role play, simulation games and other models, with an analysis of research on the effectiveness of these models. Emphasis is on current trends in the content areas.

**Textbook(s) and Materials**

Articles and book chapters as assigned in each module and reserved through the UT Arlington Library Services in e-reserves under EDUC 5309 or Cavallo (course developer).

**Supplemental Web Sources:**


http://standards.nctm.org/document/appendix/numb.htm


http://www.tea.state.tx.us/rules/tac/chapter112/ch112a.html, and Subchapter B (middle school):
http://www.tea.state.tx.us/rules/tac/chapter112/ch112b.html

http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111a.html and Subchapter B (middle school):
http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111b.html

**Grades**

Students in this course will engage in and complete three distinct assessment activities that will be used to measure the attainment of course concepts. These assessment activities are Assignments, Discussions, and Reflections. An overview of these assessment activities are presented below. Detailed instructions and scoring rubrics for all assignments are included in the module for that assessment activity. The summary of grade distribution for assignments, discussions and reflections is as follows:

- Assignments: 75%
- Discussions: 15%
- Reflections: 10%
- **Total Grade: 100%**

**Grade Calculation**

The points earned will be transformed to percentages/100. The grading system as per UTA policy is as follows.

- A = 90 – 100
- B = 80 – 89
- C = 70 – 79
- D = 60 – 69
- F = Below 60
Policies

Class Attendance and Assignments. As this course is online it is expected that all students will access the learning modules as required and complete assignments, discussions, and reflections as directed in the module. Assignments are to be completed and submitted by the posted deadline.

Drop Policy. If you choose to withdraw from the course for any reason, you must follow University procedures. It is your responsibility to execute these procedures correctly and within the deadlines.

Student Expectations. This course is designed to engage students in active learning toward enhancing the knowledge and skills of science, math and pedagogy as would be expected for graduate level expertise. Full participation in course modules, assignments, discussions, reflections and inquiry investigations is expected and required.

Americans with Disabilities Act (ADA)
The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing me of your needs at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Dishonesty
It is the philosophy of UTA that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. I take scholastic dishonesty very seriously – if the excerpt below is unclear, see me. I consider copying directly from the text or Internet sites without proper citation as plagiarism. If in doubt, cite. I do not give credit for plagiarized assignments or cheating on exams and I will refer plagiarism to the Office of Student Judicial Affairs.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.” (Regents = Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)

Plagiarism
Plagiarism is the presentation of another person’s work as your own, whether you mean to or not! Copying or paraphrasing passages from another writer’s work without acknowledging that you’ve done so is plagiarism. Allowing another writer to write any part of your essay is plagiarism. Plagiarism is a serious offense. If you are suspected, you will be called before the Vice President for Student Affairs for disciplinary action. You will be given an incomplete for the course until your case is resolved. Plagiarism is easy to avoid. Simply acknowledge the source of any words, phrases or ideas that you use. If you’re not sure how to quote or paraphrase a source or if you need help with the format of endnotes or bibliographies, check with me. While you can (and should) seek the help and advice of friends, classmates, and tutors, be sure that your written work is completely your own.

To learn how to properly acknowledge sources, complete the UTA Library’s tutorial located at http://library.uta.edu/tutorials/Plagiarism/.
**Student Support Services**

The University supports a variety of student success programs to help you connect with the University and achieve academic success. They include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

**University Mission**

The mission of The University of Texas at Arlington is to pursue knowledge, truth and excellence in a student-centered academic community characterized by shared values, unity of purpose, diversity of opinion, mutual respect and social responsibility. The University is committed to lifelong learning through its academic and continuing education programs, to discovering new knowledge through research and to enhancing its position as a comprehensive educational institution with bachelor’s, master’s, doctoral and non-degree continuing education programs.

**College Mission**

The mission of the UTA College of Education is to develop and deliver educational programs that ensure the highest levels of teacher, administrator, and allied health science practitioner preparation and performance. As a recognized contributor to the fields of education and allied health science, the College engages in effective teaching, quality research, and meaningful service. The College is committed to diversity and to the advancement of active teaching and learning in all educational environments and at all levels.

**Core Values:** Effective Teaching, Active Learning, Quality Research, and Meaningful Service

**Title IX**

The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX).
<table>
<thead>
<tr>
<th>Class Module</th>
<th>Topic</th>
<th>Assignment</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>Overview of the Learning Cycle and its Theory Base</td>
<td>Readings (articles on e-Reserves)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Basic Instruction Strategies</td>
<td>Assignment 1: Analysis of Science Learning &amp; Reasoning</td>
<td>11:59 p.m. Sunday of Week 1</td>
</tr>
<tr>
<td></td>
<td>Introduction to Density</td>
<td>Assignment 2: Tests</td>
<td>11:59 p.m. Sunday of Week 1</td>
</tr>
<tr>
<td></td>
<td>Density Exploration</td>
<td>(Submit scanned images of your subjects’ tests for Assignment 1.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Density Term</td>
<td>Group Discussion</td>
<td>First post: Wednesday</td>
</tr>
<tr>
<td></td>
<td>Introduction</td>
<td>Class Discussion</td>
<td>Final post: Saturday</td>
</tr>
<tr>
<td></td>
<td>Density Application</td>
<td></td>
<td>11:59 PM designated day of Week 1</td>
</tr>
<tr>
<td></td>
<td>Density and Beyond</td>
<td>Reflections</td>
<td>11:59 p.m. Sunday of Week 1</td>
</tr>
<tr>
<td>Module 2</td>
<td>Using Lectures in Learning Cycles</td>
<td>Readings (article on e-Reserves)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Using Demonstrations</td>
<td>Assignment : Lawson’s Learning Cycles</td>
<td>11:59 p.m. Sunday of Week 2</td>
</tr>
<tr>
<td></td>
<td>Classroom Management for Inquiry-Based Activities</td>
<td>Group Discussion</td>
<td>First post: Friday</td>
</tr>
<tr>
<td></td>
<td>Wrap-Up/closure</td>
<td></td>
<td>Final post: Sunday</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11:59 p.m. designated day of Week 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reflections</td>
<td>11:59 p.m. Sunday of Week 2</td>
</tr>
</tbody>
</table>
### Module 3
**Instructional Models in the Learning Cycle**
(Week 3)

<table>
<thead>
<tr>
<th>“Sticking Together” Predict-Explain-Observe-Explain Model (PEOE)</th>
<th>Readings (articles on e-Reserves)</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generative Learning Model</td>
<td>Group Discussion</td>
<td>First post: Friday Final post: Sunday 11:59 p.m. designated day of Week 3</td>
</tr>
<tr>
<td>Children’s Learning in Science Model (CLIS)</td>
<td>Assignment :</td>
<td>11:59 p.m. Sunday of Week 3</td>
</tr>
<tr>
<td></td>
<td>Reflections</td>
<td>11:59 p.m. Sunday of Week 3</td>
</tr>
</tbody>
</table>

### Module 4
**Project-Based and Problem-Based Models**
(Week 4)

<table>
<thead>
<tr>
<th>Learning Cycles that Span Time and Disciplines “Bean Babies” “Bean Baggies” “Bean Sprouts”</th>
<th>Readings (articles on the Internet)</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Discussion</td>
<td>First post: Friday Final post: Sunday 11:59 p.m. designated day of Week 4</td>
</tr>
<tr>
<td></td>
<td>Assignment : Project-Based Learning</td>
<td>11:59 p.m. Sunday of Week 4</td>
</tr>
<tr>
<td></td>
<td>Reflections</td>
<td>11:59 p.m. Sunday of Week 4</td>
</tr>
</tbody>
</table>

### Module 5
**Math and Science Education Research**
(Week 5)

<table>
<thead>
<tr>
<th>The Heart Surgeon The Impact of Research on Math/Science Education Annenberg/CPB Math and Science Project Teacher Resources</th>
<th>Readings (articles on the Internet)</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group Discussion</td>
<td>11:59 p.m. Friday of Week 4</td>
</tr>
<tr>
<td></td>
<td>Assignment : Analysis of Learning Cycle</td>
<td>11:59 p.m. Friday of Week 5</td>
</tr>
<tr>
<td></td>
<td>Reflections</td>
<td>11:59 p.m. Friday of Week 5</td>
</tr>
</tbody>
</table>

### Course Assignments

**Analysis of Science Learning and Reasoning**

You will use the tests/questionnaires provided in the Resources section to assess three students/individuals (ages 9 through adult). Then, you will analyze each student's data, post the scores and general findings to the Discussion Board, and respond to the items on the matrix in this document to demonstrate analysis of students’ reasoning, learning, views, and needs and application of theories of learning and development.
The specific components of this assignment are:

1. The administration of tests and questionnaires that measure the individuals’ learning and development (Part A)
2. A report of the data/interview findings summarizing the individuals’ responses to questions (Part B)
3. A discussion of relationships of data/interview findings to theories of learning and development discussed in class (Piaget, Ausubel, Vygotsky) (Part C)
4. A discussion of suggestions and ideas for science teaching strategies that would be most appropriate for promoting learning for each individual interviewed (Part D)

Lawson’s Learning Cycles

For this assignment, you will review the three types of Learning Cycles described by Lawson (descriptive, empirical-inductive, hypothetical-deductive), then outline the Learning Cycles of each type in your subject. The essential difference among the three types is the “degree to which students either gather data in a purely descriptive fashion… or initially set out to test hypotheses in a controlled fashion” (Lawson, 1986). You will select topics that correlate to the goals of each type, and describe how each “fits” Lawson’s model.

You can review Lawson’s explanation of the three models at http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/34/96/23.pdf

Curriculum Models

A number of commercial products mirror the Learning Cycle model, including Full Option Science System and Great Explorations in Science and Math (FOSS and GEMS, Lawrence Hall of Science, University of California at Berkeley). Other curriculum models that foster discovery and critical thinking in students are Predict-Explain-Observe-Explain (PEOE), Generative Learning, and Children’s Learning in Science (CLIS).

For this assignment, you will select and complete one of these tasks:

- Option 1: Analysis of Curriculum Unit
  Find an existing Learning Cycle curriculum in your school, such as FOSS or GEMS, and critically critique a unit for consistency with the Learning Cycle.

- OR

- Option 2: Learning Cycle Incorporating Specific Model
  Outline a Learning Cycle in math or science that incorporates PEOE, Generative Learning, or CLIS model characteristics.

Project-Based Learning

Long-term, in-depth, and large-scale instructional models can be designed as constructivist-based Learning Cycles. Such projects generally span several weeks of instruction and incorporate various concepts, levels of a single concept, or interdisciplinary connections.

For this assignment, you will outline a long-term teaching/learning project for use in science and/or math teaching. Your project should reflect the Learning Cycle pedagogy, the way that children learn, and the true nature of science and math. It should utilize a number of activities that connect to one another and to applications or situations that are meaningful to students so they participate in meaningful learning.
Analysis of a Learning Cycle
You will review the “Cycling through Plants” Learning Cycle that was presented in this module and the math and science education concepts that you have studied throughout the module. Then you will analyze the design of the Learning Cycle and the features of the specific activities by applying what you have learned about math and science education research, gender issues, and the future of math and science in the nation.

Assignments: 75%

Course Discussions and Reflections:
In addition to the more formal course assignments, students are to engage in more informal Discussions and Reflections as indicated within the modules of this course.
Discussions involve electronic exchange of ideas with peers in the course via the Discussion Board on specific topics as indicated in each learning module.

Discussions: 15%

Reflections are informal, yet personal and reflective analysis of course activities and content to be electronically submitted.

Reflections: 10%