BEEP 4311: Math and Science in Dual Language Settings  

Fall 2009

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Program Web Site: http://www.uta.edu/coed/bilingual/

Course Website: http://webct.uta.edu

Course Information
Course Number: BEEP 3382, Section 001  
Semester: Fall, 2009  
Course Date, Location and Time: Tuesdays, 5:00-7:50pm. SH 324

Catalog Description
Integration of mathematics and science concepts in relation to the cognitive and linguistic development of English language learners. Analysis of the State curriculum for math and science in K-4. Design and implementation of instruction in dual language settings.

Course Prerequisites:
Admission to the College of Education and the internship; BEEP 3381, 3381, 4382, 4384, ECED 4317 and 4318. Taken concurrently with BEEP 4305 & BEEP 4306. Field experiences required.

Textbook(s) and Materials:

Available online at http://www.project2061.org/tools/earlychild/online/default.htm
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
Meaningful service

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.

The Educator and Administrator Preparation units’ collaboratively developed shared vision is based on these CORE VALUES, dispositions and commitments to:

- Excellence
- Diversity
- Learner-centered environment
- Technology
- Research-based Experiences
- Field
- Collaboration Learning
- Life-long
Each candidate in the Educator and Administrator Unit of the College of Education of UT-Arlington will be evaluated on PROFESSIONAL DISPOSITIONS by faculty and staff. These dispositions have been identified as essential for a highly qualified educator. Instructors and program directors will work with candidates rated as "unacceptable" in one or more stated criteria. The candidate will have an opportunity to develop a plan to remediate any deficiencies.

Demonstrates excellence

- Meets stated expectations of student performance.
- Keeps timelines. Arrives on time for class and other activities.
- Produces significant artifacts of practitioner evidence.
- Possesses a willingness to set goals.
- Attends all classes/trainings and practicum experiences.
- Completes activities as assigned.
- Has appropriate personal appearance and/or hygiene for professional setting.

Participates in a learner centered environment and shows respect for self and others

- Uses appropriate and professional language and conduct.
- Supports a "high quality"-learning environment.
- Shows respect and consideration for the thoughts and feelings of others.

Research-based pedagogy

- Has an awareness of and willingness to accept research-based concepts.
- Identifies important trends in education.
- Demonstrates interests in learning new ideas and strategies.
- Relates class discussions and issues to current events in education.

Participates in on-going collaboration with peers and professionals

- Demonstrates kindness, fairness, patience, dignity and respect in working with peers, staff and instructors.
- Works effectively with others.
- Assists others in the university classroom or practicum setting.
- Demonstrates openness to assistance from others.
- Receives feedback in a positive manner and makes necessary adjustment.

Exhibits stewardship of diversity

- Shows appropriate stewardship and tolerance to diverse people, environments, and situations.
Advocates use of technology

- Uses and applies existing technologies sufficiently in work.
- Shows a willingness to use and apply emerging technologies in work.

Shows interest in the learner and the learning-process

- Demonstrates significant learning improvement over time.
- Shows interest in the learning process and demonstrates the necessary amount of time, energy, and enthusiasm for becoming better learners, teachers, and practitioners.

‘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.

State Domains and Competencies:


TX-TEXES 103

DOMAIN III—MATHEMATICS

*Competency 016 (Mathematics Instruction)*
The teacher understands how children learn mathematical skills and uses this knowledge to plan, organize, and implement instruction and assess learning.

*Competency 017 (Number Concepts, Patterns, and Algebra)*
The teacher understands concepts related to numbers and number systems and demonstrates knowledge of patterns, relations, functions, and algebraic reasoning.

*Competency 018 (Geometry, Measurement, Probability, and Statistics)*
The teacher understands concepts and principles of geometry and measurement and demonstrates knowledge of probability and statistics and their applications.

*Competency 019 (Mathematical Process)*
The teacher understands mathematical processes and knows how to reason mathematically, solve mathematical problems, and make mathematical connections within and outside of mathematics.

DOMAIN V—SCIENCE

*Competency 024 (Science Instruction)*
The teacher uses knowledge of science content and methods to plan effective, engaging, and safe instruction and to assess learning.

*Competency 025 (Physical Science)*
The teacher understands the fundamental concepts, principles, and processes of physical science.
Competency 026 (Life Science)
The teacher understands the fundamental concepts, principles, and processes of life science.

Competency 027 (Earth and Space Science)
The teacher understands the fundamental concepts, principles, and processes of earth and space science.

**Learning Outcomes:**
Given the appropriate instruction and guidance, students will be able to master the following objectives with at least 70% accuracy:

1. describe and demonstrate a thorough understanding of the mathematics and science curriculum components for children in PK to 4th grade.
2. use the TEKS & curriculum guidelines to develop, evaluate and implement lesson plans that integrate mathematics and science topics for children in PK to 4th grade.
3. plan and establish learning centers to teach TEKS and the PK4 curriculum in general.
4. apply knowledge of key concepts of mathematics and science covered in the TExES 103 exam.

**Attendance and Drop Policy:**

**Class Attendance**
Attendance & participation in our class activities are crucial, as most of what I hope you will take with you from this course will happen in our classroom. Attendance will be taken every time we meet, by means of a signing sheet. It is the student's responsibility to sign in each week, and to follow up with the instructor as necessary. Each student is allowed one absence for reasons of health, religion, etc. (TExES practice exam) without penalty. Arriving substantially late or leaving early counts as half an absence.

**Adds and Drops—last date to drop October 31, 2008**
Adds and drops may be made during late registration either by SAM, by the Web or in person in the academic department offering the course. Drops may continue in person through the 12th week of class. Students are responsible for adhering to the following regulations concerning adds and drops. These rules apply to regular semesters and to equivalent time limits in summer sessions as noted on the summer session calendar.

- A student may not add a course after the end of late registration.
- No grade is given if a student drops a course before the Census Date of that semester.
- A student may drop a course with a grade of W during the first six weeks of class.
- From the seventh week of class through the 12th week of class, a student may drop a course with a grade of W if passing or a grade of F if failing.
- A student may not drop a course after the 12th week of class.
- The dean of the college or school in which the student is majoring may require a student to drop a course at any time upon the recommendation of the instructor and the concurrence of the department chair.
- Students wanting to drop all courses for which they are enrolled must withdraw from the University.
**Attendance and Drop Policy:**

**Class Attendance**

Attendance in this class is mandatory. Students are expected to arrive **on time** to class. A sign-in sheet will be used every time we meet. Students arriving late must see the instructor at the **end of class** to be sure that they are counted present. Only one health-, work-, or religious-related absence will be permitted. Should you need to arrive late or leave early on a given date, make sure you inform the professor **before** the class meets. Arriving late or leaving early without prior permission will count as an absence.

**Adds and Drops - last date to drop October 31, 2008**

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- Students wanting to drop all courses for which they are enrolled must withdraw from the University.

**Email Communication:**

UTA e-mail is considered the official means of communication between the university and students, effective August 22, 2005. Utilize your UTA e-mail for all communications. You are advised to regularly check your UTA email. You will be held responsible if you do not receive information because you did not check your UTA email.
**American with Disabilities Act (ADA):**

If you are a student who requires accommodations in compliance with the ADA, please consult with me at the beginning of the semester. 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. Your responsibility is to inform me of the disability at the beginning of the semester and provide me with documentation authorizing the specific accommodation. Student services at UTA include the Office for Students with Disabilities (located in the lower level of the University Center) which is responsible for verifying and implementing accommodations to ensure equal opportunity in all programs and activities.

**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.

**Academic Honesty:**

Academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form at The University of Texas at Arlington. 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. "Academic 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).

**Policies regarding assignments:**

All work for this course is to be edited and executed with care and professionalism. Handwritten documents will not be accepted except for those you will be producing in class. Always make sure you keep a copy of documents submitted to your professor.

**Description of Assignments (see grade calculation below)**

The grade for the course is determined by the following components.

1. Preparation & Participation ................................................................. 15 points
2. Effective practices videos (total of 5) ..................................................... 50 points
3. Lesson Plan ......................................................................................... 20 points
4. Curriculum Evaluation ......................................................................... 15 points
5. Mathematics and Science Board Game & Implementation .................. 20 points
6. Final exam (comprehensive) ................................................................. 30 points
1. **Preparation and Participation** (15 points)
Your active participation in this class is expected. To prepare for class make sure you complete all the assigned readings per week and you come with questions to class. The questions may be based on factual information and/or on practice and implementation. Your lack of preparation for class will significantly affect your classroom participation and your overall grade. Please consult the calendar for the weekly assigned readings and assignments.

2. **Effective Practices Videos** (5 videos, 10 points each; 50 points total)
For this assignment you will be creating short (5 minutes at the most) ‘how-to’ videos on materials we will be creating in class for mathematics and science instruction. The purpose of the videos is to allow you to not only have opportunities to put your pedagogical content knowledge of mathematics and science for bilingual settings in practice, but to give you opportunities to reflect on your actual delivery of such content. These topics directly respond to the state’s EC-6 curriculum. The possible topics for these videos include the following: (1) number sense and counting, (2) ordering, seriation and patterning, (3) measurement (e.g., volume, weight, time), (4) logic and classification, (5) operations with whole numbers, (6) the scientific process, (7) scientific inquiry, (8) physical science (e.g., properties of matter) and life science (e.g., germination), (9) environmental awareness (e.g., water conservation) and (10) health and nutrition (e.g., healthy habits). You will be expected to create at least three of these videos in Spanish; the remaining ones will be created in English. Additional information about this assignment will be provided in class and will be posted on WebCT.

3. **Lesson Plan** (20 points)
You are to choose a topic of your choice from EC-4 mathematics and science, and develop it into a single lesson. Ideally this should be one of the lessons you teach in your field classroom. Use the lesson plan format provided in the intern handbook. Suggestions for the actual creation as well as the implementation of the lesson will be posted on WebCT.

4. **Curriculum/Materials Evaluation** (15 points)
Choose one of the math or science textbooks/materials in use in your mentor teacher's classroom and critique it. You may want to choose one activity and focus on it: what science or math it involves, where it falls short, etc. Be sure to provide a complete citation for the textbook or material. If possible, bring the textbook/material to class on the due date. In your critique you will specifically need to address the following questions:

- Consider the learning theory behind it... how does the author believe children learn, based on the content (e.g., by telling them or by allowing them to explore)?
- Do the exercises go beyond rote drill to encourage critical thinking?
- Is it readable?
- Can children learn from using it?
- Is it easy to plan a good lesson with it?
Write a two to three page (double-spaced) paper with your responses to the five questions above in a narrative/essay form.

4. **Mathematics & Science Board Game (20 points)**
For this two-part assignment you will be creating an original TEKS-aligned board game in Spanish for bilingual children in K-6 dual language settings. The board game must integrate both mathematical and science concepts for the students you are working with in your field placement setting. As part of the assignment you will also be required to implement your board game in the classroom you have been assigned for internship. To document the game’s implementation, you must take pictures of the children playing such game. Keep in mind that you will need to bring your board game as well as the pictures for a short in-class presentation. Be prepared to talk about your board game for three minutes. Make sure you obtain parental permissions for using such pictures in class. A release form will be posted on WebCT. Some suggested steps for creating your board game follow:

**Suggested Steps to Create the Board Game**

1. Select the target grade level you are currently working at for internship; that is, is it PK-1 or 2-4?

2. Select an appropriate theme for your board game. Make sure the theme selected builds upon what is currently being done in your internship classroom.

3. Decide how many children will be allowed to play the game at one time. The minimum should be two and the maximum should be four.

4. Once a theme has been selected, discuss with your mentor teacher what TEKS you ought to select so that playing your game will provide children with opportunities to either learn new material or reinforce what is being taught in the classroom. You should have at least two TEKS per area (i.e., mathematics and science).

5. Decide what students will be asked to do when playing the game. For instance, will they need to collect tokens as they play the game? Will there be rules that they need to follow? What rules will these be? Keep in mind the grade level and the children’s age at all times. Also, keep in mind Piaget and Vygotsky's theories and stages of mental development.

6. Decide on whether your game will have roadblocks or certain special activities in order to continue playing. For instance, will you have the common roadblocks such as ‘miss a turn,’ ‘move one space,’ and ‘go back two spaces,’ among others? Will students be asked to answer certain content-related questions to move on?

7. Create a visual draft of what the board game will look like.

8. Select what theme-related visuals you will be including in your board game. You are allowed to use clipart, stickers, etc. to embellish your board game. Be creative, but do not over do it!
9. Find the materials you will need to create your board game. Do not forget that your game needs to have at least one dice if game is for young learners and two die if older. Using the die will also reinforce counting skills, operations, etc.

10. Begin creating your board game. It is highly recommended that you create it on cardboard or card stock! You may also want to laminate your board game. The material has to be durable.

11. Create the ‘additional materials’ your players will need to play the game. For instance, create written rules, write out the cards, select tokens or counters, etc.

12. Begin setting up the path on the board game. Remember to include your ‘roadblocks’ and any other ‘activities’ at this time.

13. Pilot test your board game before taking it into the classroom. Are there things that do not seem to be working in the board game? Are the instructions confusing or too simple/advanced for the ‘target’ students who will be playing the game? Revise your game if needed.

14. Pack all the materials you will need for students to play the game. This includes the cards, roadblocks, counters, etc. Remember that you will need to use dice (see 9)!

15. Have fun (and take lots of pictures)!

6. Final Exam
There will be a cumulative/comprehensive, in-class final exam for this course. The final exam will consist of two parts. The first part of the exam will aim to assess your understanding of concepts, key terms and important definitions in mathematics and science teaching and learning. For the second part of the exam you will be required to connect the theory/research behind mathematics and science learning with actual practice. The questions you will be asked in this second part will include both short and essay questions. Examples of the questions you will be asked in the final will be provided throughout the semester.
## Course Schedule

<table>
<thead>
<tr>
<th>Week &amp; Date</th>
<th>Topics Covered</th>
<th>Assignments Due</th>
<th>Materials to be brought to class</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Course introduction, expectations</td>
<td>• None</td>
<td>None</td>
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<tr>
<td>August 25, 2009</td>
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<tr>
<td>Week 2</td>
<td>Learning theories; Science and Mathematics Standards; Acquisition and development of concepts and thought; M&amp;S Curriculum Considerations</td>
<td>• Read Units 1 &amp; 2</td>
<td>TBA</td>
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<tr>
<td>September 1, 2009</td>
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<tr>
<td>Week 3</td>
<td>Problem solving, scientific inquiry</td>
<td>• Read Unit 3</td>
<td>TBA</td>
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<td>September 8, 2009</td>
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<tr>
<td>Week 4</td>
<td>Early number &amp; science concepts</td>
<td>• Read Units 5-19; 15, 16, 23, 24 • Effective Practices Videos #1</td>
<td>TBA</td>
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<td>September 15, 2009</td>
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<td>Week 5</td>
<td>Measurement and observation</td>
<td>• Read Units 18, 19 &amp; 21</td>
<td>TBA</td>
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<td>September 22, 2009</td>
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<td>Week 6</td>
<td>Organizing, patterns and change</td>
<td>• Read Units 10, 11, 17, 21 • Lesson Plan</td>
<td>TBA</td>
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<td>September 29, 2009</td>
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<td>Week 7</td>
<td>Representations</td>
<td>• Read Units 20, 21 • Effective Practices Videos #2</td>
<td>TBA</td>
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<td>October 6, 2009</td>
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<tr>
<td>Week 8</td>
<td>Algebraic thinking, life science</td>
<td>• Read Units 25, 26 &amp; 31 • Mathematics &amp; Science Board Game</td>
<td>TBA</td>
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<td>October 13, 2009</td>
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<td>Week 9</td>
<td>Place value, physical science</td>
<td>• Read Units 30, 35 &amp; 40</td>
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<td>October 20, 2009</td>
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<tr>
<td>Week 10</td>
<td>Addition/subtraction; Earth and space science</td>
<td>• Read Units 27, 33 &amp; 36 • Effective Practices Videos #3</td>
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<td>October 27, 2009</td>
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<td>Week 11</td>
<td>Multiplication/division; environmental science</td>
<td>• Read Units 37, 39</td>
<td>TBA</td>
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<td>November 3, 2009</td>
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<tr>
<td>Week 12</td>
<td>Fractions and systems</td>
<td>• Read Units 14 and 29 • Effective Practices Videos #4</td>
<td>TBA</td>
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<td>November 10, 2009</td>
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<tr>
<td>Week 13</td>
<td>Geometry and health science</td>
<td>• Read Units 12, 13, 22, 31 &amp; 38</td>
<td>TBA</td>
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<td>November 17, 2009</td>
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<td>Week 14</td>
<td>Assessment</td>
<td>• Read Unit 4 • Curriculum/Materials</td>
<td>TBA</td>
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<td>November 24, 2009</td>
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<td>Week</td>
<td>Evaluation</td>
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| Week 15   | Diversity, equity and technology | • Read Unit 41  
• Prepare for final exam  
• Effective Practices Videos #5 | TBA |
| December 1, 2009 |                       |            |
| Week 16   | Final       | • None     |
| December 8, 2009 |                       | None       |