

**CENTRAL TEXAS COLLEGE  
MATH AND SCIENCE FOR EARLY CHILDHOOD  
CDEC 2307**

**Semester Hours Credit:** \_\_\_\_\_

**INSTRUCTOR:** \_\_\_\_\_

**OFFICE HOURS:** \_\_\_\_\_

**I. INTRODUCTION**

- A.** This course will allow students to explore principles, methods, and materials for teaching children math and science concepts through discovery and play. This course is designed to provide students with a good foundation for assessing a child's knowledge of math and science concepts, and planning activities and materials for teaching math and science concepts to young children.
- B.** This course is required for the AAS Degree and Certificates in the Early Childhood Development.
- C.** This course is occupationally related and serves as preparation for careers in Early Childhood Development.
- D.** Alphanumeric coding used throughout this syllabus denotes integration of SCANS occupational competencies (C1, etc.) and foundation skills (F1, etc.)
- E.** Prerequisite(s): None
- F.** NAEYC Standards and Program Level Outcomes: All CTC's Child Development Department coursework includes student learning opportunities and outcomes that address the National Association for the Education of Young Children's Standards for Child Development Professional Preparation in Associate Degree Programs. These Standards address areas of growth and development of the "whole child".

***STANDARD 1: The student will apply an understanding of child development and learning by:***

- 1a:** Knowing and understanding young children's characteristics and needs.
- 1b:** Knowing and understanding the multiple influences on development and learning.
- 1c:** Using developmental knowledge to create healthy, respectful, supportive, and challenging learning environments.

**STANDARD 2: The student will explain how to build family and community**

**relationships by:**

- 2a:** Knowing about and understanding family and community characteristics.
- 2b:** Supporting and empowering families and communities through respectful, reciprocal relationships.
- 2c:** Involving families and communities in their children's development and learning.

**STANDARD 3: The student will demonstrate skills in teaching and analyze young children's learning by:**

- 3a:** Knowing, understanding, and using positive relationships and supportive interactions.
- 3b:** Knowing, understanding, and using effective approaches, strategies, and tools for early education.
- 3c:** Using own knowledge and other resources to design, implement, and evaluate meaningful, challenging curriculum to promote positive outcomes.

**STANDARD 4: Using developmentally effective approaches to connect with children and families**

- 4a:** Understanding positive relationships and supportive interactions as the foundation of their work with children
- 4b:** Knowing and understanding effective strategies and tools for early Education
- 4c:** Using a broad repertoire of developmentally appropriate teaching/learning approaches
- 4d:** Reflecting on their own practice to promote positive outcomes for each child

**STANDARD 5: Using content knowledge to building meaningful curriculum:**

- 5a:** Understanding content knowledge and resources in academic disciplines
- 5b:** Knowing and using the central concepts, inquiry tools, and structures of content areas or academic disciplines
- 5c:** Using their own knowledge, appropriate early learning standards, and other resources to design, implement, and evaluate meaningful, challenging curricula for each child

## **II. LEARNING OUTCOMES**

- A.** Upon successful completion of this course, Math and Science for Early Childhood, the student will be able to:
  - 1. Relate the sequence of cognitive development to the acquisition of math and science concepts. (C5, C6, C8, C10, F2, F6, F12)
    - a. Summarize the sequential development of mathematical concepts. (C5, F2)
    - b. Outline appropriate science concepts for children.
    - c. Describe the development of mathematical concepts through problem-solving and thinking skills. (C10)
    - d. Explain how to promote children's cognitive development and understanding of their world through active, hands-on exploration

- of science concepts and processes. (C5, C10, F6)
  - e. Compare theories of cognitive development as they relate to math and science. (C5, F12)
  - f. Summarize how brain development affects concept formation (C5, C6, F12)
  - g. Compare gender similarities and differences in the acquisition of math and science concepts (C5, C6, F12)
- 2. Describe the scientific process and its application to early childhood indoor and outdoor learning environments (C5, C6, F2)
  - a. Explain how to encourage all children to view themselves as competent scientific explorers (C6, F2)
  - b. Describe ways to promote all children's abilities to think scientifically (C6, F2)
  - c. Summarize ways to nurture all children's natural curiosity by encouraging them to explore and make discoveries about their world (C6, F2)
- 3. Develop strategies which promote thinking and problem-solving skills in children (C5, C6, C7, C10, F2, F12)
  - a. Explain how instructional methods involving the use of various types of thinking can enhance children's mathematical and scientific understanding. (C5, C7, 10, F2)
  - b. Describe ways to integrate curriculum content through a variety of learning experiences so children can make connections across disciplines C5, C6, F2)
  - c. Explain techniques for integrating math and science throughout the curriculum (C5, C7, C10, F2)
  - d. Plan developmentally appropriate methods that include play, small group projects, open-ended questioning, group discussion, problem solving, cooperative learning, and inquiry experiences to help children develop intellectual curiosity, solve problems, make decisions, and become critical thinkers (C5, C8, C10,F2, F12)
- 4. Utilize observation and assessment as a basis for planning learning discovery experiences for the individual child (C5, C6, C7, C12, C18, F1, F2, F8, F9)
  - a. Review a variety of assessment strategies (C5,C6, C7)
  - b. Explain how assessment information is interpreted and used to provide developmentally appropriate learning activities (F2, F9)
  - c. Use a variety of assessment strategies to monitor children's progress in achieving outcomes and planning learning activities. (C5, C6, C7, F2, F9) Create, evaluate and/or select developmentally appropriate materials and environments to support the attainment of math and science concepts (C5, C6, C7, C10, F2)
  - d. Evaluate children's books, software, manipulatives, music, blocks, and other materials which enhance math and science concepts for

- e. developmental appropriateness (C5, C6, C7, F1, F2)  
Describe how to create indoor and outdoor environments that encourage emergent numeracy and scientific literacy by offering children varied, meaningful, and concrete learning experiences (C5, C6, C7, F1, F2)
- f. Discuss how technology can be philosophically and physically integrated to support development of math and science concepts in the curriculum (C5, C6, C18)
- g. Explore community resources, including cultural, available for enhancing math and science concepts (C5, C6, C7)
- h. Make and use developmentally appropriate, culturally diverse, and nonsexist activities and materials to support development of specific math and science concepts. (C5, C6, C7, F2, F8)
- i. Adapt math and science activities, materials, equipment, and environments for children with special needs(C5, C6, C7, C12)

### **III. INSTRUCTIONAL MATERIALS**

The instructional materials identified for this course are viewable through [www.ctcd.edu/books](http://www.ctcd.edu/books)

### **IV. COURSE REQUIREMENTS**

#### **A. General**

1. Participate in class regularly.
2. Participate constructively in class discussions.
3. Complete all assignments and examinations on time.
4. Attend any face to face classes on time and remain for the duration of the period. Check into Bb regularly for online courses.
5. Know and observe all college regulations.
6. Read all assigned selections from the text, or other, as assigned.
7. Ask instructor for permission before using audio-recorders to record face-to-face classes.
8. Keep cell phone on vibrate in face-to-face class. Refrain from texting, or using cell phone in face-to-face class, unless otherwise indicated by instructor.

Good class participation is indispensable for earning a good grade. Regular attendance, whether in person or online, is essential for the same reason.

#### **B. There is not a Lab Requirement for this course.**

### **V. EXAMINATIONS**

#### **A. There will be at least two examinations. (Quizzes are optional.)**

- B. Make-up examinations will be given only with the instructor's permission.
- C. All students are expected to maintain the highest standard of scholastic honesty in the preparation of all course work and during examination.

## VI. SEMESTER GRADE COMPUTATIONS

Your point total is determined by adding earned points on each scored assignment (projects, labs, examinations, participation, exams, quizzes, discussions, other).

Percentage	Grade
90-100%	A
80- 89%	B
70- 79%	C
60- 69%	D
Below 60%	F

## VII. NOTES AND ADDITIONAL INSTRUCTIONS

- A. **Withdrawal from course:** It is your responsibility as a student to officially drop a class if circumstances prevent attendance. Any student who desires to or who must officially withdraw from a course after the first scheduled class meeting, must file an Application for Withdrawal or an Application for Refund. The withdrawal form must be signed by the student.

Application for Withdrawal will be accepted according to the following schedule

Friday of 3rd week for 5-week courses  
 Friday of 4th week for 6-week courses  
 Friday of 6th week for 8-week courses  
 Friday of 7th week for 10-week courses  
 Friday of 9th week for 12-week courses  
 Friday of 12th week for 16-week courses

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

Students who officially withdraw will be awarded the grade of "W," provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of "F" or "FN" for nonattendance.

- B. Administrative Withdrawal:** An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on the Administrative Withdrawal Form for submission to the registrar.

Under Section 51.907 of the Texas Education Code, “an institution of higher education may not permit a student to drop more than six courses, including any course a transfer student has dropped at another institution of higher education.” This statute was enacted by the State of Texas in spring 2007 and applies to Students who enroll in a public institution of higher education as first-time freshmen in fall 2007 or later.

- C. Incomplete Grade:** In keeping with College policy, the instructor may Grant an Incomplete grade in cases in which the student has completed the majority of the course work, but because of extenuating circumstances, is unable to complete the requirement for the course. Prior approval from the instructor is required before the grade of “IP” is recorded. Deadline for changing the IP grade is 110 days after the scheduled end of the course. An IP grade can be replaced with the student’s actual grade, including an F; but it may not be replaced with a W. At the end of the 110 calendar days if the student has not completed the remaining coursework as required by the instructor, the “IP” will be converted to an “FI” and appear as an “F” on the student’s official transcript.
- D. Cellular Phones and Beepers:** Cellular phones and beepers will be turned off while the student is in any classroom or laboratory/field experience setting.
- E. American with Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.
- E. Instructor Discretion:** The instructor reserves the right of final decision in Course requirements.
- F. Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.
- G. Scholastic Honesty:** All students of the Child Development program are

required and expected to maintain the highest standards of scholastic honesty in the preparation of all work and in examinations. Each student should avoid:

1. **Plagiarism**: the taking of passages or ideas from writings of others without giving proper credit to the source.
2. **Collusion**: working together with another person in the preparation of Work unless such joint preparation is specifically approved in advance by the instructor.
3. **Cheating**: giving or receiving information on an examination, homework, or projects.

## VIII. COURSE OUTLINE

### B. **Lesson One:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:
  - a. Define concept development and identify the concepts children are developing early childhood.
  - b. Describe three types of learning experiences, and give an example of each.
  - c. Design lessons and activities using the six steps in instruction suggested in this chapter.
  - d. Explain the reasons for the development of the National Assessment Standards.
2. **Learning Activities:**
  - a. Class lecture/discussion/project
3. **Equipment and Materials:** Textbook
4. **Audio-Visual Aids:** None
5. **Lesson Outline:**
  - a. Concept development developing in early childhood
  - b. Three types of learning experiences
  - c. Design lessons and activities using the six-steps in instruction.
  - d. Reasons for development of the National Assessment Standards

### C. **Lesson Two:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

- a. Describe the importance of the science framework and standards, the relationship of science and literacy, science as inquiry and as engineering design, and the content areas of science.
- b. Explain how science concepts are developed and learned.
- c. Assess, plan, teach, and evaluate science instruction in line with national standards.

2. **Learning Activities:**

- a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook

4. **Audio-Visual Aids:** None

5. **Lesson Outline:**

- a. Know and understand the framework and standards for science education
- b. Concept understanding of young children
- c. Integrating Science in the curriculum

**D. Lesson Three:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

- a. Assess, plan, teach, and evaluate one-to-one correspondence concept lesson activities.
- b. Describe, assess, plan, teach, and evaluate number and number sense concept lesson activities.
- c. Assess, plan, teach, and evaluate logic and classification concept lesson activities.
- d. Assess, plan, teach, and evaluate comparison concept lesson activities.

2. **Learning Activities:**

- a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook

4. **Audio-Visual Aids:** None

5. **Lesson Outline:**

- a. One-to-one correspondence
- b. Number sense and counting standards
- c. Logic and classification standards
- d. Comparison standards

**E. Lesson Four:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:
  - a. Assess, plan, teach, and evaluate shape concept lesson activities following national standards.
  - b. Assess, plan, teach, and evaluate spatial concept lesson activities following national standards.
  - c. Assess, plan, teach, and evaluate parts and wholes concept lesson activities following national standards.
  - d. Assess, plan, teach, and evaluate science concept lesson activities following national standards.
2. **Learning Activities:**
  - a. Class lecture/discussion/project
3. **Equipment and Materials:** Textbook
4. **Audio-Visual Aids:** None
5. **Lesson Outline:**
  - a. Expectations and Characteristics of Shape
  - b. Standards and Part-Whole Relationships
  - c. Science and Engineering Standards: Connection to Mathematics

**F. Lesson Five:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:
  - a. Plan, teach, and evaluate ordering, seriation, and patterning concept lesson activities following national standards.
  - b. Plan, teach, and evaluate measurement (volume, weight, length, and temperature) concept lesson activities following national standards.
  - c. Plan, teach, and evaluate time concept lesson activities following national standards.
  - d. Plan and teach data and graph concept lesson activities following national standards.

- e. Plan and teach science concept application lesson activities following national standards.

2. **Learning Activities:**

- a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook

4. **Audio-Visual Aids:** None

5. **Lesson Outline:**

- a. Class lecture/discussion/project

**F. Lesson Six:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

- a. Explain how the national standards, play, and thematic units and projects relate to STEM and STEAM.
- b. Explain the importance of language and literacy to math, science, an engineering concept formation.

2. **Learning Activities:**

- a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook, Children's Literature

4. **Audio-Visual Aids:** None

5. **Lesson Outline:**

- a. Standards and Stem and Steam.
- b. Language, Literacy, and Concept Formation.

**G. Lesson Seven:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

- a. Assess, plan, teach, and evaluate number symbol concepts in line with national standards.
- b. Assess, plan, teach, and evaluate groups and number symbols in line with national standards.
- c. Assess, plan, and teach 13 higher-level concepts in line with national standards.

d. Plan and teach science investigations in line with national standards.

2. **Learning Activities:**

a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook

4. **Audio-Visual Aids:** None

5. **Lesson Outline:**

a. Number Symbols and concepts

b. Groups and symbols

c. High-level concepts

d. End of kindergarten science experiences

**H. Lesson Eight:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

a. Select appropriate materials and set up learning centers for math and science.

2. **Learning Activities:**

a. Class lecture/discussion/project

3. **Equipment and Materials:** Textbook

4. **Audio-Visual Materials:** None

5. **Lesson Outline:**

a. Materials and Environment

b. Standards and Action: Hands-on problem solving and inquiry

**I. Lesson Nine:**

1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:

a. Plan and provide math and science experiences using blocks, games, woodworking, outdoor activities, technology, manipulatives

2. **Learning Activities:**

- a. Class lecture/discussion/project
- 3. **Equipment and Materials:** Textbook
- 4. **Audio-Visual Aids:** None
- 5. **Lesson Outline:**
  - a. Math Games

**J. Lesson Ten:**

- 1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:
  - a. Provide families with strategies and activities that support math and science learning at home
- 2. **Learning Activities:**
  - a. Class lecture/discussion/project
- 3. **Equipment and Materials:** Textbook/back pack or bag, manipulatives
- 4. **Audio-Visual Aids:** Computer, Internet
- 5. **Lesson Outline:**
  - a. Create a school-to- home math concept activity

**K. Lesson Eleven: Lesson Planning**

- 1. **Learning Outcomes:** Upon successful completion of this lesson, the Student will:
  - a. Using prior knowledge/learning, each student will design a one-week thematic math and science inquiry lesson plan.
- 2. **Learning Activities:**
  - a. Class lecture/discussion/project
- 3. **Equipment and Materials:** Textbook, internet
- 4. **Audio-Visual Aids:** None
- 5. **Lesson Outline:**

- a. Design a one-week thematic math and science inquiry lesson plan using conceptual math and science inquiry information learned in previous lessons.