Las Positas College
3000 Campus Hill Drive
Livermore, CA 94551-7650
(925) 424-1000
(925) 443-0742 (Fax)

Course Outline for ECE 42

EARLY CHILDHOOD MATH AND SCIENCE

Effective: Spring 2017

I. CATALOG DESCRIPTION:
ECE 42 — EARLY CHILDHOOD MATH AND SCIENCE — 3.00 units

An examination of the constructivist approach to teaching science, technology, engineering and mathematics (STEM) to young children; emphasizing application to everyday experiences of children .

3.00 Units Lecture

Prerequisite
ECE 63 - Early Childhood Curriculum
with a minimum grade of C

Grading Methods:
Letter Grade

Discipline:
- Child Development/Early Childhood Education

	MIN
Lecture Hours:	54.00
Total Hours:	54.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering the course a student should be able to:

A. ECE63

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Define the theories, standards and guiding principles associated with the teaching of mathematics and science to young children
B. Explain the pedagogical role of play in teaching science, technology, engineering and mathematics (STEM) to children
C. Demonstrate familiarity with the use of a variety of tools and simple machines which can be used by young children to solve problems of interest to them
D. Identify developmentally appropriate concepts and terminology (subject matter content) in mathematics, physical science, and natural science
E. Apply the principles of developmentally appropriate practice to develop and evaluate environments and curriculum that facilitate math and science learning in young children.
F. Through observation identify examples of math and science learning in the activities of young children as well as emergent themes for further exploration
G. Evaluate the impact of personal experiences with STEM concepts on teaching effectiveness.

V. CONTENT:
A. Theory, standards and guiding principles
    1. Brain research
    2. Developmental theories (Piaget)
    3. Early learning theories (Vygotsky, Gardner)
    4. Developmentally Appropriate Practices (DAP)
    5. National Council of Teachers of Mathematics (NCTM)
    6. California Preschool Curriculum Framework
    7. Common Core
B. Math and science pedagogy for young children
    1. Inquiry and play
    2. Creating a culture of inquiry
    3. Hands-on exploration
    4. Appropriate questioning
    5. Loose parts and open-ended material
C. Simple machines, mechanical concepts and technology
D. Early science and math vocabulary and concepts
    1. Science

a. Physical science
b. Natural science (life science, earth science)
c. Simple tools and machines

2. Scientific behaviors
   a. Observation
   b. Recording and documentation
   c. Predictions/forming hypotheses
   d. Reporting
3. Mathematics
   a. Numbers
   b. Algebra and functions
   c. Measurement
   d. Geometry

E. Planning and preparing the learning environment for STEM
   1. Organization
   2. Selection of materials
   3. Creation of "invitations"

F. Planning STEM learning opportunities and activities for young children
   1. Observation as a tool to plan math and science learning activities for young children
   2. Identifying emerging interests
   3. Embedding science and math in everyday experiences
   4. Designing in-depth projects and explorations
   5. Document children's experiences to evaluate and communicate learning
   6. Engaging families and sharing understanding of early math and science learning
   7. Inclusion of all children

G. Personal attitudes and experiences with STEM concepts

VI. METHODS OF INSTRUCTION:

A. **Lecture** -
B. **Observation and Demonstration** -
C. **Field Trips** -
D. **Classroom Activity** -
E. **Discussion** -
F. Multi-media presentations
G. **Research** -

VII. TYPICAL ASSIGNMENTS:

A. Class activity - Demonstrate STEM activity (student's choice from instructor generated list)
B. Discussion - Based on observation #3, discuss examples of children's numeracy, number awareness, and ability to sort, group and classify objects.
C. Fied trip - Planned field trip to a community site that has implemented STEM into everyday curriculum
D. Lecture - lecture 2 - Theory, standards and guiding principles as they pertain to STEM concepts
E. Observation and Demonstration - Use the "reflective curriculum process to provide opportunities for children to explore gravity. Create two "invitations" that build upon the child's interest to explore gravity. Document which of the "invitations" most capture child's interest and document what the child said when exploring the materials.
F. Multi-media presentation - Create a Powerpoint or Prezi that documents math/science learning based on instructor provided criteria
G. Research - Research the California Preschool Curriculum Framework for Math and Science learning in children 0 - 5.

VIII. EVALUATION:

A. **Methods**

1. Quizzes
2. Research Projects
3. Oral Presentation
4. Group Projects
5. Class Participation
6. Home Work

B. **Frequency**

a. Weekly class participation
b. 2 - 3 quizzes
c. 3-5 individual oral presentations or projects
d. homework as assigned
e. 1 research project (final)
f. 1 - 2 group projects

IX. TYPICAL TEXTS:

1. Moomaw, Sally. *Teaching STEM in the Early Years: Activ.for Integrating Sci., Tech., Eng., and Math.* 1st ed., Redleaf Press, 2013.
2. Charlesworth, Ph.D. , Rosalind . *Math and Science for Young Children.* 8th ed., Cengage, 2016.
3. , The Early Math Collaborative from the Erikson Institute. *Big Ideas of Early Mathematics.* 1st ed., Pearson, 2014.
4. California State Preschool Learning Foundations

   http://www.cde.ca.gov/sp/cd/re/documents/preschool.pdf

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Internet access is strongly recommended