CD M09: SCIENCE, TECHNOLOGY, ENGINEERING, & MATH IN EARLY CHILDHOOD EDUCATION

Originator
scoulter

College
Moorpark College

Discipline (CB01A)
CD - Child Development

Course Number (CB01B)
M09

Course Title (CB02)
Science, Technology, Engineering, & Math in Early Childhood Education

Banner/Short Title
STEM in ECE

Credit Type
Credit

Start Term
Fall 2023

Catalog Course Description
Presents theoretical foundations and developmentally appropriate practices for designing curriculum in the areas of science, technology, engineering, and mathematics for use with young children. Examines the creation of supportive environments, selection of appropriate materials, and development, presentation, and evaluation of curriculum. Emphasizes science, technology, engineering, and math curricula that emerges from the interests of children and is facilitated through the inquiry approach.

Taxonomy of Programs (TOP) Code (CB03)
1305.00 - *Child Development/Early Care and Education

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
B (Transferable to CSU only)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
C - Clearly Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will be required

Faculty notes on field trips; include possible destinations or other pertinent information
Early childhood programs in the community pre-school; Resource and referral program in the County

Grading method
(L) Letter Graded

Alternate grading methods
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
52.5
Maximum Contact/In-Class Lecture Hours
52.5

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5

Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
105
Maximum Outside-of-Class Hours
105

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
157.5
Total Maximum Student Learning Hours
157.5

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Advisories on Recommended Preparation
CD M02 and CD M14

Requisite Justification
Requisite Type
Recommended Preparation

Requisite
CD M02 and CD M14

Requisite Description
Course in a sequence

Level of Scrutiny/Justification
Content review

Student Learning Outcomes (CSLOs)	
	Upon satisfactory completion of the course, students will be able to:
1	apply their knowledge of children's development of science content knowledge and process skills to their observations of children and theoretically interpret the observed behavior.
2	apply their knowledge of children's development of technology content knowledge and process skills to their observations of children and theoretically interpret the observed behavior.
3	apply their understanding of young children's development of engineering content knowledge and process skills to their observations of children, and theoretically interpret the observed behavior.

| 4 | apply their understanding of young children's development of mathematics content knowledge and process skills to their observations of children, and theoretically interpret the observed behavior. |

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	demonstrate an understanding of emergent curriculum and the science, technology, engineering, and mathematics processes utilized by typical and atypical children from infancy through age eight.
2	describe and develop methods used to integrate science, technology, engineering, and math opportunities across the curriculum.
3	demonstrate an understanding of the teacher's role in planning and facilitating activities that promote children's construction of knowledge of science, technology, engineering, and math content and processes.
4	identify and design science, technology, engineering, and math activities developmentally appropriate for young children and consistent with state and national standards.
5	evaluate science, technology, engineering, and math activities and materials for developmentally appropriateness and consideration of children's cultural, linguistic, and special needs.
6	explain the nature and importance of equitable science, technology, engineering, and math curriculum for young children.
7	apply self-evaluation methods to reflect upon their teaching strategies for early childhood science, technology, engineering, and math concepts.
8	utilize various science, technology, engineering, and math assessment and documentation methods.

Course Content

Lecture/Course Content
- **10% - Mathematics content knowledge and process skills for young children**
- **7% - Equity issues: Culture, gender, language, and special needs**
- **7% - The role of the teacher: innovation and best practices**
  - Intentional teaching
- **7% - Cooking with young children (chemistry and quantification)**
- **8% - Physical science knowledge lesson plans, materials, activities, facilitation**
- **8% - Earth and life science: background knowledge, materials, activities, facilitation**
- **7% - Integration of science, technology, engineering, and math with other areas of the early childhood curriculum**
- **7% - Observation, assessment, and evaluation of curriculum and development**
  - Use of state and national assessment tools
- **7% - State and national standards relevant to science, technology, engineering, and math**
- **7% - The continuing cycle of observation, assessment, curriculum planning, and documentation**
- **7% - Emergent and purposeful science, technology, engineering, and math opportunities throughout the curriculum, environment, and the daily routine**
- **9% - Technology content knowledge and skills for young children**
- **9% - Engineering content knowledge and process skills for young children**

Laboratory or Activity Content
n/a

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):
Written expression
Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):
Essay exams
Group projects
Individual projects
Objective exams
Oral presentations

Quizzes
Research papers
Role playing
Simulations
Skills demonstrations
Other (specify)
Classroom Discussion
Projects
Participation
Reports/Papers/Journals

Other

Lesson plans/activity presentation
Child observations
Teacher observations
Children's literature selection

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Computer-aided presentations
Demonstrations
Distance Education
Field trips
Group discussions
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Lecture
Observation
Readings
Role-playing
Small group activities
Web-based presentations
Other (specify)

Specify other method of instruction

Analysis of child and teacher observations

Describe specific examples of the methods the instructor will use:

Instructor will use PowerPoint presentation, short YouTube videos, group activity, and classroom demonstration to explain course content. In addition, the instructor will utilize the Child Development Center Lab School to conduct teacher and child observations.

Representative Course Assignments

Writing Assignments
- Write a summary of the facilitation of a science, technology, engineering, or math experience with a child and the analysis of a child's thinking.
- Write a summary of appropriate background information pertinent to a given science concept.
- Write peer reviews of student presentations in class.
- Synthesize the content of the class lesson and the development of a personal philosophy.

Critical Thinking Assignments
- Develop activity plans incorporating developmentally appropriate practices, science concepts, and elements of the process approach.
- Evaluate early childhood science, technology, engineering, and math curriculum based on state and national standards.
- Analyze child observations using knowledge of child development research and theory.

Reading Assignments
- Read handouts provided by the instructor regarding curriculum design in science, math, engineering and/or technology, summarize the article, and answer questions about the article.

- Read and study selected chapters from the textbook and the accompanying lecture notes, then answer questions assigned by the instructor.

Skills Demonstrations
- Demonstrate an early childhood science activity
- Demonstrate an early childhood technology activity
- Demonstrate an early childhood engineering activity
- Demonstrate an early childhood math activity

Outside Assignments

Representative Outside Assignments
- Written child observations of children exploring science, technology, engineering, and math concepts.
- Written observations of classroom teachers facilitating science, technology, engineering, and math experiments.
- Lesson plans and development of science, technology, engineering, and math activities.
- Readings from text and professional early childhood journals.

Articulation

Comparable Courses within the VCCCD

CD M53 - Science and Math in ECE
ECE R132 - Science in Early Childhood

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Saddleback College	CDE 113	Teaching Science, Math, and Technology	3
Mt. San Antonio College	CJ:D 63	Math and Science for the Young Children	3
Palomar College	CHDV 130	Math and Science in Early Childhood	3

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
F1995

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Cohen, Lynn E. and Sandra Waite-Stupiansky. *STEM in Early Childhood Education: How Science, Technology, Engineering, and Mathematics Strengthen Learning.* Routledge, 2020.

Resource Type
Textbook

Description
Heroman, Cate. *Making and Tinkering With STEM: Solving Design Challenges With Young Children*. National Association for the Education of Young Children, 2017.

Resource Type
Other Resource Type

Description
California State Department of Education. *California Preschool Curriculum Framework, Vol. 1*. 2011, http://www.cde.ca.gov/sp/cd/re/documents/psframeworkkvol1.pdf. Accessed 14 Sept 2022.

Resource Type
Other Resource Type

Description
California State Department of Education. C*alifornia Preschool Learning Foundations, Vol. 1*. 2008, http://www.cde.ca.gov/sp/cd/re/documents/preschoollf.pdf. Accessed 14 Sept 2022.

Resource Type
Textbook

Description
Maslyk, Jacie. *Big Engineering experiments for Little Kids: A first science book for ages 3 to 5*. Rockridge Press, 2021.

Library Resources

Assignments requiring library resources

Planning for science, technology, engineering, and math activities; selecting children's books relevant to the science, technology, engineering, and math curriculum areas; research, using the Library's print and online resources, on teaching science, technology, engineering, and math to children.

Sufficient Library Resources exist

Yes

Example of Assignments Requiring Library Resources

Research, using the Library's print and online resources, to gather information on a children's book to use as a hook for an early childhood science, technology, engineering, or math activity.

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (1%−50% online)
Hybrid (51%−99% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.
Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.
Yes

Regular Effective/Substantive Contact

Hybrid (1%−50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Regular use of asynchronous discussion boards encourages various types of interaction and critical thinking skills among all course participants. Questions and topics posed will allow students to discuss, compare and contrast, identify, and analyze elements of the course outcomes. Other discussion boards may be used for Q&A and general class discussion by students and instructor to facilitate student success and strengthen student learning outcomes.

Method of Instruction	Document
E-mail	E-mail, class announcements, and various learning management system tools such as "Message Students Who" and "Assignment Comments", will be used to regularly communicate with all students on matters such as clarification of class content, reminders of upcoming assignments and/or course responsibilities, to provide prompt feedback to students on coursework to facilitate student learning outcomes, or to increase the role of an individual educator in the academic lives of a student. Students will be given multiple ways to email instructor through both the learning management system inbox and faculty provided email accounts.
Face to Face (by student request; cannot be required)	The instructor may hold weekly, scheduled office hours for students to be able to meet and discuss course materials or individual progress. Students can request additional in-person or web conferencing meetings with faculty member as needed. Faculty may encourage online students to form "study groups" in person or online. Note: For hybrid classes, face-to-face class time will provide opportunities for students to discuss amongst themselves (in groups or pairs) and ask questions about the material to facilitate SLOs and course outcomes.
Other DE (e.g., recorded lectures)	Faculty may use a variety of ADA compliant tools and media integrated within the learning management system to help students reach SLO competency. Tools may include: Recorded Lectures, Narrated Slides, Screencasts, Instructor created content, MC Online Library Resources, Canvas Peer Review Tool, Canvas Student Groups (Assignments, Discussions), Websites and Blogs, Multimedia (YouTube, Films on Demand, 3CMedia, Khan Academy, etc.)
Synchronous Dialog (e.g., online chat)	Instructor may provide a set time each week where s/he will be available for synchronous chat and be available in the discussion board and can answer questions in live time.
Video Conferencing	Video tools such as Zoom can be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Video Conferences will be used to facilitate SLOs and student-to-student group meetings will also be encouraged.
Telephone	Instructor may provide a phone number for the students where they can leave a voicemail and expect a call back within 24 hours.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Regular use of asynchronous discussion boards encourages various types of interaction and critical thinking skills among all course participants. Questions and topics posed will allow students to discuss, compare and contrast, identify, and analyze elements of the course outcomes. Other discussion boards may be used for Q&A and general class discussion by students and instructor to facilitate student success and strengthen student learning outcomes.
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Telephone	Instructor may provide a phone number for the students where they can leave a voicemail and expect a call back within 24 hours.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Regular use of asynchronous discussion boards encourages various types of interaction and critical thinking skills among all course participants. Questions and topics posed will allow students to discuss, compare and contrast, identify, and analyze elements of the course outcomes. Other discussion boards may be used for Q&A and general class discussion by students and instructor to facilitate student success and strengthen student learning outcomes.
E-mail	E-mail, class announcements, and various learning management system tools such as "Message Students Who" and "Assignment Comments", will be used to regularly communicate with all students on matters such as clarification of class content, reminders of upcoming assignments and/or course responsibilities, to provide prompt feedback to students on coursework to facilitate student learning outcomes, or to increase the role of an individual educator in the academic lives of a student. Students will be given multiple ways to email instructor through both the learning management system inbox and faculty provided email accounts.
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Examinations

Hybrid (1%–50% online) Modality
On campus
Online

Hybrid (51%–99% online) Modality
On campus
Online

Primary Minimum Qualification
CHILD DEV/ECE

Review and Approval Dates

Department Chair
09/01/2022

Dean
09/06/2022

Technical Review
09/15/2022

Curriculum Committee
09/20/2022

DTRW-I
MM/DD/YYYY

Curriculum Committee
MM/DD/YYYY

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000434264

DOE/accreditation approval date
MM/DD/YYYY