# CDE A132: SCIENCE AND MATH FOR YOUNG CHILDREN

| Item | Value |
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| Curriculum Committee Approval Date | 09/22/2021 |
| Top Code | 130500 - Child Development/Early Care and Education |
| Units | 3 Total Units |
| Hours | 54 Total Hours (Lecture Hours 54) |
| Total Outside of Class Hours | 0 |
| Course Credit Status | Credit: Degree Applicable (D) |
| Material Fee | No |
| Basic Skills | Not Basic Skills (N) |
| Repeatable | No |
| Grading Policy | Standard Letter (S) |

## Course Description

Physical and natural science activities that encourage children's thinking and problem solving skills. Emphasis on the development of programs and materials that allow for exploration and/or experimentation. Formerly known as EC A132. Transfer Credit: CSU.

## Course Level Student Learning Outcome(s)

1. Develop and organize an early childhood mathematics and sciences curriculum rooted in children's thinking and problem solving.
2. Demonstrate knowledge in open-ended questioning to enhance metacognition in preschoolers.
3. Demonstrate knowledge in extending and coordinating science and math throughout their classroom day in a play-based approach.

## Course Objectives

- 1. Apply the principles of development to design an appropriate science Curriculum.
- 2. Identify the immediate moment as the learning moment.
- 3. Analyze the learning moment for the appropriate new concept to be introduced to stimulate childrens thinking, through evaluation of science observation.
- 4. Apply the principles of effective teaching strategies in the development of a project with children.
- 5. Set up interest centers that will pose problems for children to work through and that will stimulate their interest.
- 6. Anticipate how to stimulate a childs interest and help him move in his own pace from "doing" to "thinking," by questions, suggestions, comparisons and include in activity write ups.
- 7. Recognize that a child constructs knowledge through concrete interactions with materials, and articulate the concept in written form in a final exam.
- 8. Collect reference lists for free materials on related subjects.
- 9. Collect visual aids on science, i.e., equipment, charts, posters, pictures, flannel board stories, puppets, music, fingerplays, dramatic play ideas, motor skills, readiness ideas and present for evaluation in class.
- 10. Examine the beauty of shape, color, pattern, rhythm, harmony, and textures in the world around and be able to explain how you would do this with children in an exam.
- 11. Gain Knowledge of how children interpret the world around them.
- 12. Evaluate the learning value of cooking activities.
- 13. Create a snack menu.
- 14. Identify the cultural aspects of food.

## Lecture Content

Physical Science Definition Developmentally Appropriate Activities Learning Through Physical Knowledge Activities The Learning Encounter Defined Correspondences Transformations Six General Levels of Cognitive Development Level of Absolute Differences Level of Opposition Level of Discrete Degrees Level of Variation Level of Functions Level of Exact Compensation Developmental Trends Two Within One Decentering From An Egocentric Perspective From Opposites To Middle Degrees Seeing The Dynamic Within The Static The Learning Process Gaps Procedures Representation Give Examples Of Children Demonstrating A Developmental Trend Evaluate A Childs Level Of Cognitive Development While Involved In An Activity Correspondences Identity Same Object, Different State Same Object, Different Use Equivalence Different Object, Same State Different Object, Same Use Simultaneous Uses Equivalence Through Pretense Summarize Definitions And Evaluate An Activity Design An Activity Changing Perspective Self-To-Object Self-To-Other Design An Activity That Encourages A Child To Decenter Identify Some Developmental Trends In The Above Activity Representing Motion Freezing Motion Unitizing Motion Imagining Motion Design An Activity Identify A Childs Possible Process In Exploring The Activity Making Functional Relations Changing Directions Changing Distance, Force, Weight, And Speed Changing Limits Summarize Definitions Design An Activity Determine The Developmental Trends Of An Activity Math Math Concepts Construction Of Knowledge Physical Knowledge Logico-Mathematical Knowledge Social Knowledge Problems In Childrens Thinking That Cause Them To Make Mistakes Preschool And Kindergarten Math Skills Reasoning And Problem Solving One-To-One Number Correspondence Recognizing And Writing Numerals 0-20 Communicating Sets, Classifying, Comparing And Matching Whole Number Operations Spacial Relations, Shapes, And Geometry Sequences Measurement Activities Developmentally Appropriate Activities Design Math Activities To Meet Specific Needs Of Children Create Three Open-Ended Math Games Identify Five Ways That A Teacher Might Incorporate Math Into Daily Activities Observe A Childs Interactions With Objects To Determine How The Child Is Using Math Knowledge And Skills Adapt math activities for children with special needs Blocks Learning Value Set Up And Storage Props Teachers Role Problems Develop Block Props Teachers Role In Supporting Childrens Science Explorations Observation And Evaluation Of Childrens Interactions In Science Activities Importance Of The Teachers Attitude Towards Science Creating And Planning Activities Appropriate Teacher Intervention Strategies Observe A Teacher Involved In A Science Activity With Children And Evaluate Her/His Effectiveness Supporting the child with special needs in science explorations Natural Science Developmentally Appropriate Topics Ways To Present Natural Science Objects To Explore Micro, Macro Dramatic Play Books, Stories, Flannel Board Stories, Pictures Songs, Creative Movement And Fingerplays Games Field Trips Develop Resources Develop Background Information In Science Evaluate Effectiveness Of A Natural Science Activity Foods And Nutrition Methods Of Introducing Healthy Foods To Young Children Developmentally Appropriate Cooking Activities For Children Appropriate Snacks For Children Health And

Safety Issues Relating To Cooking And Snacks Cultural Aspects Of Food Develop A Snack Menu For A Week Plan A Cooking Activity For Children And Determine Its Learning Value EXTENDED TOPIC OUTLINE: Math Math Concepts Construction Of Knowledge Physical Knowledge Logico-Mathematical Knowledge Social Knowledge Students Demonstrate Concepts Through Use Of Math Materials Problems In Childrens Thinking That Cause Them to Make Mistakes Synthesis Of Order Hierarchical Inclusion Conservation Preschool And Kindergarten Math Skills Reasoning And Problem Solving Applying Math Skills To Real-Life Situations Creating Challenges One-To-One Number Correspondence Identification Of The Skill Levels Of The Skill Recognizing And Writing Numerals 0-20 Numbers As Symbols Recognition Vs. Understanding Communicating Verbalizing Concepts In Play Verbal Problem Solving Symbolizing Sets, Classifying, Comparing And Matching Sorting Skills > Classification Skills Comparing The Quantity Of Sets Whole Number Operations Adding And Subtracting In Real-Life Situations Appropriate Learning Materials Spacial Relations, Shapes, And Geometry How Shapes Are Learned Knowledge Of Spacial Relations And Vocabulary Sequences Ability To Create And Identify Patterns Understanding Time Sequences In Daily Life Measurement Length, Weight, Area, Quantity, Time, And Capacity Estimation And Verification The Childs Invention Of Measurement Tools Math Activities Criteria For Developmentally Appropriate Activities Real-Life Experiences Age Appropriate Design Math Activities To Meet Specific Needs Of Children Interests Skill Level When Is A Challenge Needed Create Three Open-Ended Math Games Definition Types Goals Identify Five Ways That A Teacher Might Incorporate Math Into Daily Activities Observe A Childs Interaction With Objects To Determine How The Child Is Using Math Knowledge And Skills And Recommend Appropriate Activities

## Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

## Instructional Techniques

• Lecture and demonstration of concepts • Slide lectures to illustrate various types of activities • Demonstration of stages of cognitive development and childrens possible responses • Small group exercises where students will problem solve curriculum situations • Video taped sequences of children interacting with science materials to be evaluated by students • Working cooperatively, students will plan a science program • Role playing of appropriate and inappropriate teacher intervention strategies • Discussion of the results of the students analytical assignments • Students will explore various science and math activities to determine learning values and possible childrens responses

## Reading Assignments

Assigned article readings 3 hours per week

## Writing Assignments

1. Students will prepare written assignments on the following: • A childs level of cognitive development while involved in an activity • A childs response to specific science activities • A childs interaction with materials with respect to math knowledge and skills • Teacher intervention strategies during a science activity • The learning value of a cooking activity (3 hours/week)

## Out-of-class Assignments

Students will present an activity plan write-up which includes an evaluation of the learning possibilities and predictions of the expected reactions of younger and older children. 8 hours in total

## Demonstration of Critical Thinking

1) Students will prepare written assignments on the following: • A childs level of cognitive development while involved in an activity • A childs response to specific science activities • A childs interaction with materials with respect to math knowledge and skills • Teacher intervention strategies during a science activity • The learning value of a cooking activity 2) Students will design curriculum activities to meet specific needs and interests in the following areas: • Math • Physical and natural science • Snack and cooking 3) Students will design interest centers that pose problems for children to work through. 4) Students will collect resources to support science curriculum. 5) Final Exam

## Required Writing, Problem Solving, Skills Demonstration

1. Students will prepare written assignments on the following: • A childs level of cognitive development while involved in an activity • A childs response to specific science activities • A childs interaction with materials with respect to math knowledge and skills • Teacher intervention strategies during a science activity • The learning value of a cooking activity 2. Students will present activity plan write-ups which include an evaluation of the learning possibilities and predictions of the expected reactions of younger and older children. 3. Essay exam

## Eligible Disciplines

Child development/early childhood education: Masters degree in child development, early childhood education, human development, home economics/family and consumer studies with a specialization in child development/early childhood education, or educational psychology with a specialization in child development/early childhood education OR bachelors degree in any of the above AND masters degree in social work, educational supervision, elementary education, special education, psychology, bilingual/bicultural education, life management/home economics, family life studies, or family and consumer studies OR the equivalent. Masters degree required.

## Other Resources

1. Assigned articles