

Course Title: Science and Mathematics – Curriculum & Assessment

Course # : EC 324

Credit Hours : 4

Catalog Description: This course focuses on a constructivist approach to teaching and learning mathematics and science concepts and skills in early childhood education (birth through age eight). Developing meaningful curricular content, supporting an inquiry approach to learning, planning for diverse learners, project based learning experiences, assessment and integration of Michigan early childhood standards are explored.

Prerequisites: Completion of EC 320

Name of Instructor: Shannan McNair Ed.D.

Semester: TBA

Class Location: TBA

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Course Objectives: Upon completion of the course students will be able to:

1. View early childhood and elementary science and mathematics as the construction of knowledge and skills through inquiry, experience and dialogue.
2. Use mathematical manipulatives and scientific demonstrations to aid students and teachers in understanding mathematical and science concepts.
3. Be aware of general mathematical and science concepts introduced in early childhood and know where to gather resources to aid in the teaching and learning of any of those concepts.
4. Develop long term, in-depth projects with children that draw on students' prior knowledge, enhance the development of new concept(s), facilitate concept understanding, and utilize authentic assessment techniques.
5. Assess the progress of students who are learning mathematics and science and be able to remediate for students who are having difficulties.
6. Create and/or adapt a personal collection of instructional resources (e.g., literature connections, instructional videos, activities, etc.) to aid in the teaching of mathematics and science.
7. Decrease math anxiety and sexism in the mathematics and science learning environment.
8. Develop a greater understanding of the interactive nature of the teaching/learning process by actively participating in role-playing experiences and class discussions related to specified topics.
9. Incorporate child-initiated practices in the 0-8 mathematics and science environment.
10. Understand & assess how you feel about mathematics and science and how that impacts your work with young children.

11. View self as a math and science learner and professional educator who is fully capable of making instructional decisions.

Text books:

Chaille, C. & Britain, L. (2003). *The Young Child as Scientist: A Constructivist Approach to Early Childhood Science Education*. Boston, MA: Allyn & Bacon

Kennedy, L.M., Tipps, S. & Johnson, A. (2008). *Guiding children's learning of mathematics* (11th ed.). Belmont, CA: Wadsworth.

Course Outline by topic:

- Scientific Inquiry
- Babies and Toddlers do Math and Science
- Key Concepts
- Science and Mathematics Process Skills
- Integrating Content Areas: Engaging Children in Projects
- Inquiry Approach to Math and Science Learning
- Observation and Assessment of Conceptual Understanding
- Key Number Tasks in EC
- Common Science Misconceptions
- The Importance of Scientifically and Mathematically Correct Materials
- Differentiation of Instruction and Assessment

Methods of instruction:

- Lecture
- Discussions – in class & on line
- Small group
- Classroom/field application

Assignments:

- Observations of Children & Reflections on Observations
- Test (s)
- Journal Articles
- Materials development
- Science and Math project work with children

Alignment of Objectives to Assignments

Course Objectives	Assignments:
1. View early childhood and elementary science and mathematics as the construction of knowledge and skills through inquiry, experience and dialogue.	Journal Articles: reading, posting key findings, comparing/contrasting approaches Response to class discussion in class, and Moodle postings 3 observation & reflection assignments (mathematics and science learning, language, teacher scaffolding, use of materials, response to inquiry-based instruction)
2. Use mathematical manipulatives and scientific demonstrations to aid students and teachers in understanding mathematical and science concepts.	In-class demonstration of teaching and learning strategies
3. Be aware of general mathematical and science concepts introduced in early childhood and know where to gather resources to aid in the teaching and learning of any of those concepts.	Test (s) on key concepts in mathematics and science teaching and learning 3 observation & reflection assignments (mathematics and science learning, language, teacher scaffolding, use of materials, response to inquiry-based instruction)
4. Develop long term, in-depth projects with children that draw on students' prior knowledge, enhance the development of new concept(s), facilitate concept understanding, and utilize authentic assessment techniques.	Science and Math project work with children – journal documenting what was learned in the implementation of inquiry-based mathematics and science projects in early childhood settings.
5. Assess the progress of students who are learning mathematics and science and be able to remediate for students who are having difficulties.	Science and Math project work with children – journal documenting what was learned in the implementation of inquiry-based mathematics and science projects in early childhood settings.
6. Create and/or adapt a personal collection of instructional resources (e.g., literature connections,	Materials development: designing the material support for investigative projects in mathematics and science.

instructional videos, activities, etc.) to aid in teaching of math and science.	
7. Decrease math anxiety and sexism in the mathematics and science learning environment.	Class reading, discussion and reflective Moodle postings
8. Develop a greater understanding of the interactive nature of the teaching/learning process by actively participating in role-playing experiences and class discussions related to specified topics.	3 observation & reflection assignments (mathematics and science learning, language, teacher scaffolding, use of materials, response to inquiry-based instruction)
9. Incorporate child-initiated practices in the 0-8 mathematics and science environment.	Moodle postings describing guided practice in EC setting
10. Understand & assess how you feel about mathematics and science and how that impacts your work with young children.	In class application & reflective Moodle postings
11. View self as a math and science learner and professional educator who is fully capable of making instructional decisions	Materials development: designing the material support for investigative projects in mathematics and science.

Academic Conduct Policy

Students are expected to submit assignments that conform to university policies governing dishonesty and misconduct (see the “Academic Conduct Policy” in the Undergraduate Catalog) Academic Honesty: Cheating and plagiarism are considered serious at Oakland University. All allegations of academic misconduct will be reported to the Dean of Students and, thereafter, to the Academic Conduct Committee for adjudication. Anyone found guilty of cheating in this course will receive a course grade of 0.0, in addition to any penalty assigned by the Academic Conduct Committee. Please refer to the 2009-2010 Oakland University Undergraduate Catalog to read the full Academic Conduct Policy

Grading Scale

<u>Grade %</u>	<u>Grade %</u>	<u>Grade %</u>
4.0 99-100	3.5 89-90	3.0 79-80
3.9 97-98	3.4 87-88	2.9 77-78
3.8 95-96	3.3 85-86	2.8 75-76
3.7 93-94	3.2 83-84	2.7 74

3.6 91-92 3.1 81-82 To <74