“Preparing Professionals for Changing Educational Contexts”

Department of Special Education
College of Education, University of Nevada, Las Vegas

Methods in ECE II: Math and Science
ECE 355
Fall 2006
3 Credit Hours
Thursday, 4:00 – 6:45

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Office Phone: 895-2966 E-Mail: michelle.tannock@unlv.edu
Office Location: CEB 154 Office Hours: By Appointment

COURSE INTRODUCTION
This course is designed to assist educators with developing the child’s understanding and appreciation of mathematics and science. The course will cover effective methods, strategies, and demonstration techniques for teaching and assessing mathematics and science in varied academic settings. Recent trends in mathematics and science education will be discussed.

Much of the learning will take place during class instructional time. Each student is expected to arrive prepared for the class, attend all class sessions, and to actively participate in all class activities and discussions. Projects will utilize individual work as well as small and large group cooperative experiences.

All assignments are required to be typed (double-spaced) and free of grammatical and spelling errors. The cover sheet for each assignment is to include the student’s name, the assignment title, date, course name and title, and the instructor’s name. All assignments are due on the date indicated in the course schedule. Late assignments will only be accepted in extenuating circumstances with prior arrangement with the course instructor. One letter grade will be deducted for each day an assignment is late without proper arrangements. A missed assignment cannot be made up and will result in a score of 0 (zero). Any missed class notes are the responsibility of the student.
NAEYC STANDARDS ADDRESSED

- **Standard 1**: Child development and learning: Programs prepare early childhood professionals who use knowledge of how children develop and learn to provide opportunities that support the development of all young children.
- **Standard 2**: Curriculum development and implementation: Programs prepare early childhood professional who plan and implement developmentally appropriate curriculum and instructional practices.
- **Standard 3**: Family and community relationships: Programs prepare early childhood professionals who establish and maintain positive, collaborative relationships with families.
- **Standard 4**: Assessment and evaluation: Programs prepare early childhood professionals who use formal and informal assessment strategies to plan and individualize curriculum and teaching practices.
- **Standard 5**: Professionalism: Programs prepare early childhood professionals who reflect, articulate, and evaluate their practices, philosophy, and evaluations for program planning and modification.

OBJECTIVES

**KNOWLEDGE**

1.1 Use knowledge of how children develop and learn to provide opportunities that support the physical, social, emotional, language, cognitive, and aesthetic development of all young children from birth through age eight.

1.2 Use knowledge of how young children differ in their development and approaches to learning to support the development and learning of individual children.

2.1 Plan and implement developmentally appropriate curriculum and instructional practices based on knowledge of individual children, the community, and curriculum goals and content.

2.1.3 Demonstrate current knowledge of and ability to develop and implement meaningful, integrated learning experiences, using the central concepts and tools of inquiry in curriculum content areas including mathematics and science.

4.1 Use informal and formal assessment strategies to plan and individualize curriculum and teaching practices.

5.1 Reflect on their practices, articulate a philosophy and rationale for decisions, continually self-assess and evaluate the effects of their choices and actions on others (young children, parents, and other professionals) as a basis for program planning and modification, and continuing professional development.

**PERFORMANCE SKILLS**

1.2.1 Demonstrate understanding of the conditions that affect children’s development and learning, including risk factors, developmental variations, and developmental patterns of specific disabilities.

1.2.2 Create and modify environments and experiences to meet the individual needs of all children, including children with disabilities, developmental delays, and special abilities.

2.1.1 Use and explain the rationale for developmentally appropriate methods that include play, small group projects, open-ended questioning, group discussion, problem solving, cooperative learning, and inquiry experiences to help young children develop intellectual curiosity, solve problems, and make decisions.

2.1.2 Use a variety of strategies to encourage children’s physical, social, emotional, aesthetic,
and cognitive development.

2.1.3 Develop and implement an integrated curriculum that focuses on children’s needs and interests and takes into account culturally valued content and children’s home experiences.

2.1.5 Create, evaluate, and select developmentally appropriate materials, equipment, and environments.

2.1.6 Evaluate and demonstrate appropriate use of technology with young children.

2.1.7 Develop and evaluate topics of study in terms of conceptual soundness, significance, and intellectual integrity.

2.2 Use individual and group guidance and problem-solving techniques to develop positive and supportive relationships with children, to encourage positive social interaction among children, to promote positive strategies of conflict resolution, and to develop personal self-control, self-motivation, and self-esteem.

4.1.1 Observe, record, and assess young children’s development and learning and engage children in self-assessment for the purpose of planning appropriate programs, environments, and interactions, and adapting for individual differences.

4.1.2 Develop and use authentic, performance-based assessments of children’s learning to assist in planning and to communicate with children and parents.

4.1.3 Select, evaluate, and interpret formal, standardized assessment instruments and information used in the assessment of children, and integrate authentic classroom assessment data with formal assessment information.

4.2 Develop and use formative and summative program evaluation to ensure comprehensive quality of the total environment for children, families, and the community.

5.5 Actively seek out opportunities to grow professionally by locating and using appropriate professional literature, organizations, resources, and experiences to inform and improve practice.

5.6 Establish and maintain positive, collaborative relationships with colleagues, other professionals, and families, and work effectively as a member of a professional team.

DISPOSITIONS

1.3 Apply knowledge of cultural and linguistic diversity and the significance of socio-cultural and political contexts for development and learning, and recognize that children are best understood in the contexts of family, culture, and society.

1.3.2 Affirm and respect culturally and linguistically diverse children, support home language preservation, and promote anti-bias approaches through the creation of learning environments and experiences.

3.1.1 Respect parents’ choices and goals for children and communicate effectively with parents about curriculum and children’s progress.

3.1.3 Support parents in making decisions related to their child’s development and parenting.

3.2 Demonstrate sensitivity to differences in family structures and social and cultural backgrounds.

3.5 Communicate effectively with other professionals concerned with children and with agencies in the larger community to support children’s development, learning, and well-being.

5.7 Establish and maintain positive, collaborative relationships with colleagues, other professionals and families, and work effectively as a member of a professional team.

RESULTS

2.1 Plan and implement developmentally appropriate curriculum and instructional practices based on knowledge of individual children, the community, and curriculum goals and content.
4.1.1 Observe, record, and assess young children’s development and learning and engage children in self-assessment for the purpose of planning appropriate programs, environments, and interactions, and adapting for individual differences.

REQUIRED TEXTBOOKS

SUPPLEMENTAL TEXTS AND/OR MATERIALS
None

ASSIGNMENTS

1. Beliefs and Practices Documentation ~ Due Week 2
   Develop a classroom management plan including how you will organize and manage disciplinary issues. The management plan should include your evaluation procedures, a portrait of the learners, and your philosophy of teaching and learning. (10 points)

2. Mathematics Journal Abstract ~ Due Week 5
   Select a mathematics journal article and write a reflective paper about the article (Questions to consider: Do you agree or disagree with the article? What are the implications for early childhood teachers? How would you implement the ideas presented in the article in your teaching? Do the ideas presented reflect Instructional Best Practices? Do the ideas presented in the article foster inquiry?). Highlight important ideas of the article and respond with comments, questions, and thoughts. Type your reference list and paper using APA standards. (10 points)

3. Math and Science Box ~ Due Week 10
   Assemble a math and science box consisting of 10 math activities and 10 science activities suitable for early childhood aged children. Use a small box and decorate it to suit the motif of the activities contained in the box. Activities in the box must each be self-contained. Worksheets are not acceptable for use in the box. All activities are to be designed for an individual and small group student use. (30 points)
4. **Science Unit ~ Due Week 12**
   Identify the goals of the unit and its correlation to Nevada’s Learning Standards. Complete a course organizer, concept/unit map, and a frame. Integrate children’s literature. Indicate Web Search/Assessments utilized in the construction of the unit. Include a Table of Contents. Complete three complete lesson plans in the unit. Complete and include a materials list. Complete a reflective piece. Indicate how the children will be assessed. Indicate how technology will be integrated in the lesson. (20 points)

5. **Math and Science Rubric ~ Due Week 14**
   Design one math and one science rubric for a selected performance-based lesson in each subject area. Discuss how these rubrics will be used with children of early childhood age (birth – 8 years). Discuss the criteria used to devise the rubrics. Discuss how the rubrics can be individualized for ALL students. Present these rubrics to the class. (30 points)

**GRADING POLICY**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>95 – 100</td>
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<tr>
<td>A-</td>
<td>90 – 94</td>
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<tr>
<td>B+</td>
<td>87 – 89</td>
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<tr>
<td>B</td>
<td>83 – 86</td>
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<tr>
<td>B-</td>
<td>80 – 82</td>
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<tr>
<td>C+</td>
<td>77 – 79</td>
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<td>C</td>
<td>73 – 76</td>
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<tr>
<td>C-</td>
<td>70 – 72</td>
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<td>D+</td>
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<tr>
<td>D</td>
<td>63 – 66</td>
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<td>D-</td>
<td>60 – 62</td>
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<td>F</td>
<td>59 or less</td>
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All grades will be contracted by the students. See the attached Grading Rubric. Contracts for grades are due the third night of class and may be revised throughout the semester. Regular attendance and class participation are expected and count as part of your grade. Five points will be deducted for each absence after two cumulative absences. Documentation through email will be necessary to ensure your absence is excused.

**PERFORMANCE ASSESSMENTS**

See Attached Rubric
Disability Resource Center
The Americans with Disabilities Act mandates accessibility in all aspects of the learning environment. “If you have a documented disability that may require assistance, you will need to contact the Disability Resource Center (DRC) for coordination in your academic accommodations. The Disability Resource Center is located in the Reynolds Student Services Complex, room 137. The DRC phone number is 895-0866 or TTY 895-0652.”

Academic Integrity Statement
UNLV and its College of Education demand a high level of scholarly behavior and academic honesty on the part of students. Violations by students exhibiting honesty while carrying out academic assignments and procedural steps for dealing with academic integrity are delineated in the Handbook of Regulations Governing Probation and Suspension Within The College of Education. This publication may be found in the curriculum Materials Library (CML – CEB 101), the Department of Educational Leadership (CEB 320), or the Office of the Dean of the College Education (CEB 301).

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Religious Holidays
It is UNLV’s policy to give students who miss class because of observance of religious holidays the opportunity to make up missed work. Students are responsible for notifying the instructor no later than the last day of registration for the semester or summer term of plans to observe the holiday.

Collection of Student Assignments for Accreditation Purposes
Assignments completed for this course may be used as evidence of candidate learning in national, regional, and state accreditation reports of COE programs. Names and other identifying elements of all assignments will be removed before being included in any report. Students who do not wish their work to be used for accreditation purposes must inform the instructor in writing by the end of late registration. Your participation and cooperation in the review of COE programs is appreciated. Thank you.

CLASS SCHEDULE

ECE 355
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction and overview of course requirements</td>
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<tr>
<td>Week 2</td>
<td>Foundations of Instruction</td>
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<tr>
<td></td>
<td>- planning and assessing learning activities</td>
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<td>- curriculum organization</td>
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<td>- developmentally appropriate curriculum</td>
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<td>- integrated curriculum</td>
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<td>- authentic assessment</td>
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<td>- incorporating diversity</td>
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<td>Week 3</td>
<td>Science Instruction</td>
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<td>- learning through manipulation and discovery</td>
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<td>- definition of science</td>
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<td>- science process skills</td>
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<td>Week 4</td>
<td>Science Instruction</td>
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<tr>
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<td>- learning through science integration</td>
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<td>- planning activities</td>
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<td>- major science themes</td>
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<td>Week 5</td>
<td>Math Instruction</td>
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<td></td>
<td>- learning with numbers</td>
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<tr>
<td></td>
<td>- manipulation and discovery</td>
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<tr>
<td></td>
<td>- how math is taught</td>
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<tr>
<td></td>
<td>- learning through math integration</td>
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</tbody>
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Week 6  Math Instruction  
- thinking and reasoning/problem solving  
- statistics and probability  
- measurement  

Week 7  Math Instruction  
- geometry  
- patterns and functions  
- integrating technology  
- assessment  

Week 8  Assessment and Reporting  
- definition of assessment  
- formal assessment  
- informal assessment  
- reporting assessment results  
- rubric development and usage  

Week 9  Scientific Investigation  
- experimental designs  
- project-based instruction  
- learning cycle  
- inquiry based teaching  

Week 10  Scientific fundamental concepts  
- big ideas of science  
- inter-relatedness of sciences  
- theme based science  
- discrepant events
Week 11 Math and Science in the Home
- involving families in children’s learning

Week 12 Math Instruction
- fractional numbers
- developing fractions and decimals
- strategic math instruction
- ratio, proportion, and percentage

Week 13 Classroom Management
- rules, consequences, expectations
- large and small group management
- individualized management plans

Week 14 Final Presentations
LESSON PLAN FORMAT

Subject: ____________________________________________

Grade: ____________________

Date: ____________________

Lesson Title: ______________________________________

Long Range Goal (s):

Objective (s):

Material (s):

Method (s):

Evaluation:
“Preparing Professionals for Changing Educational Contexts”
Department of Special Education
College of Education, University of Nevada, Las Vegas
ECE 355 Early Childhood Methods: Math and Science
Class Grading Sheet

<table>
<thead>
<tr>
<th>Proficiency</th>
<th>Lesson Formats 5%</th>
<th>Criteria 50%</th>
<th>Completion 45%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary A</td>
<td>• Clear, logical sequence and order • Easy to follow • Typed • Appropriate grammar and spelling</td>
<td>• Provides background information • Has appropriate materials prepared • Developmentally appropriate</td>
<td>• All work completed • All work handed in on time • No absences from class</td>
</tr>
<tr>
<td>Acceptable B/C</td>
<td>• Clear, logical sequence and order • Somewhat easy to follow • Few grammar and spelling errors</td>
<td>• Provides some background information • Has few appropriate materials • Considers most of the developmentally appropriate concepts</td>
<td>• Most work completed • Most work handed in on time • Two or less absences from class</td>
</tr>
<tr>
<td>Unacceptable F</td>
<td>• No clear, logical sequence or order • Hard to follow • Many grammar and spelling errors</td>
<td>• No background information given • No materials available • Developmentally inappropriate</td>
<td>• Little or no work completed • Little or no work handed in on time • Excessive absences from class</td>
</tr>
</tbody>
</table>

Rubric for Lesson/Unit Plan Development
| Instruction Goals and Objectives | Instructional goals and objectives are not stated. Learners can not tell what is expected of them. Learners can not determine what they should know and be able to do as a result of learning and instruction. | Instructional goals and objectives are stated but are not easy to understand. Learners are given some information regarding what is expected of them. Learners are not given enough information to determine what they should know and be able to do as a result of learning and instruction. | Instructional goals and objectives are stated. Learners have an understanding of what is expected of them. Learners can determine what they should know and be able to do as a result of learning and instruction. | Instructional goals and objectives clearly stated. Learners have a clear understanding of what is expected of them. Learners can determine what they should know and be able to do as a result of learning and instruction. |
| Instructional Strategies | Instructional strategies are missing or strategies used are inappropriate. | Some instructional strategies are appropriate for learning outcome(s). Some strategies are based on a combination of practical experience, theory, research and documented best practice. | Most instructional strategies are appropriate for learning outcome(s). Most strategies are based on a combination of practical experience, theory, research and documented best practice. | Instructional strategies appropriate for learning outcome(s). Strategy based on a combination of practical experience, theory, research and documented best practice. |
| Assessment | Method for assessing student learning and evaluating instruction is missing. | Method for assessing student learning and evaluating instruction is vaguely stated. Assessment is teacher dependent. | Method for assessing student learning and evaluating instruction is present. Can be readily used for expert, peer, and/or self-evaluation. | Method for assessing student learning and evaluating instruction is clearly delineated and authentic. Can be readily used for expert, peer, and/or self-evaluation. |
| Technology Used | Selection and application of technologies is inappropriate (or nonexistent) for | Selection and application of technologies is beginning to be appropriate for | Selection and application of technologies is basically appropriate for | Selection and application of technologies is appropriate for learning |
|----------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------|
| **Materials Needed**             | Material list is missing.                                                      | Some materials necessary for student and teacher to complete lesson are listed, but list is incomplete. | Most materials necessary for student and teacher to complete lesson are listed. |
| **Organization and Presentation**| Lesson plan is unorganized and not presented in a neat manner.                 | Lesson plan is organized, but not professionally presented.                        | Complete package presented in well organized and professional fashion. |