COURSE OF STUDY

1. **Title and Number of Credits**: CIEE 5130 Mathematics Methods and Assessments for Teaching K-5 (2 graduate credits)

2. **Course Description**: The purpose of this course is to develop teacher candidate competence in planning, conducting, and assessing mathematics learning experiences with children from kindergarten through fifth grade to ensure the success of all children in meeting the standards. The course makes use of relevant readings and video to show the experiences of diverse children to enable teachers to interpret children’s mathematical behavior in meaningful ways. It considers mathematical thinking as part of a developmental process and explores the origins of elementary students’ mathematical ideas before school begins and in formal school settings. The content of the course follows the recommendations for mathematics standards developed by the New Jersey in the Core Curriculum Content Standards for Mathematics (NJCCCS, 2004, revised 2008), principles and standards for school mathematics developed by the National Council of Teachers of Mathematics, (NCTM, 2000, NCTM, 2002), and reflects performance expectations for K-5 students on statewide and other standardized assessments.

3. **Prerequisites**: CIEE 5110

4. **Course Objectives**:  
   1. Identification and analysis of the big ideas included in the mathematics standards for preschool and K-5 students.  
   2. Use of informal and formal assessments to interpret the mathematical knowledge and skills that elementary children bring to learning the core curriculum content in mathematics.  
   3. Development of knowledge and skills in using effective instructional methods for teaching mathematics to elementary students through problem solving, cooperative learning, interdisciplinary applications, and the use of models, manipulative materials and technology.  
   4. Development of knowledge and skills to address the cultural, language, and special education factors that affect learning and assessment of elementary students as they construct mathematical concepts.  
   5. Development of knowledge and skills to plan and teach standards-based lessons that address the big ideas in the mathematical content standards, engage the children in meaningful and challenging activities to address the content, include differentiated instructional strategies, and assess children’s learning.
5. **Student Learning Outcomes:**
The teacher-candidate will be able to:

1. Identify and analyze the conceptual and procedural knowledge that K-5 students need to meet the curriculum content standards through online discussions, in-class discussions, and video analyses.
2. Accurately observe, interpret, and document elementary children’s knowledge and thinking about mathematics through direct observation, clinical interviews and analysis of video examples.
3. Develop, administer, document and reflect on informal and formal assessments of children’s mathematical thinking.
4. Demonstrate in lesson plans how to use effective instructional strategies in teaching elementary mathematics, such as the use of models, manipulative materials and technology applications, and how to use teaching and assessment techniques to provide equitable opportunities and access for all students to higher level and challenging mathematics knowledge.

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<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>NJ Teaching Standards</th>
<th>ACEI Standards (SPA)</th>
<th>NCATE Standards</th>
<th>WPU Competencies</th>
<th>NJ DOE ECE/CCCS Standards</th>
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6. **Course Content**

1. Analyzing core curriculum content and process standards in elementary mathematics-
   - *Principles and Standards for School Mathematics* (NCTM, 2000),
   - the *Position Statement on Mathematics for Young Children* (NCTM/NAEYC, 2002),
   - and the *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence* (NCTM, 2006).

   - History of the standards movement
   - Six NCTM principles (Equity, Curriculum, Teaching, Learning, Assessment, Technology)
   - Importance of process standards
   - Role of teacher attitudes about mathematics in teaching and learning mathematics
- Problem solving orientation to lesson planning
- Standards-based elementary mathematics programs and texts
- Impact of high-stakes testing, including state assessments

2. Developing children’s early number concepts and number sense; patterns and algebraic thinking; developing understanding of the meanings for and relationships among the arithmetic operations.
   - Assessing children’s informal knowledge of number concepts
   - Constructing new knowledge based on existing ideas and knowledge
   - Conceptual and procedural understanding
   - Multiple representations to support understanding
   - Classifying, quantifying, counting, and comparing numbers
   - Developing, recognizing and continuing patterns
   - Relationships of number to the real world
   - Developing meaning for the arithmetic operations
   - Using children’s literature to develop concepts

3. Developing whole number place value concepts.
   - Counting by one, groups and singles, tens and ones
   - Standard and non-standard base-ten representations—decomposing and composing
   - Models for place value
   - Place value notation

4. Learning about strategies for teaching whole number computation—addition and subtraction; multiplication and division.
   - Thinking strategies and games for learning facts
   - Problem-solving context for learning computation
   - Flexible methods for taking apart and combining numbers
   - Relationships among the operations
   - Invented strategies and alternative algorithms (cross-cultural connection)
   - Traditional algorithms
   - Appropriate use of calculators and other technology

5. Developing children’s fraction concepts and strategies for computation.
   - Models and meanings for fractions
   - Developing number sense for common fractions, decimal fractions and percents
   - Models for understanding algorithms
   - Cross-content connections

6. Developing geometric thinking and concepts
   - Van Hiele levels of geometric thinking
   - Shapes and properties
   - Transformation, location and visualization
   - Technology tools for exploring geometric concepts
7. Developing measurement concepts
   - Direct comparison, non-standard, and standard units
   - Using models of measuring units
   - Using measuring instruments and selecting the appropriate measure
   - Developing benchmarks for estimation
   - Relationship of area, perimeter, and volume

8. Teaching data analysis and probability and statistics in the elementary grades
   - Collecting, organizing, displaying and interpreting data
   - Theoretical and experimental probability

9. Lesson planning in elementary mathematics
   - Informal and formal assessment strategies to learn about children’s prior knowledge and to evaluate children’s learning
   - Evaluating children’s learning
   - Strategies for questioning and encouraging mathematical discourse
   - Connections across the curriculum
   - Integrating technology, models and manipulative materials
   - Differentiating mathematics instruction to meet the needs of English language learners and children with disabilities

7. **Teaching/Learning Methods**
   1. Technology-supported, interactive lectures
   2. Reflection and discussion on assigned readings, virtual manipulative materials, and classroom-based assignments using the Blackboard Discussion Board
   3. In-class and on-line analysis of video clips of children’s mathematical thinking
   4. In-class small group problem solving, exploration of mathematical models, and lesson planning activities

8. **Evaluation Methods:**
   1. Weekly assignments on Blackboard Discussion Board and classroom work, including presentations of action research from the professional journals (SLO 1)
   2. Clinical interview of elementary grade child to assess thinking strategies and difficulties with selected mathematical concepts (SLO 2)
   3. Developing, administering, and reflecting on open-ended assessment items of selected mathematical content at an elementary grade level (SLO 3)
   4. Developing, presenting, and reflecting on a lesson plan for an elementary school classroom. * (SLO 4)

9. **Recommended Texts**

10. **Preparer’s Name and Date:** Originally revised, Rochelle Goldberg Kaplan, Ph.D., Fall 2004

11. **Department’s Approval Date:** Fall, 2004

12. **Reviser’s Name and Date:** Linnea Weiland, Ph.D., Spring 2010

13. **Department’s Approval Date for Revisions:** Spring 2010

14. **Bibliography**

**Texts and Journal Articles**


National Council of Teachers of Mathematics. (2002). Learning and teaching with technology [Focus Issue]. Teaching Children Mathematics. 8(6).

National Council of Teachers of Mathematics. (2004). Teaching mathematics to special needs students [Focus Issue]. Teaching Children Mathematics. 11(3).

National Council of Teachers of Mathematics (2009). Equity and diverse populations [Focus Issue]. Teaching Children Mathematics. 16(3).


**Websites**

Computing Technology for Math Excellence, [http://www.ct4me.net/math_manipulatives.htm](http://www.ct4me.net/math_manipulatives.htm)

K-12 Mathematics Curriculum Center, [http://www2.edc.org/mcc/default.asp](http://www2.edc.org/mcc/default.asp)


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