WILLIAM PATERSON UNIVERSITY
College of Education
Department of Special Education and Counseling

COURSE OF STUDY

Theme: Preparing Inquiring Educators: Knowledge, Understanding and Application

A. **Course Title:** SPEE 424 Math/Science Assessment And Instruction For Diverse Learners K-5
   3 Credits

B. **Course Description:** In this course teacher candidates explore the principles and techniques of mathematics and science education at the K-5 level. Curricular content is based upon the NCTM's Curriculum and Evaluation Standards for School Mathematics, the National Science Standards and the New Jersey Core Curriculum Content Standards. Teacher candidates learn how to teach mathematics content ranging from counting skills to pre-algebra and topics in the earth, biological, and physical sciences. Candidates are prepared to motivate and teach all learners through a fluid and comprehensive process of assessment, instruction and practice. Individualized goal setting, adaptation of materials, task and error analysis, and transitioning from manipulative materials to paper-and-pencil are presented as methods of meeting the needs of the special learner. An embedded field experience is included.

C. **Prerequisites, Co-Requisites and Restrictions:**
   **Prerequisites**
   - Completion of all general education course work
   - Admission to the Dual Endorsement Special Education/K-5 Elementary Program
   - Completion of at least 60 hours of Service Learning Credit
   - Completion of CIEE 229, CISE 340 and CODS 371
   - GPA of 2.75
   - SPEE 354: Classroom Management in Diverse & Inclusive Settings
   - SPEE 353: Instruction in Diverse & Inclusive Settings
   **Co-Requisites*** To be taken as part of a package with:
   - SPEE 423: Math/Science Assess and Instruct for Diverse Learners K-5
   - SPEE 425: Practicum and Seminar
   - SPEE 429: Individualized Instructional Strategies and Materials

D. **Course Objectives:** The Teacher Candidate will . . .
   1. Identify current issues and trends in elementary mathematics and science instruction
2. Identify the standards, curricular objectives and key operations for math and science instruction as articulated in the professional organizations for teachers and the New Jersey CCCS and Cumulative Progress Indicators.

3. Identify and evaluate appropriate instructional materials in math and science, including textbooks, teachers' guides, manipulative materials, multi-media, and technology.

4. Evaluate materials in terms of their ability to address the needs of special learners and learners from diverse cultural backgrounds.

5. Prepare effective math and science instruction that helps students at all ability levels progress towards meeting the New Jersey CCCS through lessons that incorporate assessment to determine the SLO and the starting point of instruction, teaching to different learning styles, multiple types of practice, and assessment of SLO.

6. To utilize a variety of learning activities, including manipulative materials, representational models, calculators, computer applications, cooperative learning.

7. To utilize problem solving activities in math and science that challenge students to think critically, form hypotheses, estimate, gather data and evidence, draw conclusions, and present results.

8. To motivate students through the use of learning activities that address a variety of learning styles, ability levels, cultural background and personal interests.

9. To adapt materials, curricular goals, instruction and practice for students with special needs.

10. To integrate math and science activities in ways that help students generalize skills and understandings across curricular areas.

E. **Teacher Candidate Learning Outcomes**: Teacher Candidates will . . .

1. Prepare and implement an integrated (mathematics and science), developmentally appropriate, culturally-sensitive thematic unit plan that incorporates content from the NJ CCCS, and include instructional adaptations for learners with special needs; and assess results using authentic assessments.

2. Identify research to understand learners’ unique learning styles and approaches to problem solving in math, and use alternative assignments based on multiple intelligences to accommodate differences in preferred learning styles and abilities.

3. Work collaboratively with colleagues to plan lessons in a variety of settings and for a variety of purposes, and cooperatively with parents [of students from diverse cultural, racial/ ethnic, socio-economic, ability levels].

4. Apply knowledge of diversity to understanding print and supplementary materials in mathematics and science by analyzing the relationships.
between the materials to the NJ CCCS, with attention to essential issues, e.g., developing critical thinking skills, suitability for diverse learners from different cultures and ethnicities, and of differing ability levels.

5. Master content for quizzes and examinations, attend and participate [as ongoing assessments of TC learning, dispositions, and professionalism], and analyze self-growth as a professional.

<table>
<thead>
<tr>
<th>Teacher Candidate Learning Outcomes</th>
<th>CEC</th>
<th>ACEI</th>
<th>NJ CCCS</th>
<th>NJPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Integrated Unit</td>
<td>3, 4, 7, 8</td>
<td>1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 3.5, 5.2</td>
<td>4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td>
<td>1, 3, 4, 5, 7, 8</td>
</tr>
<tr>
<td>2. Approaches to problem solving</td>
<td>3, 4, 7</td>
<td>1, 2.2, 2.3, 3.1, 3.2, 4</td>
<td>4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td>
<td>1, 4, 7</td>
</tr>
<tr>
<td>3. Lesson Plans</td>
<td>3, 4, 7, 8, 10</td>
<td>1, 2.2, 2.3, 3.1, 3.2, 3.3, 4, 5.4</td>
<td>4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td>
<td>1, 3, 4, 7, 9</td>
</tr>
<tr>
<td>4. Analysis of materials</td>
<td>3, 7</td>
<td>2.2, 2.3, 3.2, 3.3</td>
<td>4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td>
<td>1, 3, 7</td>
</tr>
<tr>
<td>5. Analysis of Self-growth</td>
<td>9</td>
<td>5.2</td>
<td>4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td>
<td>10</td>
</tr>
</tbody>
</table>

**F. Course Content:**

1. The NJ Core Curriculum Content Standards, NCTM Curriculum and Evaluation Standards for School Mathematics, the National Science Standards in relation to K-5 content and IEP goals.

2. Cognitive processes and attitudes conducive to the study of mathematics and science, e.g., inquiry, discovery learning, respect for the environment.
3. Print and manipulative materials, internet sites, and math/science software
4. Evidence-based learning strategies, e.g., cooperative learning, inquiry-based small group problem solving
5. Transition from concrete and experiential activities to formal and symbolic representation through paper and pencil activities
6. Number recognition, counting, number facts, computational algorithms, patterns of numbers, pre-algebra, geometry, probability and statistics, and graphing
7. Earth and the universe, living things and their environment, the human body and nutrition, changes in matter and energy, friction and machines, sound and light, magnetism and electricity
8. Analysis of the results of state and district formal high-stakes tests
9. Informal assessment, including observation, questioning for understanding, authentic assessments, seatwork and homework, performance tasks, and teacher-made test that are sensitive to learning and cultural differences
10. Unit and lesson planning, and the integration of lessons within the larger instructional goals identified in units
11. Reflection on practice (preparation, materials, pacing, engagement, student success)

G. Teaching / Learning Methods:
  ▪ Lecture and discussion; BlackBoard [Bb] technology to augment lectures
  ▪ Live Text
  ▪ Text/Related readings
  ▪ Cooperative learning groups
  ▪ Video vignettes/Case studies
  ▪ Experiential learning in math and science
  ▪ Clinical experiences in parallel practicum course
  ▪ Demonstration lessons
  ▪ Journaling of math and science experiences

H. Performance Based Assessment:
  1. Prepare an integrated unit plan in math science (rubric)
  2. Analyze learning styles and approaches to problem solving in math in order to develop assignments that accommodate learning differences (rubric)
  3. Develop lesson plans that meet the needs of students from a variety of levels and cultural backgrounds (rubric)
  4. Analyze science and math materials in terms of their sensitivity to cultural diversity, connection to the NJ CSSS and the degree to which they foster critical thinking skills (rubric)
  5. Reflect in journal on growth in knowledge, understanding and
application of pedagogical and content knowledge in science and math (rubric).

I. **Suggested Text:**

J. **Preparer’s Name (most recent revision):** Peter Griswold on 12/3/04

K. **Department Approval Date:** February 1, 2005

L. **Current Preparer’s Name(s):**

M. **Current Department Approval Date:**

N. **Bibliography:**


Association of Science and National Association for Special Educational Needs (2002). *Inclusive science and special education needs,* http://issen.org.uk/


<table>
<thead>
<tr>
<th><strong>Lesson Plan</strong></th>
<th><strong>Needs Work</strong></th>
<th><strong>Satisfactory</strong></th>
<th><strong>Advanced</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>NJ Core Curriculum Content Standard and/or SLO missing or inappropriate</td>
<td>Includes appropriate NJ Core Curriculum Content Standard and SLO</td>
<td>Includes appropriate NJ Core Curriculum Content Standard and an SLO express as observable behavior</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Skills and content inappropriate to the students' level</td>
<td>Skills and content appropriate to the students' level</td>
<td>Skills and content promote critical thinking, maintenance, or generalization to other settings</td>
</tr>
<tr>
<td><strong>Instruction</strong></td>
<td>Introduction and/or instruction are missing or unclear;</td>
<td>Introduction and instruction clearly explained</td>
<td>Introduction is motivating; instruction is multi-sensory and creative; questioning for understanding included</td>
</tr>
<tr>
<td><strong>Practice</strong></td>
<td>Practice is missing or unclear</td>
<td>Guided and independent practice is clearly explained and provides opportunities to apply skills</td>
<td>Guide and independent practice that includes hands-on activities, technology, and/or cooperative learning</td>
</tr>
<tr>
<td><strong>Adaptations</strong></td>
<td>No adaptations listed</td>
<td>Appropriate adaptations</td>
<td>Appropriate adaptations that promote independence and self-worth</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
<td>Assessment is missing, does not assess all learners or does not assess SLO</td>
<td>Assessment assesses mastery of the SLO</td>
<td>Assessment assesses mastery of SLO by all students; includes a rubric if necessary</td>
</tr>
<tr>
<td><strong>Overall Rating</strong></td>
<td>Lesson does not promote or assess learning</td>
<td>Lesson promotes and assesses learning</td>
<td>Lesson promotes and assesses higher learning skills in an effective and creative manner</td>
</tr>
<tr>
<td>Materials Plan</td>
<td>Needs Work</td>
<td>Satisfactory</td>
<td>Advanced</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
<td>--------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td>Limited or missing relationship of materials to NJ CCCS</td>
<td>Describes the relationship of the materials to the NJ CCCS</td>
<td>Detailed and insightful description of the relationship of the materials to the NJ CCCS</td>
</tr>
<tr>
<td><strong>Organization and Appearance</strong></td>
<td>Descriptions are poorly sequenced and/or contain multiple errors in language mechanics</td>
<td>Descriptions are well organized and free from error in language mechanics</td>
<td>Quality of organization and appearance exceeds standards (top 5% of student work)</td>
</tr>
<tr>
<td><strong>Completeness</strong></td>
<td>Focuses on text; excludes electronic, media and/or manipulative materials</td>
<td>Describes all materials (electronic, print, manipulative, multi-media)</td>
<td>Describes all materials and their interrelationship</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Limited description of how materials are used in learning activities</td>
<td>Describes how materials are used in learning activities</td>
<td>Describes how print, electronic, media and manipulative materials are integrated in learning activities and promote critical thinking skills</td>
</tr>
<tr>
<td><strong>Adaptations</strong></td>
<td>No adaptations listed</td>
<td>Describes how materials can be adapted for learners with special needs</td>
<td>Illustrates how materials can be adapted through models and examples</td>
</tr>
<tr>
<td><strong>Diversity</strong></td>
<td>Fails to address how materials are culturally sensitive</td>
<td>Describes how materials are culturally sensitive</td>
<td>Insightful analysis and use of examples to show how materials are culturally sensitive</td>
</tr>
<tr>
<td><strong>Overall Rating</strong></td>
<td>Analysis does not meet standards</td>
<td>Analysis meets standards</td>
<td>Analysis exceeds standards</td>
</tr>
</tbody>
</table>