William Paterson University  
College of Education  
Department of Elementary and Early Childhood Education  

COURSE OF STUDY

Theme--Preparing Inquiring Educators; Knowledge, Understanding, Application

1. **Course Title and Credits:** ELCL 620, Math Clinic; 3 graduate credits

2. **Course Description:**
This course provides teachers with a clinical experience in identifying and rebuilding mathematics conceptions of school-age children. Its purpose is to provide teachers with an opportunity to explore and apply current professional standards by examining in-depth the ways in which students interpret and think about school mathematics content. During the course of the semester, each teacher works with one or two children. The primary assessment and teaching tool used is the individual clinical interview in the context of problem solving and scaffolded learning experiences. Technology applications of mathematical concepts and procedures are also used to further understand children's reasoning. A detailed assessment and instructional plan for each student is developed and implemented during the semester.

2. **Prerequisites:** Matriculation in Teaching Children Mathematics (TCM) concentration of M.Ed. in Education program or permission of program director.

3. **Course Objectives:**
A. To examine the current position taken by the National Council of Teachers of Mathematics and the New Jersey Mathematics Core Curriculum Standards regarding the development and assessment of mathematical knowledge
B. To analyze misconceptions in mathematics through case study material and videotaped interviews.
C. To become aware of teachers' own styles of communication with students in a one-to-one interview context.
D. To learn how to identify and correct mathematics misconceptions of school-age children.
E. To explore and apply current professional standards to examine students' thinking about informal or invented concepts and conventional school mathematics content.
F. To learn how to use the clinical interview and scaffolded instruction in the context of problem solving as a primary assessment tool.
G. To learn about technology applications of mathematical concepts and procedures to further understand children's reasoning.
H. To learn how to help parents learn to work with their own children.
I. To be able to reflect on the progress of weekly assessments
J. To develop a summative diagnosis and instructional plan with follow-up for each student seen in the clinic.
K. To practice skills in the clinic context that will transfer to teachers practices in their own classrooms.
4. **Student Learning Outcomes:**
   As a result of participating in this course, students will:

A. do a task analysis of the major curriculum strands described by the National Council of Teachers of Mathematics and the New Jersey Core Curriculum Standards for Mathematics
B. analyze students' mathematical constructions and misconceptions in mathematics curriculum topics across the curriculum through case study material and videotaped interviews.
C. conduct and reflect upon a practice clinic interview before meeting with clinic students
D. prepare specific tasks for interviews incorporating concrete and symbolic representations, problem solving, explanations, games, and technology to assess the mathematical thinking of individual students.
E. conduct interviews with children in order to understand how mathematical knowledge is constructed in various topics of the mathematics curriculum
F. utilize scaffolding teaching to aid in the assessment process.
G. prepare and post on Blackboard written reflective reports on weekly sessions including assessment findings and plans for subsequent sessions.
H. confer with parents about how to facilitate school mathematics success of their own children.
I. develop and implement a mathematics reconstruction plan for students seen in the clinic.
J. extend individual assessment techniques to the diagnosis of mathematics misconceptions in their own classrooms.
K. apply their knowledge of mathematical thinking to develop mathematics learning activities for their own classrooms

5. **Course Content:**
A. Overview of Current National and Regional Standards in Mathematics Education and State-of-the-Art Practices
   1) Hands-on experiences in the construction of mathematical knowledge using non-routine problem solving and manipulative materials
   2) Small and large group reflections upon the experience of constructing mathematical knowledge
   3) Philosophical and historical background of constructivism, Piaget's theory of development, and his clinical interviewing technique
B. Distinguishing Between Formal and Informal Assessment for Evaluating Students' Mathematical Knowledge
   1) Standardized tests
   2) Teachers' written tests
   3) The role of observation
   4) Listening to and interpreting students' explanations
   5) Clinical interviewing
C. The Origins of Children's Informal Mathematical Thinking
   1) Viewing of videotapes of children engaged in mathematical Piagetian tasks such as seriation, conservation, and classification in order to investigate the process of clinical interviewing and to analyze the mathematical constructions and misconceptions of young children
2) Administration of Piagetian mathematics tasks to children in order to understand firsthand how children construct mathematical knowledge

D. Transitions to Formal School Procedures
   1) Students conceptions of symbols and other representational formats
   2) Additional viewing of videotapes of children and adults engaged in school mathematics activities (including arithmetic operations with whole numbers; operations with fractions, decimals, and percents; probability and statistics; geometric concepts; pre-algebra and algebra concepts) in order to further investigate the process of clinical assessment in mathematics.

E. Working with and adapting standardized assessments techniques in relation to core curriculum standards and the NJ Framework for Mathematics Education

F. Assessing and teaching students with mathematics learning difficulties referred through the Mathematics Clinic with emphasis on diagnosing strengths as well as weaknesses and on collecting information through a range of assessment techniques

G. Communicating the results of assessments of students with mathematics difficulties and formulating a reconstruction plan

H. Adapting individual assessment techniques for classroom use and for use by parents

7. **Teaching/Learning Methods:**
   A. Lecture and demonstration
   B. Assigned readings
   C. In-class practice and demonstration of assessment techniques by instructor & students
   D. Analysis of published videotaped interviews
   E. Practice clinical interviewing and scaffolded teacher prior to clinic opening
   F. Interviewing experiences with individual children
   G. Reflective report writing with feedback
   H. Use of Blackboard as a course communication system

8. **Evaluation Methods:**
   A. Feedback on presentation of videotaped clinic interview with a child outside of the clinic setting
   B. Weekly written reflective reports and plans for clinic meetings with students and/or their parents (posted and reviewed through the Blackboard system or on email before each clinic session)
   C. Participation in class discussions on session debriefings including sharing of videotaped sessions
   D. In-class shared planning and problem practice for next session
   E. Written final portfolio report describing the assigned students’ mathematical competence and needs for further teaching.
   F. Written short report to parents of child’s progress and areas still needing improvement.

9. **Recommended Texts/Readings**
Psychological Research and Practice.
New Jersey Curriculum Framework for Mathematics K-12, NJ Department of Education.

10. **Preparer’s Name and Date:** Rochelle G. Kaplan, Fall 1996

11. **Department Approval Date:** 1996

12. **Reviser’s Name and Date:** Rochelle G. Kaplan, Spring 1998; updated Spring 2000; revised Fall 2003

13. **Department Revision Approval Date:** Spring 1998, Spring 2000; Fall 2003

14. **Bibliography**


