

OFFICE OF THE PROVOST  
APR 1 2004  
PROCESS A

\*Sponsoring Dpt is Math

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NON-GENERAL EDUCATION ~ CURRICULUM PROPOSAL  
LIBRARY RESOURCE FORM REQUIRED

SCC #03-04- JLP

Deadlines  
October 3, 2003 to be implemented Fall 2004 ~ February 13, 2004 to be implemented Spring 2005

Apr/05

PROPOSAL TITLE: Processes & Principles of School Mathematics

Sponsor(s): Dr. Jill Perry E-Mail: perry@rowan.edu Ext: 3732  
Dr. Eric Milon E-Mail: milon@rowan.edu Ext: 3276

DEPARTMENT: Sec. Ed + Math

COLLEGE: Education

If Liberal Arts & Sciences CHECK :  History/Humanities  Math/Sciences  Social/Behavioral Sciences

UNDERGRADUATE  GRADUATE

THE ATTACHED NON-GEN-ED PROPOSAL IS BEST DESCRIBED BY THE ITEM(S) CHECKED

- New non-gen-ed course
- Short-term non-gen-ed course
- Minor curricular changes (fewer than three) to:
  - Existing non-gen-ed course
  - Non-gen-ed degree requirements
  - Major
  - Minor, specialization, concentration, track, certificate program

THE FOLLOWING SIGNATURES REPRESENT APPROVAL

Department Chair: [Signature] Date: 3-9-04  
Department Curriculum Chair: [Signature] Date: 3/9/04  
Academic Dean: [Signature] Date: 3-9-04

University  
COLLEGE CURRICULUM COMMITTEE

OPEN HEARING Date: 3-2-2004 Approved  Not Approved

COLLEGE CURRICULUM CHAIR: \_\_\_\_\_  
Senate Curriculum Chair Signature: [Signature] Date: Senate Announcement 3-25-2004

Comments: Approved at time of #806 at Senate Curriculum Meeting

EXECUTIVE VICE PRESIDENT/PROVOST Signature: [Signature] Date: \_\_\_\_\_

Approved  Not Approved

07/04

Date: 7/14/04 Course Description Received & Approved ~ Hegis Taxonomy & Course #: 1701560  
Registrar Signature: [Signature] 0833.502

NOTIFICATION FORWARD

- SCC Chair
- Academic Dean
- Department Chair
- Registrar
- IR
- CAP
- VP Student Affairs
- Others

Trans. 7/27/04

(per Registrar's office - 8/12/04  
RW  
see attached

**From:** Kessel, Steven J.  
**To:** Wiest, Rosemarie  
**Date:** 8/12/04 11:47AM  
**Subject:** Process/Principles of School Math

*C3-04-828*

Responding to Dr. Milou's concern over the HEGIS number for Process/Principles of School Math, I find I was mistaken to assign it a math code. I've changed the number for the course, from 1701560, to 0833502.

0833502 Process/Princ School Math

Steven Kessel  
Office of the Registrar  
Rowan University  
(856) 256-4361  
fax (856) 256-4424

**CC:** Milou, Eric, Perry, Jill Ann

## New Course Proposal

### 1. Details

- A. Title: Processes and Principles in School Mathematics
- B. Sponsor: Dr. Jill Perry, Department of Secondary Education/Foundations of Education
- C. Credit Hours: 3
- D. Course Level: Graduate
- E. Prerequisites: acceptance into COGS for mathematics education
- F. Suggested Time, Implementation: One section of the course to be offered once a year
- G. Curricular Effect: Required for certificate of graduate study in mathematics education
- H. Adequacy: Present staff is adequate
- I. Resources: Faculty, computer equipment, mathematics department resources, and secondary education department resources are adequate

### 2. Rationale

- A. The National Council of teachers of Mathematics' (NCTM) Principles and Standards of School Mathematics (PSSM), establishes ten standards for K-12 mathematics – five content (Number and Operations, Algebra, Geometry, Measurement, and Data analysis and Probability) and five process (Problem Solving, Reasoning and Proof, Communication, Representation, and Connections). These standards are mirrored in the New Jersey Core Curriculum Content Standards for Mathematics (NJCCCS) (2002), the document intended to be the primary guide for New Jersey teachers' curricular decision-making. Hence, in this course, teachers will update their pedagogical content knowledge by engaging in coursework that will help them to incorporate the process standards into their own teaching.

In addition to the ten standards, PSSM defines six principles (Curriculum, Teaching, Technology, Equity, Learning, and Assessment) that should guide the teaching and learning of K-12 mathematics. Therefore, this course will also provide teachers with the opportunity and tools with which to examine, against these principles, their curricula, pedagogy, and assessment, philosophy, and praxis. Engaging in reflective practice and using PSSM as a framework, students will articulate their philosophies of teaching and learning and align these with their practice.

### 3. Essence of the Course and Outline

- A. In this course, students will enrich their pedagogical content knowledge – rounding out their teaching repertoires by learning how to incorporate the principles and process standards, and teaching methodologies consistent with these, into their planning and practice (NCTM, 2000).
- B. The content of this course:
  - 1. examination of the process standards (NCTM, 2000) and their connections with the NJCCCS

2. examination and discussion of the principles (NCTM, 2000) and their connection to the New Jersey Mathematics Curriculum Frameworks (1996)
  3. analysis and evaluation of current classroom practices
  4. analysis and synthesis of NSF-funded, standards-based curricula
  5. modeling of methodologies congruent with current research on teaching and learning
  6. planning standards-based units
  7. teaching using standards-based unit
- C. Evaluation and grading:  
Students will be evaluated by written work, participation in class activities and discussions, written exams, and creation and implementation of a standards-based mathematics unit

D. Consultation:

Department of Mathematics

Catalogue Description:

##### 3sh

(Prerequisites: none) In this course, designed for certified teachers of secondary school mathematics, students will expand their pedagogical repertoires to include the mathematical processes of communicating, representing, making connections, problem solving, and reasoning and proving. The principles of curriculum, teaching, technology, equity, learning, and assessment will provide a framework for the study of the processes and students' current practice. These processes and principles will be studied entirely within the context of school mathematics content.

## New Course Proposal

### 1. Details

- A. Title: Processes and Principles in School Mathematics
- B. Sponsor: Dr. Jill Perry, Department of Secondary Education/Foundations of Education
- C. Credit Hours: 3
- D. Course Level: Graduate
- E. Prerequisites: Undergraduate degree in mathematics or secondary mathematics teaching certificate
- F. Suggested Time, Implementation: One section of the course to be offered once a year
- G. Curricular Effect: Required for certificate of graduate study in mathematics education
- H. Adequacy: Present staff is adequate.
- I. Resources: Faculty, computer equipment, mathematics department resources, and secondary education department resources are adequate as 10 years of NJ SSI grants and the current MSP grant have built a substantial library of materials.

### 2. Rationale

- A. The National Council of teachers of Mathematics' (NCTM) Principles and Standards of School Mathematics (PSSM), establishes ten standards for K-12 mathematics – five content (Number and Operations, Algebra, Geometry, Measurement, and Data analysis and Probability) and five process (Problem Solving, Reasoning and Proof, Communication, Representation, and Connections). These standards are mirrored in the New Jersey Core Curriculum Content Standards for Mathematics (NJCCCS) (2002), the document intended to be the primary guide for New Jersey teachers' curricular decision-making. Hence, in this course, teachers will update their pedagogical content knowledge by engaging in coursework that will help them to incorporate the process standards into their own teaching.
- B. In addition to the ten standards, PSSM defines six principles (Curriculum, Teaching, Technology, Equity, Learning, and Assessment) that should guide the teaching and learning of K-12 mathematics. Therefore, this course will also provide teachers with the opportunity and tools with which to examine, against these principles, their curricula, pedagogy, and assessment, philosophy, and praxis. Engaging in reflective practice and using PSSM as a framework, students will articulate their philosophies of teaching and learning and align these with their practice.

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  4. analysis and synthesis of NSF-funded, standards-based curricula
  5. modeling of methodologies congruent with current research on teaching and learning
  6. planning standards-based units
  7. teaching using standards-based unit

Resources:

- Adams, D., & Hamm, M. (1998). Collaborative inquiry in science, math, and technology. Portsmouth, NH: Heinemann.
- Burns, M. (1992). About teaching mathematics: A K-8 resource. Sausalito, CA: Math Solutions Publications.
- Burrill (1992). The graphing calculator: A tool for change. In Calculators in mathematics education: 1992 Yearbook (pp. 14-22). J. T. Fey. Reston, VA, National Council of Teachers of Mathematics.
- Cobb, P. & Steffe, L. (1983). The constructivist teacher as researcher and model builder. Journal for Research in Mathematics Education, 14 (2), 83 – 94.
- Cobb, P., Yackel, E. & McClain, K. (2000). Symbolizing and communicating in mathematics classrooms. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Countryman, J. (1992). Writing to learn mathematics: Strategies that work, k-12. Portsmouth, NH: Heinemann.
- Crowley, M. (1987). The Van Hiele model of the development of geometric thought. In Learning and teaching geometry, k-12: 1987 yearbook. Reston, VA: NCTM.
- Cuoco, Goldenberg and Mark (1996). Habits of mind: An organizing principle for mathematics curricula. Journal of mathematical behavior, (15) pp. 375-402.
- Dossey, J. A., McCrone, S., Giordano, F. R., Weir, M. D. (2002). Mathematics methods and modeling for today's mathematics classroom: A contemporary approach to teaching grades 7-12. Brooks-Cole.

- Driscoll, M. (1985). The teaching and learning of algebra. In Research within reach: Secondary school mathematics (pp. 19-33). Reston, VA: NCTM.
- Duckworth, E. (1996). The having of wonderful ideas and other essays on teaching and learning (2nd ed.). New York, NY: Teachers College Press.
- Germain-McCarthy, Y. (1999). Bringing the NCTM standards to life: Exemplary practices from high schools. Eye on Education.
- Grouws, D. (1992). Handbook of research on mathematics teaching and learning. New York: Maxwell Macmillan.
- Hiebert, J. (1986). Conceptual and procedural knowledge: The case of mathematics. Hillsdale, NJ: Erlbaum.
- Hiebert, J., & Behr, M. (1988). Number concepts and operations in the middle grades. (Vol. 2). Reston, VA: The National Council of Teachers of Mathematics, Inc.
- Hiebert, J., Carpenter, T.P., Fennema, E., Fuson, K.C., Wearne, D., Murray, H., Olivier, A., and Human, P. (1997). Making sense: Teaching and learning mathematics with understanding. Portsmouth, NH: Heinemann.
- Johnson, D.R. (1982). Every minute counts: Making your math class work. Palo Alto, CA: Dale Seymour.
- Johnson, D.R. (1986). Making minutes count even more. Palo Alto, CA: Dale Semour.
- Lakatos, I. (1976). Proofs and refutations: The logic of mathematical discovery. New York, NY: Cambridge University Press.
- Lampert, M. (1990). When the problem is not the question and the solution is not the answer: Mathematical knowing and teaching. American Educational Research Journal, 27 (1), 29 – 63.
- Lappan, G., Fitzgerald, S., Friel, S., Fey, J., & Phillips, E. (1996). Connected mathematics. White Plains, NY: Dale Seymour Publications.
- National Council of Teachers of Mathematics (NCTM). (2000). Principles and standards for school mathematics. Reston, VA: National Council of Teachers of Mathematics.
- Pimm, D. (1987). Speaking mathematically: Communication in mathematics classrooms. New York, NY: Routledge.
- von Glasersfeld, E. (1995). Radical constructivism: A way of knowing and learning. Washington, DC: Falmer Press.
- Wheatley, G. H. (1992). The role of reflection in mathematics learning. Educational Studies in Mathematics, 23 (5), 529 – 541.

C. Evaluation and grading:

Students will be evaluated by written work, participation in class activities and discussions, written exams, and creation and implementation of a standards-based mathematics unit

Course evaluation:

This course will be evaluated through the customary student evaluations as well as a regular departmental review.

D. Consultation:

Dr. Carol Sharp, Dean of College of Education

Dr. Jay Kuder, Dean of Graduate School

Dr. Holly Willett, Chairperson Department of Secondary Education

Dr. Ron Czocho, Chairperson Department of Mathematics

Catalogue Description:

##### 3sh

In this course, designed for certified teachers of secondary school mathematics, students will expand their pedagogical repertoires to include the mathematical processes of communicating, representing, making connections, problem solving, and reasoning and proving. The principles of curriculum, teaching, technology, equity, learning, and assessment will provide a framework for the study of the processes and students' current practice. These processes and principles will be studied entirely within the context of school mathematics content.