LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		08-86b	AP-4/7/09	App-4/28/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
Dr. Janet Walker	jwalker@iup.edu
Proposing Department/Unit	**Phone**
Mathematics	724-357-2741

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

_____New Course _____Course Prefix Change _____Course Deletion

__XX__Course Revision _____Course Number and/or Title Change __XX__Catalog Description Change

Current Course prefix, number and full title	*Proposed course prefix, number and full title, if changing*
EDUC 456:Teaching Mathematics in the Secondary Schools	**same**

2. Additional Course Designations: check if appropriate

___ This course is also proposed as a Liberal Studies Course.

___ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision

_____New Degree Program _____Program Title Change _____Other

_____New Minor Program _____New Track

Current program name	*Proposed program name, if changing*

4. Approvals		**Date**
Department Curriculum Committee Chair(s)	Janet M Walker	2-10-09
Department Chair(s)	Gary Stoudt	2-20-09
College Curriculum Committee Chair		03-11-09
College Dean	John D. Pella	03-11-09
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph DeMarandi TECC	3-25-09
	Mary Ann Rafoth	3-26-09
UWUCC Co-Chairs	Gail S Sechrist	4/7/09

Received

MAR 25 2009

Liberal Studies

Part II: Description of Curriculum Change

1. New Syllabus of Record

I. Catalog Description

EDUC 456 Teaching Mathematics in the Secondary Schools 03-01-3cr

Prerequisites: Admission to Teacher Education Program, must have a declared major in Mathematics Education, and must have completed EDUC 242 with a "C" or better.

A study of curricula, standards, methods, and techniques for teaching mathematics in the secondary schools.

II. Course Outcomes

The student will be able to:

1. Discuss current theories of mathematics learning and their implications for mathematics instruction in secondary school classrooms.
2. Apply current theories of mathematics learning to unit design, lesson planning, and teaching.
3. Present classroom lessons that teach mathematical concepts using both conceptual and procedural knowledge.
4. Recognize and remediate common student errors in mathematics.
5. Discuss and use effective questioning techniques.
6. Teach mathematics using a variety of mathematical representations including concrete, pictorial, numerical, and symbolic representations.
7. Discuss and use effective cooperative learning techniques in teaching mathematics.
8. Select and use appropriate technology when teaching mathematics.
9. Use a variety of formative and summative assessment methods in teaching mathematics.
10. Differentiate instruction (i.e., adapt lessons) to meet the special needs of learners such as English language learners, learners with learning and/or physical disabilities, and gifted learners.
11. Create a unit plan with daily lessons that reflect sound mathematics, use real-world contexts, integrate K-12 mathematics standards (national and state), and address the accommodations that can be made for students with special needs (e.g., learning disabilities, physical disabilities, or English language learners).
12. Discuss and utilize various methods of classroom management.
13. Compare, contrast, and evaluate mathematics curriculum for grades 7-12 with respect to state and national standards.
14. Review, evaluate, and use articles in professional mathematics education journals.
15. Evaluate a professional development conference or workshop.
16. Reflect on and evaluate own growth in teaching.

Danielson Model	INTASC Standards	NCATE/NCTM Program Objectives	Course Objectives	Course Assessment
1a, 1b	2.11, 2.12, 2.13, 4.11, 5.11	8.6	1	**Midterm** Final
1a, 1b, 1c, 1d, 1e	2.33, 5.11, 7.11, 7.12, 7.31	7.4, 8.1, 8.4, 8.8, 8.7	2	Unit Plan Lesson Plan #1, #2, #3 Micro-Lesson #1, #2, #3
3a, 3b, 3c, 3d, 3e	4.13, 4.35	5.1, 5.2, 5.3, 7.4, 8.7	3	Micro-Lesson #1, #2, #3
1a, 3d, 3e	1.12	8.3, 8.8	4	Micro-Lesson #1, #2, #3 Quizzes

3a, 3b, 3d	4.32, 4.33	8.3, 8.7, 8.8	5	Question Worksheet Lesson Plan #1, #2, #3 Micro-Lesson #1, #2, #3
1a, 1d, 3c	1.31, 4.13, 4.32, 4.35	5.1, 5.2, 5.3, 7.3, 7.4, 8.1	6	Micro-Lesson #1, #2, #3
2c	4.12	8.3, 8.7	7	Micro-Lesson #1, #2, #3
1d, 3c	4.23, 4.36, 6.35	6.1, 7.6, 8.9	8	Micro-Lesson #3 (with tech)
1f, 3d, 4b	2.31, 4.31, INTASC 8	7.5, 8.3	9	Unit Plan
1b, 1c, 1d, 1e	INTASC 3, 7.31	8.8, 8.1	10	Lesson Plan #1, #2, #3 Micro-lesson #1, #2, #3
1a, 1b, 1c, 1d, 1e, 1f	1.13, INTASC 3, 7.12, 7.31, 7.33	4.1, 4.2, 4.3, 8.1, 8.4, 8.7, 8.8	11	Unit Plan
2c, 2d	5.14	7.3	12	Final Exam Quizzes
1a, 1c, 1d, 4d	1.33, 9.32	8.1	13	**Textbook Evaluation**
4a, 4e	1.33, 9.13, 9.25, 9.32, 9.33	8.5	14	Journal Article
4e. 4f	1.33, 9.13, 9.25, 9.32, 9.33	8.5	15	Conference Assignment
4a	INTASC 9		16	Self-Reflections from Micro-lessons

III. Detailed Course Outline

The following topics will be studied with the use of mathematical concepts based on national and state standards. Specifically, trigonometry, logarithms, conic sections, discrete mathematics, pre-calculus, and calculus concepts will be used.

The hours designated for studying students with special needs is labeled with SPED and will be incorporated using the chapters listed below from Thorton, C. A. & Bley, N. S. (Eds.). (1994). *Windows of Opportunity: Mathematics for Students with Special Needs*, Reston, VA: National Council of Teachers of Mathematics.

I. Introduction to Teaching and Learning Mathematics — 5 hours

- A. What is mathematics?
- B. Constructivism
- C. Direct Instruction
- D. Procedural vs. Conceptual knowledge
- E. Discovery-based learning
  - 1. Construct-a-concept
  - 2. Discover-a-relationship
- F. Compare and contrast of student roles
- G. Compare and contrast of teacher roles

II. Standards for Teaching Mathematics — 1 hour

- A. NCTM Historical Perspective on Standards
- B. PA Mathematics Curriculum Framework

III. Current Issues and Trends in Mathematics Education — 1 hour

IV. Instructional Objectives and Lesson Planning — 3 hour

A. Three parts to the behavioral objective
   1. Performance
   2. Condition
   3. Criteria
B. Structure of the objective
C. Bloom's Taxonomy for teaching
D. Lesson design and planning format
E. Accommodations for Students with Special Needs on lesson plan

V. Representations in Teaching Mathematics — 6 hours

A. Concrete vs. Abstract concepts
B. Types of Representations (using number, algebraic, and geometric concepts)
   1. Pictorial
   2. Hands-on
   3. Graphical
   4. Numerical
   5. Symbolic
   6. Verbal
C. Examples of Representations for the same concept
D. How representations help students with special needs (3 hours SPED)
E. Compare and contrast representations from mathematics textbooks.

Micro-Lesson #1 — 1 hour

VI. Classroom Management vs. Discipline — 4 hours

A. "An ounce of prevention is worth a pound of cure."
B. Strategies for having effective lessons
   1. Writing detailed lesson plans
   2. Organization
   3. Managing materials
   4. Giving clear, concise directions (8 properties for giving directions)
   5. Managing accommodations for students with special needs
C. What will you do when....?
D. Strategies for effective classroom management
E. Role playing for practicing discipline strategies
F. Why students drop out of school

Micro-Lesson #2 — 1 hour

VII. Mathematics Curriculum Study — Midterm Exam (Take Home)

A. Compare and Contrast
   1. Saxon Curriculum
   2. University of Chicago School Mathematics Project
   3. Integrated Mathematics Series
   4. Traditional Curricula

B. Evaluation of Mathematics Curriculum

VIII. Cooperative Learning in Mathematics — 4 hours

A. Establishing groups
B. Directions for groups
C. Assigning roles for group work
D. Assessing group work
E. Grouping students with special needs

IX. Inclusion in Mathematics (6 hours SPED)-Van de Walle Chapter 23 — 6 hours

A. What limits the learning of mathematics?
B. Information Processing System
C. Physical disabilities
    1. Types of physical disabilities
    2. Modifications for various physical disabilities
D. Learning Disabilities including psychological, perceptual, and cognitive processing deficits.
    1. Types of learning disabilities
    2. Identifying learning disabilities
    3. Modifications for various learning disabilities
E. IEP's and 504's
    1. Sample IEP's
    2. Teacher's roles and responsibilities with IEP's

X. Assessment Strategies for Mathematics — 6 hours

A. Standardized testing
    1. PSSA/PASA testing
    2. Testing accommodations for students with special needs
    3. PSSA/PASA grading
B. Classroom Assessment in Mathematics
    1. Types of assessments
    2. Grading
    3. Uses for classroom assessments
    4. Matching assessments to objectives
    5. Creating a unit test
    6. Evaluating a unit test
    7. Analyzing assessments
C. Uses for assessments
    1. 4Sight
    2. PVAAS

XI. Summary — 1 hour

A. Teaching in PA
B. Teaching in other states
C. First few years of teaching

Final Micro-Lesson from Unit Plan — 1 hour

Final Exam — 2 hours

IV. Evaluation Methods

Evaluation of this course will be based on the accumulation of points students earn over the semester. A final percentage will be determined based on the following distribution:

Class Assignments and participation	45%
Micro-Lessons with self-reflections	25%
Quizzes	10%
Midterm/Final Exams	20%

V. Example Grading Scale

Grades will be based on a pre-determined level of mastery as follows:

90-100%	A
80-89%	B
70-79%	C
60-69%	D
below 60%	F

VI. Course Attendance Policy

The attendance policy for this course will follow university guidelines.

VII. Required Textbook(s), Supplemental Books and Readings

Cangelosi, J. S. (2002) *Teaching Mathematics in Secondary and Middle School: An Interactive Approach*, 3rd Ed., Charles Merrill Publishing Co.

Johnson, D. R. (1982) *Every Minute Counts: Making Your Math Class Work*, Dale Seymour Publishing Co.

VIII. Special Resources or Requirements

Graphing calculator recommended.

IX. Bibliography

*Bley, N. S. & Thornton, C. A. (2001). *Teaching Mathematics to Students with Learning Disabilities*, 4ed. Austin, TX: Pro-Ed Publishing Co.

Brahier, D. J. (2000). *Teaching Secondary and Middle School Mathematics*. Boston, MA: Allyn and Bacon Publishing Co.

California State Department of Education (1989). *A Question of Thinking*. Sacramento, CA: CA Dept. of Education.

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Dossey, J. A., et. al. (2002). *Mathematics Methods and Modeling for Today's Mathematics Classroom*. Pacific Grove, CA: Brooks-Cole Publishing Co.

Farrell, M. A. & Farmer, W. A. (1980). *Systematic Instruction in Mathematics for the Middle and High School Years*. Reading, MA: Addison-Wesley Publishing Co.

Huetinck, L & Munshin, S. (2000). *Teaching Mathematics for the 21st Century*. Upper Saddle River, NJ: Merrill Publishing Co.

Johnson, D. R. (1986). *Making Minutes Count Even More: A Sequel to Every Minute Counts*. Palo Alto, CA: Dale Seymour Publications.

Johnson, D.R. (1994). *Motivation Counts: Teaching Techniques That Work*. Palo Alto, CA: Dale Seymour Publications.

Kreindler, L. & Zahm, B. (Eds.) (1992). *MathFINDER Sourcebook: A Collection of Resources for Mathematics Reform*. Armonk, NY: The Learning Team.

Mager, R. (1984). *Preparing Instructional Objectives*. Belmont, CA: Pitman Learning, Inc.

National Council of Teachers of Mathematics. *Arithmetic Teacher (AT)*.

National Council of Teachers of Mathematics. *Journal for Research in Mathematics Education (JRME)*.

National Council of Teachers of Mathematics. *Mathematics Teacher (MT)*.

National Council of Teachers of Mathematics. *Mathematics Teaching in the Middle School (MTMS)*.

National Council of Teachers of Mathematics. (1993) *Assessment Standards for School Mathematics*. Reston, VA: NCTM.

National Council of Teachers of Mathematics. (1999). *Mathematics Assessment: A Practical Handbook for Grades 9-12*. Reston, VA: NCTM.

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National Council of Teachers of Mathematics (1989). *Curriculum and Evaluation Standards for School Mathematics*. Reston, VA: NCTM.

National Council of Teachers of Mathematics (1982). *How to Evaluate Mathematics Textbooks*. Reston, VA: NCTM.

*Nolting, P. D.(2000). *Mathematics and Learning Disabilities Handbook: Guide to Processing Deficits and Accommodations*. Bradenton, FL: Academic Success Press, Inc.

*Nolting, P. (2002). *Winning at Math: Your Guide to Learning Mathematics Through Successful Study Skills*, Bradenton, FL: Academic Success Press, Inc.

Parke, C., Lane, S., Silver, E., & Magone, M. (2003*). Using Assessment to Improve Middle-Grades Matheamtics Teaching and Learning*. Reston, VA: NCTM.

Polya, G. (1973). *How to Solve It*. Princeton: Princeton University Press.

Posamentier, A. & Stepelman, J. (1981). *Teaching Secondary School Mathematics*. Columbus, OH: Merrill Publishing Co.

*Rivera, D. P (Ed.) (1998). *Mathematics Education for Students with Learning Disabilities*. Austin, TX: Pro-ED Publishing Co.

Rubenstein, R., Beckmann, C, &Thompson, D. (2004). *Teaching and Learning Middle Grades Mathematics*. Emeryville, CA: Key College Publishing.

Sobel, M. & Maletsky, E. (1975). *Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies*. Englewood Cliffs, NJ: Prentice Hall.

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*Strichart, S. S. & Mangrum, C. T. (2002). *Teaching Learning Strategies and Study Skills to Students with Learning Disabilities, Attention Deficit Disorders, or Special Needs*, Boston . MA: Allyn and Bacon Publishing Co.

Thompson, F.M. (1994). *Hand-On Math!* West Nyack, N.Y.: The Center for Applied Research in Education.

*Thorton, C. A. & Bley, N. S. (Eds.) (1994). *Windows of Opportunity: Mathematics for Students with Special Needs*. Reston, VA: National Council of Teachers of Mathematics.

*Van de Walle, John. (2003). *Elementary and Middle School Mathematics: Teaching Developmentally*. Boston, MA: Allyn and Bacon

Webb, N. (Ed.) (1993). *Assessment in the Mathematics Classroom*. Reston, VA: NCTM.

2. Summary of proposed revisions: There are several major changes to this syllabus, including pre-requisite changes, course description changes, objective changes, and course outline changes.

3. **Justification for revisions:** The most recent approved syllabus for this class that we could find was from 1989. Many things have changed in mathematics education since then, so we are taking this opportunity to update this syllabus.

Justification/rationale for the pre-requisite change: This course is specifically designed for Mathematics Education majors only. Thus, the statement "must have a declared major in Mathematics Education"

is needed. The current prerequisite uses incorrect terminology. It should read "Admission to Teacher Education Program". Furthermore, The Mathematics Education program has found that students are not prepared for EDUC 456 if they have not taken EDUC 242. In EDUC 242, students learn how to write lesson plans and observe in various public school classrooms. If students have not had the instruction on how to write a lesson plan and do not have a point of reference for what is happening in the public school classrooms (from a teacher's perspective) they struggle with the course. As a program, we would like the students to be better prepared for this course and we feel that adding the prerequisite will help all students.

Justification for the addition of a course objectives and hours for Special Needs Students: The Pennsylvania State Board of Education adopted changes that affect all of Pennsylvania's teacher and educational specialist certification programs by adding 9 credits or 270 hours or equivalent combination for adaptations and accommodations for diverse students in an inclusive setting (special needs students). The Mathematics Education program is adding EDEX 323 Instruction of English Language Learners with Special Needs (2 credits) in order to help fulfill the PDE requirement. The other hours are being included into existing coursework and practicum experiences. EDUC 456 is one of the courses working to integrate the teaching of mathematics to students with special needs. There were 15 hours needed for this infusion. Thus, this course needed two additional objectives listed as Objective #11 and #12 and additional hours that are listed on the Course Outline as SPED.

Justification for Course Description Change: This is a minor change, but we added "standards" in the course description and reworded it a bit.

Justification for other changes:
Course Objectives were updated to meet the requirements for current syllabi and updated to reflect more current language in mathematics education. All of the old objectives have been incorporated into the new ones.
Course Outline was updated to reflect the current trends in mathematics education and to meet the new objectives. One might notice that some of the mathematical content that is listed on the old syllabus is not shown on the new syllabus. This is because we have added a new course (MATH 430) since this syllabus was updated which includes this content.
Evaluation Methods were updated to reflect what is currently used. We added a sample grading scale.
Course Attendance Policy was added to the new syllabus.
Required Textbooks were updated. The Cangelosi book was updated to show the most recent version.
Special Resources was changed. We removed the videotaping requirement. We now are using DVD technology and will leave this option open to the most current available technology.
Bibliography was updated with several new resources.

4. Old syllabus of record:

I. Catalog Description
EDUC 456 Teaching Mathematics in the Secondary Schools
Credits: 3 semester credits
Prerequisites: Admission to Student Teaching

A study of modern methods and techniques for teaching mathematics and current curricula.

II. Course Objectives
The student will:

1. examine mathematics curriculum for grades 7-12.
2. investigate theories for learning and teaching mathematics.
3. practice teaching mathematical concepts and procedures and connecting conceptual and procedural knowledge.
4. use questioning techniques.
5. utilize concrete, pictorial, and symbolic representations of mathematical concepts.
6. engage in cooperative learning.
7. estimate answers as well as find exact answers.
8. make appropriate use of calculators and computers.
9. explore various methods of assessment and evaluation.
10. write lesson plans, including objectives, procedures, and evaluations.
11. develop a unit plan.
12. discuss methods of discipline.
13. review articles in professional mathematics journals.
14. evaluate a mathematics textbook.
15. participate in professional development.

IV. Course Outline

A. Pedagogy

1. What is mathematics? What are the NCTM Curriculum and Evaluation Standards for School Mathematics? What are the NCTM Principles and Standards for School Mathematics? What is the Mathematics Curriculum Framework for Pennsylvania?
2. How do we learn? How do we learn mathematics? What is the Information Processing System?
3. How do we teach? How do we teach mathematics? What are the NCTM Professional Standards for Teaching Mathematics?
4. What is conceptual knowledge? What is procedural knowledge? How do we connect conceptual and procedural knowledge?
5. What limits the learning of mathematics? Psychological, perceptual, and cognitive processing deficits.
6. How do we achieve equity in mathematics education?
7. How do we assess and evaluate mathematical concepts and skills? What do the NCTM Assessment Standards for School Mathematics include?

B. Mathematical Concepts

1. Number and number relationships.
2. Number systems and number theory.
3. Computation and estimation; mathematical operations. (Arithmetic)
4. Patterns, sequences, and series.
5. Variables, expressions, equations, inequalities. (Algebra)
6. Geometric shapes and solids, properties, and relationships; congruence, similarity; constructions; proofs. (Geometry)
7. Transformations; coordinate representations. (Algebra & Geometry)
8. Measurement.
9. Tabular, symbolic, and graphical representations of functions; properties and behaviors of functions. Polynomial, rational, radical, and transcendental functions.
10. Trigonometric and circular functions; graphing techniques.

11. Collecting, organizing, & interpreting data; making predictions; testing hypotheses. (Statistics)
12. Experimental and theoretical probability.
13. Finite graphs, matrices, recurrence relations. (Discrete Mathematics)

C. Mathematics Curricula Goals
1. Problem Solving
2. Communication
3. Mathematical Reasoning
4. Mathematical Connections

V. Evaluation Methods

Achievements may be based on quizzes, assignments/projects, class participation, mid-term examinations, a comprehensive final examination or any combination of these parts. Students will present several lessons to their peers that are appropriate for the secondary school level. These lessons will be videotaped and students will review tape and write a self-reflection of their teaching.

VI. Required Textbook(s), Supplemental Books and Readings

Cangelosi, J. S. (1992) Teaching Mathematics in Secondary Middle School: Research-Based Approaches, Charles Merrill Publishing Co.

Johnson, D. R. (1982) Every Minute Counts: Making Your Math Class Work, Dale Seymour Publishing Co.

VII. Special Resources or Requirements

Graphing calculator recommended. Videotaping equipment needed.

VIII. Bibliography

Cooney, T. J. (Ed.) (1990). Teaching and Learning Mathematics in the 1990s. Reston, VA: NCTM.

Davidson, N. (Ed.) (1990). Cooperative Learning in Mathematics: A Handbook for Teachers. Reading, MA: Addison-Wesley.

Fey, J. & Hirsch, C. (Eds.) (1992). Calculators in Mathematics Education. Reston, VA: NCTM.

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Tobias, S. (1987). Succeed with Math: Every Student's Guide to Conquering Math Anxiety. New York: College Entrance Examination Board.

Webb, N. (Ed.) (1993). Assessment in the Mathematics Classroom. Reston, VA: NCTM.

5. Liberal Studies course approval form and checklist (if appropriate)
   Not Appropriate.

PART III: Letters of Support or Acknowledgement

These course changes do not affect any other departments.