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Curriculum Proposal Cover She	eet - University-	Wide Undergra	duate Curriculum C	Committee	
Contact Person			Email Address		
Dr. Janet Walker		-	jwalker@iup.edu		
Proposing Department/Unit Mathematics			Phone 724-357-2741		
Check all appropriate lines and comple	te information as	requested. Use		t for each course	
proposal and for each program proposal.				,	
1. Course Proposals (check all that apply New Course			Course D. I		
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School Mathematics					
2. Additional Course Designations: check if appropriate  This course is also proposed as a Liberal Studies Course.  Other: (e.g., Women's Studies,					
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Department Curriculum Committee Chair(s)	fact IV	Wall		2-10-09	
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College Dean	Tah	n D/	Ed	3/11/09	
Director of Liberal Studies *					
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UWUCC Co-Chairs

Received

## PART II: Description of the Curriculum Change

### 1. New syllabus of record

### **MATH 430 Seminar in Teaching Secondary School Mathematics**

3 class hours 0 lab hours 3 semester hours (3c-0l-3cr)

**Prerequisites:** Junior Status (57+ credits), must have a declared major in Mathematics Education, and must have completed EDUC 242 with a "C" or better.

Catalog Description: Provides insights into the teaching and learning of numbers and operations, algebra, geometry, measurement, probability, and statistics. Students will become aware of and use the resources and methods of instruction for teaching mathematics at the secondary level.

Must be taken within two semesters prior to student teaching.

## II. Course Objectives: Students will be able to:

- 1. Design appropriate learning activities involving a variety of mathematical topics to promote discovery among secondary school students.
- 2. Use real-world situations in the teaching of mathematics.
- 3. Design mathematical tasks that engage secondary school students as active participants.
- 4. Develop mathematical tasks that allow secondary school students to construct new meaning by building on or extending their prior knowledge.
- 5. Communicate mathematical ideas, concepts, and procedures in written, oral, symbolic, and pictorial forms, using mathematical reasoning to pose, explore and validate conjectures and arguments.
- 6. Pose questions and tasks that elicit, engage, and challenge thinking.
- 7. Design and teach appropriate mathematical learning activities for students with special needs.
- 8. Use technology as a tool to promote mathematical thinking.

Danielson Model	INTASC Standards	NCATE/NCTM Program Objectives	Course Objectives	Course Assessment
1a. 1b, 1c, 1d, 1e, 1f	1.34, 4.31, 4.32, 4.35, 7.11, 7.12, 7.33, 8.31	7.1, 7.4, 7.5, 8.1, 8.2, 8.4, 8.6, 8.7, 8.8, 9.4. 11.4	1	Lesson Plan
1a	1.11, 1.13	1.1, 1.2, 15.3	2	Assignments
3c	1.34, 4.35	8.1, 8.8	3	Micro-lesson
1a, 1b, 1e	1.31, 2.32, 4.22, 4.31, 7.33, 8.31, 9.13	7.3, 7.5, 8.1, 8.2, 8.4, 8.5, 8.6, 8.7, 8.8	4	Lesson Plan Micro-lesson
1a	1.11	2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 9.3, 9.4, 9.8, 15.1	5	Assignments
3b	1.34, 2.33	8.8, 15.3	6	Micro-lesson Lesson Plan
1a, 1d, 3d, 3e	3.11, 3.12, 3.14, 3.21, 3.31, 3.32, 3.33, 3.34	7.1, 8.1	7	Lesson plan
1d, 1e, 3c	4.23, 4.36, 6.35	7.6, 8.9	8	Assignments

#### III. Course Outline

(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.

### A. Teaching and Learning Numbers and Operations

6 hours

- 1. Arithmetic of whole numbers, rational numbers, and integers
- 2. Patterns and Relationships
- 3. Number Sense and Number Theory
- 4. Estimation
- 5. Problem solving with Numbers and Operations
- 6. Common misconceptions with Numbers and Operations
- 7. Questions frequently asked with Numbers and Operations
- 8. Teaching Numbers and Operations to students with special needs (1 hour SPED)-Chapter 9

## B. Teaching and Learning Algebra

12 hours

- 1. Equations and inequalities
- 2. Coordinate representations and graphing calculators
- 3. Functions and their properties
- 4. Problem solving in algebra
- 5. Common misconceptions in algebra
- 6. Questions frequently asked in an algebra classroom
- 7. Teaching Algebra to students with special needs (1 hour SPED)-Chapter 14

### C. Teaching and Learning Geometry and Measurement

10 hours

- 1. The van Hiele Model of geometric thought
- 2. Methods of teaching proof
- 3. Geometric constructions
- 4. Precision, accuracy, and other measurement concepts
- 5. Problem solving in geometry
- 6. Common misconceptions in geometry and measurement
- 7. Questions frequently asked in the geometry classroom
- 8. Integration of algebra and geometry
- 9. Teaching geometry and measurement to students with special needs (1 hour SPED)-

Chapters 11 and 12

#### D. Teaching and Learning Probability:

6 hours

- 1. Theoretical vs. experimental probability
- 2. Geometric probability
- 3. Combinatorics
- 4. Problem solving using probability including the fundamental counting principle
- 5. Common misconceptions in probability
- 6. Questions frequently asked in probability
- 7. Teaching probability to students with special needs (½ hour SPED)-Van de Walle, Chapter 23

### E. Teaching and Learning Statistics

6 hours

- 1. Gathering, organizing, analyzing, and summarizing data
- 2. Measures of central tendency and dispersion

- 3. Multiple representations of data
- 4. Problem solving in statistics
- 5. Common misconceptions in statistics
- 6. Questions frequently asked in statistics
- 7. Integration of probability and statistics through simulations
- 8. Teaching statistics to students with special needs (½ hour SPED)-Van de Walle, Chapter 23

Midterm/Final 2 hours

#### IV. Evaluation Methods

Grades will be based on quizzes, assignments, lesson plans, class participation, micro-lessons, self-critiques, mid-term examination, and a comprehensive final examination.

# The final grade will be determined as follows:

Assignments and class participation	40%
Lesson plans, micro-lessons, and self-critiques	25%
Quizzes	15%
Midterm/Final Exams	20%

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

Students will write lesson plans that are consistent with the approved lesson plan format. These lessons will be appropriate for teaching mathematics in the secondary schools. Each lesson plan is required to have a detailed discussion of the accommodations that will be made for students with special needs.

Students will present micro-lessons appropriate for secondary schools, incorporating technology and other appropriate learning activities.

Students will be evaluated on their written and oral communication abilities. Students will be expected to follow standard English usage and spelling. Any written material must consist of grammatically correct sentences and paragraphs. Mathematical terminology must be correct.

#### V. Attendance Policy

The attendance policy for this course will follow university guidelines.

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

- Cangelosi, J. S. (2003). Teaching Mathematics in Secondary and Middle School: An Interactive Approach. (3<sup>rd</sup> ed.). Columbus, OH: Merrill/Prentice Hall Publishing Co.
- Johnson, D. R. (1982). Every Minute Counts: Making Your Math Class Work. Parsippany, NJ: Dale Seymour Publishing Co.
- Johnson, D. R. (1986). Every Minutes Counts Even More: A Sequel to Every Minute Counts. Parsippany, NJ: Dale Seymour Publishing Co.
- Johnson, D. R. (1994). *Motivation Counts: Teaching Techniques That Work*. Parsippany, NJ: Dale Seymour Publishing Co.

## VII. Special Resources or Requirements

Students are required to have a TI-83/84 graphing calculator.

# VIII. Bibliography

- \*Bley, N. S. & Thornton, C. A. (2001). *Teaching Mathematics to Students with Learning Disabilities*, 4ed, Austin, TX: Pro-Ed Publishing Co.
- Boaler, J. (Ed.). (2000). *Multiple Perspectives on Mathematics Teaching and Learning*. Westport, CT: ABLEX Publishing Co.
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- National Council of Teachers of Mathematics. (1993) Assessment Standards for School Mathematics. Reston, VA: National Council of Teachers of Mathematics.
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- National Council of Teachers of Mathematics. (1981). *Teaching Statistics and Probability: NCTM Yearbook*. Reston, VA: National Council of Teachers of Mathematics.
- \*Nolting, P. (2002). Winning at Math: Your Guide to Learning Mathematics Through Successful Study Skills, Bradenton, FL: Academic Success Press, Inc.
- \*Nolting, P. D.(2000). Mathematics and Learning Disabilities Handbook: Guide to Processing Deficits and Accommodations. Bradenton, FL: Academic Success Press, Inc.
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- \*Rivera, D. P (Ed.). (1998). *Mathematics Education for Students with Learning Disabilities*. Austin, TX: Pro-ED Publishing Co.
- Serra, M. (1998). Discovering Geometry, An Inductive Approach. Emeryville, CA: Key Curriculum Press.
- Sobel, M. & Maletsky, E. (1988). *Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies* (2<sup>nd</sup> edition). Englewood Cliffs, NJ: Prentice Hall Publishing Co.
- \*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.
- \*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
- Wah, A. & Picciotto, H. (1994). Algebra. Mountain View, CA: Creative Publications.

### 2. Summary of Proposed Changes

**Proposed Changes**: There are two major changes proposed. The first one is to revise and add a prerequisite for the course. The second is to add a course objective and incorporate it into the course outline.

The other changes are simple changes that are being made to update the syllabus.

#### 3. Justification for the changes:

Justification for the pre-requisite change: The Mathematics Education program has found that students are not prepared for MATH 430 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 objective 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. MATH 430 is one of the courses working to integrate the teaching of mathematics to students with special needs. Thus, this course needs the additional objective listed as Objective #7: Students will be able to design and teach appropriate mathematical learning activities for students with special needs.

Two other parts of the syllabus were revised to clarify how the objective will be met in the course. The first part is in the Course Outline section where each content area title was changed to include "Teaching and Learning of (content area) ". Each content area also specifically lists the content "Teaching (content area) to students with special needs." The following was added to clarify how the objective will be met in the course:

The second part that was added to include this objective was in the Evaluation Methods section. Each lesson plan that students will write in this course will now include a section that lists specific accommodations that will be made for students with special needs. It reads: "Each lesson plan is required to have a detailed discussion of the accommodations that will be made for special needs students."

# Justification for other changes:

<u>Under Course Description</u>: The last sentence was changed so that it was not redundant with the prerequisites for the course.

<u>Under Course Objectives:</u> We felt that Objective #3 was unclear and thus have re-worded it.

<u>Under Special Resources and Requirements</u>: Texas Instruments has a new graphing calculator that is also appropriate for secondary level students, so we are allowing students to use either the TI-83+ or the TI-84 in this course.

<u>Under Bibliography:</u> We have added several resources that will be useful for the instructor of this course to help them integrate the teaching of special needs students into the course.

<u>Throughout</u>: The terms "general mathematics" and "Middle School Mathematics" are vague and we wanted to match the wording with the NCTM Standards. Thus, we changed these terms to "Numbers and Operations" which is a NCTM Content Standard.

<u>Under Course Outline:</u> We also wanted to add "problem solving in <u>(content area)</u>" in each section and "Common misconceptions in <u>(content area)</u>" in each section. This reflects what is actually done in the course better.

We also rearranged some of the section parts to be consistent within each section.

We took out "Uses and application of (content area) because that is already built into the "Problem solving in (content area)" section.

<u>Under Attendance Policy</u>: We revised this to indicate that the course would follow university guidelines for attendance.

We have tried to make each content area in the course outline more cohesive. Each content area starts with the actual content of that topic, then the problem solving, then common misconceptions, then questions frequently asked in (content area), and finally the teaching of (content area) to students with special needs.

# 4. Old Syllabus of Record

## **MATH 430 Seminar in Teaching Secondary School Mathematics**

3 class hours

0 lab hours

**Prerequisites**: Junior Status and Must be enrolled in Mathematics Education

3 semester hours

(3c-01-3cr)

Provides insights into the teaching of general mathematics, algebra, geometry, probability, and statistics. Students will become aware of and use the resources and methods of instruction for teaching mathematics at the secondary level. Open to secondary mathematics education majors only and must be taken within two semesters prior to student teaching.

# **II. Course Objectives**

Students will be able to:

- 1. Design appropriate learning activities involving a variety of mathematical topics to promote discovery among secondary school students.
- 2. Use real-world situations in the teaching of mathematics.
- 3. Do mathematics that engages the students as active participants.
- 4. Develop mathematical tasks that allow secondary school students to construct new meaning by building on or extending their prior knowledge.
- 5. Communicate mathematical ideas, concepts, and procedures in written, oral, symbolic, and pictorial forms, using mathematical reasoning to pose, explore and validate conjectures and arguments.
- 6. Pose questions and tasks that elicit, engage, and challenge thinking.
- 7. Use technology as a tool to promote mathematical thinking.

#### III. Course Outline

A. Teaching Middle School Mathematics:

6 hours

- 1. Arithmetic of whole numbers, rational numbers, and integers
- 2. Patterns and Relationships
- 3. Number Sense and Number Theory
- 4. Estimation

B. Teaching Algebra:

11 hours

- 1. Problem solving in algebra
- 2. Common misconceptions in algebra
- 3. Questions frequently asked in an algebra classroom
- 4. Uses and applications of algebra
- 5. Equations and inequalities
- 6. Coordinate representations and graphing calculators
- 7. Functions and their properties

Midterm

1 hour

C. Teaching Geometry:

12 hours

- 1. The van Hiele Model of geometric thought
- 2. Common misconceptions in geometry
- 3. Methods of teaching proof
- 4. Problem solving in geometry
- 5. Questions frequently asked in the geometry classroom
- 6. Geometric constructions
- 7. Uses and applications of geometry
- 8. Integration of algebra and geometry

## D. Teaching Probability:

6 hours

- 1. Theoretical vs. experimental probability
- 2. Problem solving using fundamental counting principle
- 3. Uses and applications of probability
- 4. Geometric probability
- 5. Combinatorics

# E. Teaching Statistics:

6 hours

- 1. Gathering, organizing, analyzing, and summarizing data
- 2. Measures of central tendency and dispersion
- 3. Uses and applications of statistics
- 4. Multiple representations of data
- 5. Integration of probability and statistics through simulations

### IV. Evaluation Methods

Grades will be based on quizzes, assignments, lesson plans, projects, class participation, minilessons, mid-term examination, and a comprehensive final examination.

The final grade will be determined as follows:

Class assignments and participation	40%
Lesson plans, presentations, and self-critique	25%
Quizzes	15%
Midterm/Final Exams	20%

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

Students will write lesson plans that are consistent with the approved lesson-plan format. These lessons will be appropriate for teaching mathematics in the secondary schools.

Students will present mini-lessons appropriate for secondary schools, incorporating technology and other appropriate learning activities.

Students will be evaluated on their written and oral communication abilities. Students will be expected to follow standard English usage and spelling. Any written material must consist of grammatically correct sentences and paragraphs. Mathematical terminology must be correct.

### V. Attendance Policy:

Students are expected to attend class. Attendance in this class is mandatory and it is expected that students will be on time and ready to participate. If a student is ill or a family emergency arises, he/she must phone the instructor prior to class.

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

- Cangelosi, J. S. (2003). <u>Teaching Mathematics in Secondary and Middle School: An Interactive Approach</u>. (3<sup>rd</sup> ed.). Columbus, OH: Merrill/Prentice Hall Publishing Co.
- Johnson, D. R. (1982). <u>Every Minute Counts: Making Your Math Class Work.</u> Parsippany, NJ: Dale Seymour Publishing Co.
- Johnson, D. R. (1986). <u>Every Minutes Counts Even More: A Sequel to Every Minute Counts</u>. Parsippany, NJ: Dale Seymour Publishing Co.
- Johnson, D. R. (1994). <u>Motivation Counts: Teaching Techniques That Work</u>. Parsippany, NJ: Dale Seymour Publishing Co.

## VII. Special Resources or Requirements

Students are required to have a TI-83+ graphing calculator.

## VIII. Bibliography

- Boaler, J. (Ed.). (2000). *Multiple Perspectives on Mathematics Teaching and Learning*. Westport, CT: ABLEX Publishing Co.
- Burrill, G. & P. Hopfensperger. (1999). Exploring Systems of Inequalities. White Plains, NY: Dale Seymour Publications.
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- Mager, R. (1984). Preparing Instructional Objectives. Belmont, CA: Pitman Learning, Inc.
- Mathematical Sciences Education Board. (1998). *High School Mathematics at Work*. Washington, DC: National Academy Press.
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- Murdock, J., et. al. (2000). Discovering Algebra, An Investigative Approach, Preliminary Edition. Emeryville, CA: Key Curriculum Press.
- National Council of Teachers of Mathematics. *Addenda Series for Grades 5-8 and Grades 9-12*. Reston, VA: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. *Mathematics Teacher (MT)*. Reston, VA: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. <u>Mathematics Teaching in the Middle School (MTMS)</u>. Reston, VA: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. (1993) Assessment Standards for School Mathematics. Reston, VA: National Council of Teachers of Mathematics.
- National Council of Teachers of Mathematics. (1991). *Professional Standards for Teaching Mathematics*. Reston, VA: National Council of Teachers of Mathematics.
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- National Council of Teachers of Mathematics. (1981). *Teaching Statistics and Probability: NCTM Yearbook*. Reston, VA: National Council of Teachers of Mathematics.

- Pennsylvania Department of Education (1994) *Mathematics Curriculum Framework*. Harrisburg, PA: Pennsylvania Department of Education.
- Phillips, E., et al. (1986). *Probability: Middle Grades Mathematics Project*. Menlo Park, CA: Addison-Wesley Publishing Co.
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- Sobel, M. & Maletsky, E. (1988). *Teaching Mathematics: A Sourcebook of Aids, Activities, and Strategies* (2<sup>nd</sup> edition). Englewood Cliffs, NJ: Prentice Hall Publishing Co.
- Wah, A. & Picciotto, H. (1994). Algebra. Mountain View, CA: Creative Publications.
- 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.