LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		09-24h	AP-10/20/09	App-12/1/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
John D. Baker	jdbaker@iup.edu
Proposing Department/Unit	**Phone**
Mathematics	724-357-3795

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

__X__Course Revision __X__Course Number and/or Title Change __X__Catalog Description Change

Current *Course prefix, number and full title*	***Proposed*** *course prefix, number and full title, if changing*
MATH 471 (was Basic Concepts of Algebra)	MATH 471 Algebra for Elementary/Middle Level Teachers

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)		3-9-9
Department Chair(s)		3-4-09
College Curriculum Committee Chair		3-16-09
College Dean		3-16-09
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph V. Demarucle, TECC	07.06.09
	Mary Ann Rafoth	7-23-09
UWUCC Co-Chairs	Gail S. Sechrist	10-23-09
		Received

* where applicable

Received
OCT 23 2009
Liberal Studies

SEP 01 2009
Liberal Studies

1. **New Syllabus of Record, etc.**

I. Catalog Description

MATH 471 Algebra for Elementary/Middle Level Teachers **(3c-0l-3cr)**
Prerequisite: MATH 152

Topics include multiple representations of sequences, integers, expressions, equations, systems of equations, inequalities, and matrices. Representations of expressions and equations will be explored through the use of hands on and visual aides and with appropriate technology. Connections will be made with the teaching and learning of algebraic concepts at the Elementary/Middle Level.

II. Course Outcomes

Students will:

1. explain algebra topics taught at the Elementary/Middle Level.
   PDE Guideline: II.B.2.a
2. explore real-world situations and problems that involve algebra as a symbolic language useful in many areas of life and as a tool for problem solving.
   PDE Guideline: II.B.2.f
3. develop and implement a lesson to teach a topic in algebra. PDE Guideline: II.B.2.d
4. master the different roles algebra plays in the study of patterns, as a symbolic language useful in many areas of life and as a tool for problem solving. PDE Guideline: II.B.2.f
5. represent physical situations symbolically, graph linear and quadratic equations and inequalities, and exhibit fluency working with symbols. PDE Guideline: II.B.2.h
6. demonstrate appropriate uses of manipulatives, calculators, and other technologies to develop concepts and solve problems in algebra. PDE Guideline: II.B.6.f

Course Outcome	College Conceptual Framework / Danielson	INTASC Standard/ Principle	NCTM—Standards for Middle Level Mathematics Teachers	Course Assessment Measuring Outcome
1	1	1, 4	2.3 9	**Key Assessment: Midterm**
2	1	1, 7	2.3 1, 4	Projects, Quizzes, Activities Midterm & Final Exam
3	1, 2, 3 4	6-9	2.3, 3.1 - 3.5 16	Project
4	1a	1, 4	2.3 10	Projects, Quizzes, Activities Midterm & Final Exam
5	1a	1, 4	2.3 10	Projects, Quizzes, Activities Midterm & Final Exam
6	1		2.3 6	Projects, Quizzes, Activities Midterm & Final Exam

1. New Syllabus of Record, etc.

I. Catalog Description

MATH 471 – Algebra for Elementary/Middle Level Teachers (3c-0l-3cr)
Prerequisite: MATH 152

Topics include multiple representations of sequences, integers, expressions, equations, systems of equations, inequalities, and matrices. Representations of expressions and equations will be explored through the use of hands on and visual aides and with appropriate technology. Connections will be made with the teaching and learning of algebraic concepts in the upper elementary and middle schools.

II. Course Outcomes

Students will be able to:

1. explain algebra topics taught in the elementary and middle level grades. PDE Guideline: II.B.2.a
2. explore real-world situations and problems that involve algebra as a symbolic language useful in many areas of life and as a tool for problem solving. PDE Guideline: II.B.2.f
3. develop and implement a lesson to teach a topic in algebra. PDE Guideline: II.B.2.d
4. Master the different roles algebra plays in the study of patterns, as a symbolic language useful in many areas of life and as a tool for problem solving. PDE Guideline: II.B.2.f
5. represent physical situations symbolically, graph linear and quadratic equations and inequalities, and exhibit fluency working with symbols. PDE Guideline: II.B.2.h
6. use manipulatives, calculators, and other technologies to develop concepts and solve problems in algebra. Technology is an important topic where explorations and demonstrations are integrated throughout the entire course where appropriate. PDE Guideline: II.B.6.f

III. Detailed Course Outline

A. Integer Models *(Outcomes #1, #6)* — 3 academic hours
   1. Positive and Negative Numbers
   2. Operations on Integers

B. Algebraic Representations in middle level grades *(Outcome #5)* — 6 academic hours
   1. Linear
   2. Two- and Three-Dimensional

C. Sequences *(Outcome #4)* — 6 academic hours
   1. Arithmetic, Geometric, Fibonacci
   2. Recursive and Explicit Representations

D. Representing Expressions *(Outcome #2)* — 3 academic hours
   1. Concretely and Pictorially
   2. Abstractly

E. Solving Equations and Inequalities Two Unknowns *(Outcome #4)* — 6 academic hours
   1. Graphically
   2. Algebraically and by Substitution

F. Fitting Lines to Data *(Outcomes #5, #6)* — 6 academic hours
   1. Scatter Plots
   2. Median – Median Line
   3. Least Squares Regression
   4. Calculator fitting

G. Matrices and Determinants *(Outcomes #5, #6)* — 3 academic hours
   1. Algebraically
   2. With Calculators and Spreadsheets

H. Student Presentations *(Outcomes #3)* — 6 academic hours

This syllabus covers 39 academic hours leaving 3 academic hours for testing and/or review. The final is an additional 2 academic hours.

IV. Evaluation Methods

Distribution of points:

Class work / participation / daily work	30%
Presentations / projects / portfolios / journals	20%
Practice Teaching Project	20%
Midterm ***(Key Assessment)***	15%
Final	15%

The Midterm is the Key Assessment and shall be required of all instructors.

V. Grading Scale

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

VI. Attendance Policy

The course attendance policy is consistent with the university policy.

VII. Required Textbook

Course packet with readings and activities

VIII. Special Course Requirements

None.

IX. Bibliography

Cuevas, G.J. (2001) *Navigating through algebra, Grades 3-5*. Reston, VA: NCTM.

Coxford, A.F. (1988) *The ideas of algebra, K-12, 1988 NCTM Yearbook*. Reston, VA: NCTM.

Driscoll, M. (1999) *Fostering Algebraic Thinking*. Portsmouth, NH: Heinemann.

Friel, S. et al. (2001) *Navigation through algebra, Grades 6-8*. Reston, VA: NCTM.

Heid, K. (1995) *Algebra in a technological world*. Reston, VA: NCTM.

Kaseberg, A. (2007) *Introductory algebra: A just-in-time approach* (4th ed.). Boston, MA: PWS Publishing Co.

Lawrence, A., & Hennessy, C. (2002) *Lessons for algebraic thinking, Grades 6-8*. Sausalito, CA: Math Solutions Publications.

National Council of Teachers of Mathematics. (2000) *Principles and standards for school mathematics*. Reston, VA: NCTM.

Stein, R. G., & Wallace, L. (2006). *Mathematics for teachers: An exploratory approach to arithmetic, algebra, and geometry*.Reno, NV: Bent Tree Press.

Wah, A. and Picciotto, H. (1994) *Algebra: themes, concepts, and tools*. Mountain View, CA: Creative Publications.

Wickett, M. et al. (2002) *Lessons for algebraic thinking, Grades 3-5*. Sausalito, CA: Math Solutions Publications.

2. Summary of the Revision

We propose to change the name and prerequisite for the course, and establish a current syllabus of record. The last syllabus we have on file is from before 1992.

Current – MATH 471 Basic Concepts of Algebra 3c-0l-3cr

V. Grading Scale

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

VI. Attendance Policy

The course attendance policy is consistent with the university policy.

VII. Required Textbook

Course packet with readings and activities

VIII. Special Course Requirements

None.

IX. Bibliography

Cuevas, G.J. (2001) *Navigating through algebra, Grades 3-5*. Reston, VA: NCTM.

Coxford, A.F. (1988) *The ideas of algebra, K-12, 1988 NCTM Yearbook*. Reston, VA: NCTM.

Driscoll, M. (1999) *Fostering Algebraic Thinking*. Portsmouth, NH: Heinemann.

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Kaseberg, A. (2007) *Introductory algebra: A just-in-time approach* (4th ed.). Boston, MA: PWS Publishing Co.

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National Council of Teachers of Mathematics. (2000) *Principles and standards for school mathematics*. Reston, VA: NCTM.

Stein, R. G., & Wallace, L. (2006). *Mathematics for teachers: An exploratory approach to arithmetic, algebra, and geometry*.Reno, NV: Bent Tree Press.

Wah, A. and Picciotto, H. (1994) *Algebra: themes, concepts, and tools*. Mountain View, CA: Creative Publications.

Wickett, M. et al. (2002) *Lessons for algebraic thinking, Grades 3-5*. Sausalito, CA: Math Solutions Publications.

2. Summary of the Revision

We propose to change the name and prerequisite for the course, and establish a current syllabus of record. The last syllabus we have on file is from before 1992.

Current – MATH 471 Basic Concepts of Algebra 3c-0l-3cr

Prerequisites: MATH 152, Elementary Education concentrate.

Concepts of basic algebraic structures such as group, ring, integral domain, field, and vector space are studied within the context of mathematical maturity of the student. Other topics include relations and functions, polynomials and polynomial equations, systems of equations and inequalities. Consideration given to development of these concepts in the mathematics curriculum.

Proposed – MATH 471 Algebra for Elementary/Middle Level Teachers 3c-0l-3cr

Prerequisites: MATH 152

Topics include multiple representations of sequences, integers, expressions, equations, systems of equations, inequalities, and matrices. Representations of expressions and equations will be explored through the use of hands on and visual aides and with appropriate technology. Connections will be made with the teaching and learning of algebraic concepts in the upper elementary and middle schools.

3. Rationale for the Revision

Overview

The state of Pennsylvania has mandated changes to teacher training programs to support its new teacher licensing scheme. The current program for elementary grades K-6 is being replaced by new requirements for two training programs in: (1) Grades pre-K to 4 and (2) Grades 4-8.

These mandates from the state require revisions to existing courses and the addition of new courses. For Grades pre-K to 4, the new IUP teacher training program includes two courses in methods of teaching. The two new methods courses are revisions of existing methods courses
for early childhood and elementary education.

For Grades 4 to 8, the new IUP teacher training program must provide coursework for prospective teachers to teach all subjects, but with a specialty in one subject area. The new program has four subject area tracks with mathematics being one track. The Mathematics Department, which supports the current K-6 program through a math concentrate for elementary education majors, will have a greater role in the math-track program.

The new math-track program will consist of nine mathematics content and one methods of teaching courses. The existing math concentrate courses (of which MATH 471 is one) need approval for revisions to fit the requirements of the new math-track program. Three new courses also need approval. The three other tracks will include three math content courses and one methods of teaching course drawn from the Mathematics Department's math-track courses.

1. Catalog Name Change

   Rationale: This change makes the name of the course consistent with the course name designations in new state guidelines.

2. Prerequisite Change

   Rationale: The reference to a concentrate was eliminated. Under the new state mandates for teacher preparation programs, the concentrate for elementary education majors will no longer exist.

3. Catalog Description Change

   Rationale: The change makes the catalog description consistent with current course content and consistent with the content prescribed in new state guidelines.

4. Course Revision - Syllabus of Record

   Rationale: The last syllabus in our files is from prior to 1992 and this revision is consistent with the content prescribed in the new state guidelines.

4. Old Syllabus of Record

Next page

I. Catalog Description

MATH 471 Algebra for Elementary and Middle School Teachers — 3 lecture hours, 0 lab hours, 3 credits (3c-01-3cr)

Prerequisite: MATH 152, Elementary Education concentration

Topics include multiple representations of sequences, integers, expressions, equations, systems of equations, inequalities, and matrices. Representations of expressions and equations will be explored through the use of hands on and visual aides and with appropriate technology. Connections will be made with the teaching and learning of algebraic concepts in the elementary and middle schools.

II. Course Objectives

The student will:

1. examine algebra topics taught in the elementary and middle school.
2. explore real-world situations and problems that involve algebra.
3. use calculators and manipulatives to develop concepts and solve problems in algebra.
4. develop and implement a lesson to teach a topic in algebra.

III. Course Outline

- A. Algebraic Representations in the Elementary Grades — 3 hours
  - a. Linear
  - b. Two- and Three-Dimensional
- B. Sequences — 6 hours
  - a. Arithmetic, Geometric, Fibonacci
  - b. Recursive and Explicit Representations
- C. Integer Models — 3 hours
  - a. Positive and Negative Numbers
  - b. Operations on Integers
- D. Representing Expressions — 3 hours
  - a. Concretely and Pictorially
  - b. Abstractly
- E. Solving Equations and Inequalities — 6 hours
  - a. Graphically
  - b. Algebraically
- F. Solving Systems of Equations — 6 hours
  - a. Graphically
  - b. Algebraically
  - c. With Tables and Charts
- G. Fitting Lines to Data — 3 hours
  - a. Scatter Plots

b. Median – Median Line
c. Least Squares Regression
d. Calculator fitting

H. Matrices and Determinants — 3 hours
   a. Algebraically
   b. With Calculators and Spreadsheets
I. Student Presentations of Lessons — 6 hours
J. Midterm Exam — 3 hours

IV. Evaluation Methods

Grade will be based upon homework and in-class assignments, lessons, quizzes, and exams. Class participation will be considered in determining border-line grades.

Distribution of points:

Assignments	20%
Presentation	20%
Quizzes	20%
Midterm Exam	20%
Final Exam	20%

Grading Scale:

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

V. Attendance Policy:

Students are expected to attend and participate in class. The attendance policy will be defined by the instructor according to the University Course Attendance Policy.

VI. Required Textbook

None

VII. Bibliography

Cuevas, G.J. (2001) *Navigating Through Algebra, Grades 3-5*. Reston, VA: NCTM

Coxford, A.F. (1988) *The Ideas of Algebra, K-12, 1988 NCTM Yearbook*. Reston, VA: NCTM

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Heid, K. (1995) *Algebra in a Technological World*. Reston, VA: NCTM

Kaseberg, A. (1996) *Introductory Algebra: A Just-in-Time Approach*. Boston, MA: PWS Publishing Co.

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