LSC Use Only
Number: _____
Action: _____
Date: _____

UWUCC Use Only
Number: 93-6
Action: App
Date: 9/21/93
Senate App 10/5/93

CURRICULUM PROPOSAL COVER SHEET
University–Wide Undergraduate Curriculum Committee

I. **Title/Author of Change**

Course/Program Title: MA 320 Mathematics for Early Childhood

Suggested 20 Character Course Title: Math Early Childhood

Department: Mathematics

Contact Person: Dr. Jacqueline Gorman

II. **If a course, is it being Proposed for:**

_X_ Course Revision/Approval Only

_____ Course Revision/Approval and Liberal Studies Approval

_____ Liberal Studies Approval Only (course previously has been approved by the University Senate)

III. **Approvals**

_____
Department Curriculum Committee

_____
Department Chairperson

_____
College Curriculum Committee

_____
College Dean *

_____
Director of Liberal Studies
(where applicable)

_____
Provost (where applicable)

*College Dean must consult with Provost before approving curriculum changes. Approval by College Dean indicates that the proposed change is consistent with long range planning documents, that all requests for resources made as part of the proposal can be met, and that the proposal has the support of the university administration.

IV. **Timetable**

Date Submitted
to LSC: _____

to UWUCC: _____

Semester to be
implemented: _____

Date to be
published
in Catalog: _____

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Part II. Description of Curriculum Change

1. Catalog Description

MA 320 Mathematics for Early Childhood   3 credits
                                                       3 lecture hours
                                                       0 lab hours
                                                       (3c-0l-3sh)

Prerequisites: MA 151, Early Childhood major

This course studies child-centered, activity-oriented mathematics
programs for early childhood education. The course focuses on
helping children develop understanding and insight into basic
concepts of mathematics through the use of manipulative materials.
Topics include prenumber activities, number activities,
numeration, operations on whole numbers, estimation, rational
numbers, geometry, measurement, probability, statistics, and
problem solving.

2. Old name, number and catalog description

<u>MA 450</u> Mathematics for Early Childhood

3 credits
3 lecture hours
0 lab hours
(3c-01-3sh)

Prerequisites: MA 151, <u>Elementary Education Concentration</u>

Study of child-centered, activity-oriented mathematics program for early childhood education. Students gather and construct manipulative materials and become familiar with commerically produced materials. Prenumber activities, number activities, numeration, operations on whole numbers, fractional numbers, geometry, measurement, problem solving.

3. Summary of changes

1. A change of the course number from MA 450 to MA 320

2. A change of the prerequisite from MA 151 and elementary education concentration to MA 151 and early childhood major

3. The inclusion of the topics of geometry, probability and statistics in the course description.

4. Justification for the change

<u>Course number and prerequisite change</u>.

Under the present course number, MA 450, two separate groups of students are served, elementary education majors who are earning a concentration in mathematics and early childhood majors. These two groups have very different backgrounds and needs. Elementary education majors, who tend to have a fairly strong mathematics background, have a separate mathematics methods course and are required to take two mathematics content classes before beginning their concentration. During their concentration, they are required to take a minimum of three more mathematics content

class. The early childhood majors who take this class have taken no previous mathematics methods course and are only required to take one mathematics content class.

The mathematics department feels that in this situation, the needs of the early childhood majors are not being met. Therefore, we propose to change the course number, closing the course to all but early childhood majors. This would target the course to a more homogeneous 'group of students, allowing us to better meet their needs.

The department believes that it now offers a sufficient variety of other courses for our mathematics concentrates, and therefore we will not be placing an undue hardship on them by creating this course number and prerequisite change.

Inclusion of new topics

In 1989, The National Council of Teachers of Mathematics published a set of recommendations for the mathematics curricula. Part of the recommendations is that the K-4 curriculum should include a broad range of topics, including geometry, statistics, and probability. The department believes that this course should reflect these changes.

COURSE SYLLABUS

I. CATALOG DESCRIPTION

MA 450   Mathematics for Early Childhood   3 credits
                                                   3 lecture hours
Prerequisite: MA 151 Mathematics for Elementary   0 lab hours
              Teachers I,
              Elementary Education concentration

Study of child-centered, activity-oriented mathematics program for
early childhood education. Students gather and construct
manipulative materials and become familiar with commercially produced
materials. Prenumber activities, number activities, numeration,
operations on whole numbers, fractional numbers, geometry,
measurement, problem solving.

II. COURSE OBJECTIVES

The student will:

1. examine and demonstrate an understanding of the scope and sequence
   of the early childhood mathematics curriculum.
2. investigate learning theories and methodology used in teaching
   mathematics in early childhood.
3. gather, construct, and use games, stories, puppet shows,
   activities, and manipulatives to develop prenumber and number
   concepts in early childhood.
4. prepare and teach lessons that implement the concrete-to-
   pictorial-to-abstract approach of teaching mathematics in early
   childhood.
5. illustrate an awareness of current trends related to the teaching
   of mathematics in early childhood.
6. examine the importance of positive attitudes in teaching and
   learning mathematics.
7. learn to integrate problem-solving and real-world applications
   into the teaching of mathematics.
8. practice communicating mathematical ideas.
9. become aware of the importance of the interconnection of
   mathematics topics and the connection of these to the
   outside world.
10. integrate mathematics with other early childhood curricula.
11. use calculators and computers appropriately to develop number
    awareness and mathematical concepts, as well as to solve problems.
12. illustrate awareness of multicultural and individual differences
    in mathematics and the benefits these differences bring.
13. examine different methods of assessment and evaluation.

III. COURSE OUTLINE

A. Development of Pedagogy
   1. Helping children construct mathematical concepts.
   2. Technology and the early childhood classroom.
   3. Planning for developmental instruction.
   4. Assessment and evaluation in the classroom.
   5. Instruction with process problems.

6. The role of affect in the learning of mathematics.
7. The role of culture in the learning of mathematics.
8. Mathematics and children with special needs.

B. Development of Prenumber Concepts
   1. Using directionality and orientation concepts.
   2. Classifying and sorting objects.
   3. Exploring and creating patterns.
   4. Developing seriation concepts.
   5. Developing concepts of matching and one-to-one correspondence.
   6. Developing concepts of conservation of number, quantity, and length.

C. Development of Number Concepts
   1. Developing rote and rational counting.
   2. Reading and writing numerals.
   3. Developing skip counting.
   4. The development of number concepts and relations.
   5. Developing meanings for the operations.
   6. Helping children master the basic facts.
   7. Whole number place-value development.
   8. Pencil-and-paper computation with whole numbers.
   9. Mental computation and estimation.
   10. Development of fraction concepts.
   11. Recognizing decimals.

D. Development of Non-Number Concepts
   1. Developing concepts of time and money.
   2. Developing measurement concepts with non-standard and standard units.
   3. Identifying geometric shapes.
   4. Organizing and interpreting data.
   5. Making concrete, pictorial, and symbolic

IV. EVALUATION METHODS

Criteria used in evaluating the competency of the student will vary depending upon the instructor, but generally will include oral and written examinations, presentations, projects, written assignments, and class participation.

V. REQUIRED TEXTS

Baratta-Lorton, M. (1976) Mathematics their way. Reading, MA: Addison-Wesley.

VI. BIBLIOGRAPHY

Barody, A.J. (1989). A guide to teaching mathematics in the primary grades. Boston: Allyn and Bacon.

Cooney, T. & Hirsch, C.R. (Eds.) (1990) Teaching and learning mathematics. Reston, VA: The National Council of Teachers of Mathematics.

Dutton, W.H. & Dutton, A. (1991). Mathematics children use and understand. Mountain View, CA: Mayfield Publishing Company.

National Council of Teachers of Mathematics. Arithmetic Teacher. Reston, VA.

National Council of Teachers of Mathematics. (1989) Curriculum and evaluation standards for school mathematics. Reston, VA: The National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics. (1991) Professional standards for teaching mathematics. Reston, VA: The National Council of Teachers of Mathematics.

Payne, J.N. (Ed.) (1990) Mathematics for the young child. Reston, VA: The National Council of Teachers of Mathematics.

Pennsylvania Department of Education. (1989) Growing together... Early childhood education in Pennsylvania. Harrisburg: Pennsylvania Department of Education.

Course Syllabus

I. Catalog Description

MA 320   Mathematics for Early Childhood   3 credits
                                                  3 lecture hours
                                                  0 lab hours
                                                  (3c-01-3sh)

Prerequisites: MA 151, Early Childhood major

This course studies child-centered, activity-oriented mathematics programs for early childhood education. The course focuses on how to teach mathematics through helping young children develop understanding and insight into basic concepts of mathematics through the use of manipulative materials. Topics include prenumber activities, number activities, numeration, estimation, operations on whole numbers, rational numbers, geometry, measurement, probability, statistics, and problem solving.

II. COURSE OBJECTIVES

1. The students will examine and demonstrate an understanding of the scope and sequences of the early childhood mathematics curriculum.
2. The students will investigate learning theories and methodology used in teaching mathematics in early childhood.
3. The students will gather, construct, and use games, stories, puppet shows, activities, and manipulatives to develop prenumber and number concepts in early childhood.
4. The students will prepare and teach lessons that implement the concrete-to-pictorial-to-abstract approach of teaching mathematics in early childhood.
5. The students will illustrate an awareness of current trends related to the teaching of mathematics in early childhood.
6. The students will examine the importance of positive attitudes in teaching and learning mathematics.
7. The students wills learn to integrate problem-solving and real-world applications into the teaching of mathematics.
8. The students will practice communicating mathematical ideas.
9. The students will become aware of the importance of the interconnection of mathematics topics and the connectionof mathematics to the outside world.
10. The students will integrate mathematics with other early childhood curricula.
11. The students will use calculators and computers appropriately to develop number awareness and mathematical concepts, as well as to solve problems.
12. The students will illustrate awareness of multicultural and individual differences in mathematics and the

benefits these differences bring.
13. The students will examine different methods of assessment and evalutation.

III. COURSE OUTLINE

A. The Theory of Learning Mathematics (5 hrs.)
1. Cognitive considerations
   a. Constuctivism vs. absorption theory
   b. Relational understanding vs. instrumental understanding
   c. Helping children construct concepts
   d. Helping children learn procedural knowledge connected with concepts
2. Affective considerations
   a. The role of affect in the learning of mathematics
   b. The role of culture in the learning of mathematics
   c. Mathematics and children with special needs

B. Development of Pedagogy   (4 hrs)
1. Teaching through questioning
2. Planning for developmental instruction
3. Assessment and evaluation in the classroom
4. Technology and the early childhood classroom
5. Using literature and media to teach mathematics

C. Development of Prenumber concepts   (5 hrs.)
1. Using directionality and orientation concepts
2. Classifying and sorting objects
3. Exploring and creating patterns
4. Developing seration concepts
5. Developing concepts of matching and one-to-one correspondence
6. Develop of comparison concepts
7. Developing concepts of conservation of number, quantity, and length.

D. Development of Number Concepts (18 hrs)
1. Developing rote and rational counting
2. Reading and writing numberals
3. Developing number concepts and relations
4. Developing meaning for the operations
5. Helping children learn basic facts
6. Whole number place-value development
7. Pencil-and-paper computation with whole numbers
8. Mental computation and estimation
9. Development of fraction concepts
10. Problem solving

E. Development of Non-Number Concepts (10 hrs.)
1. Developing the concepts of measurement
   a. Non-standard and standard units
   b. Concepts of length, weight, capacity

    c. Concepts of time and money
2. Developing geometric concepts
    a. Developing geometric thinking
    b. Informal vs. formal geometry
    c. Exploring shapes and properties
    d. Building, drawing, and making shapes
    e. Geometric problem solving activities
3. Developing the concepts of probabilty and statistics
    a. Developing the concepts of chance
    b. Collecting data
    c. Organizing data
    d. Picturing data

IV. EVALUATION METHODS

The final grade for the course will be determined as follows:

40 %   Tests. Minimum of two tests consisting of open-ended as well objective questions.

40 %   Projects. Minumum of two projects. These could include class presentations, unit plans, learning centers, puppet shows, or interviews.

10 %   Short assignments. A varitey of short, written or oral assignments.

10 %   In class activities.

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Required textbook:

> Dutton, W., H., & Dutton, A. (1991). _Mathematics children use and understand_. Mountain View, CA: Mayfield Publishing Company.

Supplemental textbook:

> Baratta-Lorton, M. (1976). _Mathematics their way_. Reading, MA: Addison-Wesley.

VI. SPECIAL RESOURCE REQUIREMENTS

None

VII. BIBLIOGRAPHY

Baroody, A.J. (1989). _A guide to teaching mathematics in the primary grades_. Boston: Allyn and Bacon.

Cooney, T. & Hirsch, C. R. (Eds.). (1990) <u>Teaching and learning mathematics</u>. Reston, VA: The National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics. <u>Arithmetic Teacher</u>. Reston, VA.

National Council of Teachers of Mathematics. (1989) <u>Curriculum and evaluation standards for school mathematics</u>. Reston, VA: National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics. (1991). <u>Professional standards for teaching mathematics</u>. Reston, VA: National Council of Teachers of Mathematics.

Payne, J. N. (Ed.). (1990) <u>Mathematics for the young child</u>. Reston, VA: National Council of Teachers of Mathematics.

Pennsylvania Department of Education. (1989). <u>Growing together . . . Early childhood education in Pennsylvania</u>. Harrisburg, PA: Pennsylvania Department of Education.
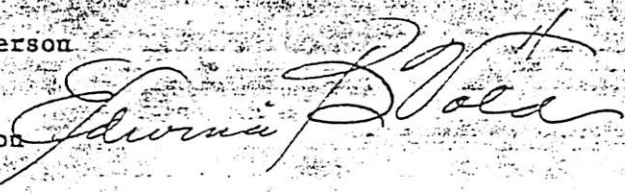
DATE: April 5, 1993

SUBJECT: Mathematics Requirement for Early Childhood Majors

TO: Dr. Gerald Buriok, Chairperson
Mathematics Department

FROM: Edwina B. Vold, Chairperson

The proposed changes in content and number of the undergraduate course MA 320 from the current MA 450 are acceptable to our faculty. We also approve of the changes proposed for the graduate course EM 655. We feel it will be more conducive for our graduate students than was the dual level EM 550 course.

The MA 320 course reflects the Early Childhood Teacher Education faculty's mission and our commitment to developmentally appropriate teaching strategies. The course also reflects the need to expand the mathematics competencies needed to be effective teachers of young children.

We appreciate all of the hard work generated by your faculty to honor our agreement. We especially commend Dr. Jackie Gorman for her exceptional knowledge of young children, teaching and mathematics education.

Thank you again for an outstanding revision/proposal.

ecw

xc: Dr. Gail Gerlach
Dr. Marilyn Willis

IUP

Indiana, Pennsylvania 15705

Date: May 7, 1993

To: Dr. Hilda Richards
            Provost

From: William G. Cale ᴜᴇ.ᴄ. ᴀᴋ
            Dean, NS&M

Subject: Curriculum Proposals

Attached please find several curriculum proposals submitted by departments in the College of Natural Sciences and Mathematics. Program changes for the BS in Education/Biology, BS in Geology, BS in Environmental Geoscience, BA in Psychology, and BA in Psychology/Applied Track, will not require an increase in the number of credits required or faculty workload hours.

Similarly, the proposed new courses do not necessitate additional resources. Those courses, BI 450/550 Pymatuning: Field Studies, MA 320 Mathematics for Early Childhood, PC 315 Experimental Developmental Psychology, PC 335 Experimental Social Psychology, PC 345 Human Cognition, PC 355 Animal Behavior, PC 356 Biopsychology, PC 390 Industrial- Organizational Psychology, PC 425 Experimental Organizational Psychology, are proposed in place of courses earlier deleted, courses previously offered as Special Topics, or as an alternative choice between laboratory or lecture versions of existing offerings. There will be no increase in the number of credits required and present faculty are well qualified to teach the proposed courses.