LSC Use Only
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Submission Date: _____
Action-Date: _____

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LIBERAL STUDIES

UWUCC USE Only
Number: 97-35n
Submission Date: _____
Action-Date: ~~App. 2/10/98~~ Senate app. 3/3/98

# CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

## I. CONTACT

Contact Person Dr. Buriok Phone 2608

Department Mathematics

## II. PROPOSAL TYPE (Check All Appropriate Lines)

_____ COURSE _____
Suggested 10 character title

_____ New Course* _____
Course Number and Full Title

_____ Course Revision _____
Course Number and Full Title

_____ Liberal Studies Approval – for new or existing course _____
Course Number and Full Title

_____ Course Deletion _____
Course Number and Full Title

_____ Number and/or Title Change _____
Old Number and/or Full Old Title

_____
New Number and/or Full New Title

_____ Course or Catalog Description Change _____
Course Number and Full Title

X PROGRAM: X Major _____ Minor _____ Track

_____ New Program* _____
Program Name

X Program Revision* Secondary Mathematics Education
Program Name

_____ Program Deletion* _____
Program Name

_____ Title Change _____
Old Program Name

_____
New Program Name

## III. Approvals (signatures and date)

Department Curriculum Committee

Department Chair

College Curriculum Committee 12/9/97

College Dean

–Director of Liberal Studies (where applicable)

*Provost (where applicable)

97-35n

**Part II. Description of Curriculum Changes**
**1. Catalog description for the revised program in the appropriate form.**

**Bachelor of Science in Education - Mathematics Education**

| | | | |
|---|---|---|---|
| **Liberal Studies:** As outline in Liberal Studies Section with the following specifications: Mathematics: (included in major) Social Science: PC 101 Liberal Studies electives: no courses with MA prefix | | | **50-52** |
| **College:** | | | **29** |
| **Professional Education sequence** | | | |
| ED242 | Pre-student Teaching Clinical Experience I | 1sh | |
| ED342 | Pre-student Teaching Clinical Experience II | 1sh | |
| ED441 | Student Teaching | 12sh | |
| ED442 | School Law | 1sh | |
| ED456 | Teaching Mathematics in the Secondary School | 3sh | |
| EP202 | Educational Psychology | 3sh | |
| EP377 | Educational Tests and Measurements | 3sh | |
| *EX301* | *Education of Students with Disabilities in an Inclusive Secondary Settings* | *2sh* | |
| FE202 | American Education in Theory and Practice | 3sh | |
| **Major:** | | | **38** |
| **Required courses:** | | | |
| MA117 | Principles of Mathematics | 3sh | |
| *MA123* | *Calculus I for Physics, Chemistry, Mathematics* | *4sh* | |
| *MA 124* | *Calculus II for Physics, Chemistry, Mathematics* | *4sh* | |
| MA171 | Introduction to Linear Algebra | 3sh | |
| MA216 | Probability/Statistics for Natural Sciences | 4sh | |
| MA271 | *Introduction to Mathematical Proofs I* | 3sh | |
| *MA272* | *Introduction to Mathematical Proofs II* | *3sh* | |
| *MA350* | *History of Mathematics* | *3sh* | |
| MA353 | Theory of Numbers | 3sh | |
| MA355 | Foundations of Geometry I | 3sh | |
| MA460 | *Technology in Mathematics Instruction* | 3sh | |
| *Two of the following: MA452/453/454 Math Seminar* | | *2sh* | |
| **Other Requirements:** | | | **3** |
| CO205 | Programming Languages for Secondary Schools | 3sh | |
| **Free Electives:** | | | **2-4** |
| **Total Degree Requirements:** | | | **124** |



Revised

**Proposed Program**
**Bachelor of Science in Education - Mathematics Education**

**Liberal Studies:** As outlined in Liberal Studies Section **50-52**
with the following specifications:
Mathematics: (included in major)
Social Science: PC 101
Liberal Studies electives: no courses with MA prefix

**College:** **29**

**Professional Education sequence**

| | | |
|---|---|---|
| ED242 | Pre-student Teaching Clinical Experience I | 1sh |
| ED342 | Pre-student Teaching Clinical Experience II | 1sh |
| ED441 | Student Teaching | 12sh |
| ED442 | School Law | 1sh |
| ED456 | Teaching Mathematics in the Secondary School | 3sh |
| EP202 | Educational Psychology | 3sh |
| EP377 | Educational Tests and Measurements | 3sh |
| EX301 | Edof Stdnts with Disabilities in Inclusive Sec. Setting | 2sh |
| FE202 | American Education in Theory and Practice | 3 sh |

**Major:** **38**

**Required courses:**

| | | |
|---|---|---|
| MA117 | Principles of Mathematics | 3sh |
| MA123 | Calculus I Physics, Chem, Math | 4sh |
| MA 124 | Calculus I Physics, Chem, Math | 4sh |
| MA171 | Intro to Linear Algebra | 3sh |
| MA216 | Probability/Statistics for Natural Sciences | 4sh |
| MA271 | Intro. to Math Proofs I | 3sh |
| MA272 | Intro. to Math Proofs II | 3sh |
| MA350 | History of Mathematics | 3sh |
| MA353 | Theory of Numbers | 3sh |
| MA355 | Foundations of Geometry I | 3sh |
| MA460 | Technology in Math Instruction | 3sh |
| MA452/453/454 | Math Seminar | 2sh |

**Other Requirements:** **3**

| | | |
|---|---|---|
| CO205 | Programming Languages for Secondary Schools | 3sh |

**Free Electives:** **2-4**
**Total Degree Requirements:** **124**

**Present Program**
**Bachelor of Science in Education - Mathematics Education**

**Liberal Studies:** As outline in Liberal Studies Section **50-52**
with the following specifications:
Mathematics: (included in major)
Social Science: PC 101
Liberal Studies electives: no courses with MA prefix

**College:** **30**

**Professional Education sequence**

| | | |
|---|---|---|
| CM301 | Technology for Learning and Instruction | 3sh |
| ED242 | Pre-student Teaching Clinical Experience I | 1sh |
| ED342 | Pre-student Teaching Clinical Experience II | 1sh |
| ED441 | Student Teaching | 12sh |
| ED442 | School Law | 1sh |
| ED456 | Teaching Mathematics in the Secondary School | 3sh |
| EP202 | Educational Psychology | 3sh |
| EP377 | Ed Tests & Measurements | 3sh |
| FE202 | Amer Ed in Theory and Practice | 3sh |

**Major:** **35-39**

**Required courses:**

| | | |
|---|---|---|
| MA117 | Principles of Mathematics | 3sh |
| MA171 | Introduction to Linear Algebra | 3sh |
| MA271 | Introduction to Algeb. Stuctures | 3sh |
| MA350 | History of Mathematics | 2sh |
| MA353 | Theory of Numbers | 3sh |
| MA355 | Foundations of Geometry I | 3sh |
| MA460 | Computers/Calculators in Secondary School | 3sh |
| MA452/453/454 | Math Seminar | 1sh |

**One Calculus sequence: (A or B)**

| | | |
|---|---|---|
| A. | MA 127 Calculus I | 4sh |
| | MA 128 Calculus II | 4sh |
| | MA 227 Calculus III | 4sh |
| B. | MA123 Calculus I for Phyics/Chem | 4sh |
| | MA124 Calculus II for Phyics/Chem | 4sh |

**One Statistics sequence: (A or B)**

| | | |
|---|---|---|
| A. | MA 363 Mathematical Statistics I | 3sh |
| | MA 364 Mathematical Statistics II | 3sh |
| B. | MA216 Probability/Statistics for Natural Sciences | 4sh |

**Other Requirements:** **3**

| | | |
|---|---|---|
| CO205 | Prog. Languages for Sec. Sch | 3sh |

**Free Electives:** **0-6**
**Total Degree Requirements:** **124**

**2. Summary of Changes:**

| Old Program | New Program |
|---|---|
| MA127 Calculus I (4 sh) | MA 123 Calculus I for Physics, Chem, Math (4 sh) |
| MA128 Calculus II (4 sh) | MA 124 Calculus II for Physics, Chem, Math (4 sh) |
| MA227 Calculus III(4 sh) | |
| or | |
| MA 123 Calculus I for Physics, Chem (4 sh) | |
| MA 124 Calculus II for Physics, Chem (4 sh) | |
| MA216 Prob & Stats Nat. Sci.(4 sh) | MA216 Prob & Stats Nat. Sci.(4 sh) |
| or | |
| MA363 Mathematical Statistics I (3sh) | |
| MA364 Mathematical Statistics II(3sh) | |
| MA271 Algebraic Structures(3sh) | MA 271 Introduction to Mathematical Proof I(3sh) |
| | MA 272 Introduction to Mathematical Proof II(3sh) |
| MA 350 History of Mathematics (2sh) | MA 350 History of Mathematics (3sh) |
| MA 460 Comp. & Calc in Sec Sch(3sh) | MA 460 Technology in Mathematics Instruction (3sh) |
| CM 301Tech for Learn/Instruction(3sh) | EX 301 Education of Students with Disabilities in an Inclusive Secondary Settings (2sh) |
| One of the following math ed seminars: MA452/MA453/MA454 (1sh) | Two of the following math ed seminars: MA452/MA453/MA454 (2sh) |

**b. List of all associated course changes:**

These courses will be deleted from the list of required courses:
CM 301 Technolgy for Learning and Instruction
MA 127 Calculus I (4sh)
MA 128 Calculus II (4sh)
MA 227 Calculus III (4sh)
MA 363 Mathematical Statistics I (3sh)
MA 364 Mathematical Statistics II (3 sh)

These courses will be added to the list of required courses:
MA 123 Calculus I for Physics, Chem, Math (4 sh)
MA 124 Calculus II for Physics, Chem, Math (4 sh)
MA 216 Prob & Stats Nat. Sci.(4 sh)
EX 301 Education of Students with Disabilities in an Inclusive Secondary Settings (2sh)

These new courses will be added to the list of required courses
MA272 Introduction to Mathematical Proof II
A second mathematics seminar MA 452/453/454

## c. Rationale for Change.

Rationale for revision of the calculus/proof sequence
One of the objectives of the various mathematics programs is to give students a rigorous understanding of mathematics and mathematical proof. As part of this objective, the Mathematics Department has traditionally offered a separate three semester calculus sequence specifically for its majors, including a more rigorous, proof-oriented presentation, while offering a "leaner," more application-oriented two semester sequence for the rest of the sciences. In recent years, the department has found this dual approach to be a stumbling block in accommodating students wishing to transfer or change majors. Many times, students coming into or leaving the major midway through one calculus sequence are forced to start a second sequence from scratch because of differences in pace or rigor. To address this problem, the Mathematics Department has decided to place all of its majors into the two semester calculus sequence for the sciences.

To make up for the reduced exposure to mathematical proof, the department has expanded its one semester introduction to proof into a two semester sequence. The expanded proof sequence will contain the more theoretical material from the calculus. Moving this material into the proof sequence will further benefit the students in that they will have had more time to "mature" mathematically before grappling with the abstract.

Rationale for revision of the statistics sequence
Future teachers will benefit more from a course which focuses on the application of probability and statistics, which is emphasized in MA 216, Probability and Statistics for Natural Sciences, rather than the theoretical treatment of the topics which is emphasized in MA 363 and MA 364 Mathematical Statistics I and II.

Rationale for inclusion of EX 301
With the mainstreaming of children with special needs into regular classrooms, it is essential for future teachers to have instruction on how to best meet their needs. The Pennsylvania Department of Education is requiring the addition of a course which focuses on education of children with disabilities to maintain program certification.

Rationale for deletion of CM 301.
The Mathematics Department recognizes the need for our students to be proficient in technology. Our current program includes two technology classes, CO205: Programming Languages for Secondary Schools and MA 460: Computers and Calculators in Secondary School (which is being revised.), as well as utilizing technology in the most of our majors mathematics classes. Our revised technology course (MA 460) includes distance education, videotaping, internet resources, and presentation software, as well as the use of computers, graphics calculators, and Calculator Based Laboratory (CBL) to teach mathematics. Since most of the topics in CM 301 are duplicated in MA 460, the department is deleting CM 301 from our program to make room for the inclusion of EX 301.

Rationale for requirement of a second mathematics education seminar
The Mathematics Department is finding that many of our better mathematics students are having difficulty breaking down mathematics concepts so that they can be clearly explained. We believe that an extra seminar will help students become more proficient in this skill before they attempt their student teaching experience. Please note, that these courses have always been offered as 1 credit courses.

## Part III. Implementation

### 1. How will the proposed revision affect students already in the existing program?

The program revision will become effective with students entering the University in the Fall of 1998. Students already in the existing program will continue under the University Catalog that was in effect when they entered the Mathematics Education program, however, with the approval of their academic advisor, the student may choose to follow the revised program. The mathematics Department will offer MA 127, 128 and 227 during the 1998-99 academic year to allow students who are already part way through the sequence or who need to repeat one of the classes, an opportunity to take the classes. Students already in the program will be permitted to take MA 272 as an elective if they completed the old MA 271.

MA 350 will become a 3 credit course in the fall of 1998. Students choosing to continue with the current program will be affected by having a three credit history rather than a two credit class.

2. **How will the proposed revision affect faculty teaching loads? Have additional faculty been authorized? If you are adding requirements, how will adequate seats be provided?**

Change in calculus/proof sequence: The department offered one section of MA 127 and MA 128 each semester. It will now offer an additional section of MA 123/124. Instead of the one section of MA 227, a section of MA 272 will be offered.

Change in the statistics sequence: Very few mathematics education students have chosen to take the MA 363/364 option. Deleting this option, therefore, will not increase the number of sections of MA 216. MA 363, 364 will still be offered for students majoring in mathematics.

MA 350 changed to three credits: The changes will mean one additional hour in the history class. No additional faculty will be needed.

Increase in number of mathematics seminars: Currently the department has three mathematics education seminars, offering one each semester on a rotation basis. The inclusion of the requirement for a second seminar will simply increase the number of students in each course. Since the enrollment in seminars has been between 10 and 15 students, there is adequate room in the existing courses.

Inclusion of EX 301: The College of Education has hired additional faculty to teach this course. Seating should be adequate.

Deletion of CM 301: Roughly 10 mathematics education majors are enrolled in Cm 301 each semester. Since the communications media department typically offers 9 to 10 sections of this course each semester, the effect on their course enrollment should be minimal.

3. **Are other resources adequate? (Space, equipment, supplies, travel funds)**

The only proposed change which affects other resources is the change in MA 460. The department will need to purchase approximately $500 in equipment. This will be done using money from the department budget.

4. **Do you expect an increase or decrease in the number of students as a result of these revisions? If so, how will the department adjust?**

No. We do not foresee that these changes will have any impact on our number of students.

From: GROVE::JBURIOK

From: GROVE::KDUDT 29-OCT-1997 11:22:31.49
To: JBURIOK
CC:
Subj: MA460 Technology in Math Instruction

The Communications Media Department is in support of the Math Department offering MA460 Technology in Math Instruction as a replacement for CM 301 Technology for Learning and Instruction.

Kurt Dudt Chair Commonication Media