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

UWUCC Use Only
Number: _____ 92-2
Action: App 11/10/92
Date: APR 13 1992
Senate App 12/1/92

CURRICULUM PROPOSAL COVER SHEET
University–Wide Undergraduate Curriculum Committee

I. **Title/Author of Change**

Course/Program Title: ___Applied Mathematics Program, B.S.___
Suggested 20 Character Course Title: _____
Department: ___Mathematics___
Contact Person: ___John Henry Steelman___

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

_____ 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

_____
College Curriculum Committee

_____
Department Chairperson

_____
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: _____

73

Part II.1.   Catalog Description of Revised Program

Bachelor of Science - Applied Mathematics
Liberal Studies: As outlined in Liberal Studies   50-52
section with the following specifications:
      Mathematics: (included in major)
      Liberal Studies Electives:
            no courses with MA prefix
            Foreign Language Intermediate Level

Major: 40-41
      Required Courses:
            MA 127 Calculus I   4 sh
            MA 128 Calculus II   4 sh
            MA 171 Introduction to Linear Algebra   3 sh
            MA 216 Probability & Statistics for Natural Science   4 sh
            MA 227 Calculus III   4 sh
            MA 241 Differential Equations   3 sh
            MA 271 Introduction to Algebraic Structures 3 sh
      Controlled Electives:
            Two courses from list: 6 sh
                  MA371,421,422,423,424,427,476,477
            One of the following two-course sequences: 6-7 sh
                  MA342/CO450; MA363/MA364; MA445/MA446
            A minimum of three additional semester hours from the list 3 sh
            of controlled electives above or the following:
                  MA353,425,447,465,481

Other Requirements: 6
      Computer Science:
            CO 110 Problem Solving and Structured Programming   3 sh
            CO 250 Introduction to Numerical Methods   3 sh

Free Electives: 25-28

Total Degree Requirements: 124

Part II.2. Summary of Changes with Justification

The B.S. in Applied Mathematics is being revised to ensure that these majors have an adequate grounding in the most important areas of mathematics while also getting the experience of studying some area in greater depth. Specifically we propose the following changes:

1. Making the intermediate level foreign language requirement part of the Liberal Studies electives. Since the College of Natural Science and Mathematics no longer has a foreign language requirement, that requirement is being dropped from the catalog description. The Mathematics Department, however, requires a foreign language. The Liberal Studies electives satisfy this requirement.

2. Adding MA 216 (Probability and Statistics for Natural Sciences) as a required course in the major. Currently, the applied math program requires no probability and statistics of its majors. Yet many of the problems faced by the applied mathematician require an understanding of probability and statistics. This course would serve as an excellent foundation on which more advanced courses can build.

3. Adding MA 241 (Differential Equations) as a required course in the major. In the current catalog, MA 241 is an implicit requirement in that it is a prerequisite for CO 450, which is required. Although CO 450 is not a required course with this proposal (only a sequence option), MA 241 is a proposed required course in that, to many mathematicians, differential equations represent the culmination of the calculus. Furthermore, differential equations and their solutions have applications to many problems in the sciences, business, economics, etc.

4. Deleting CO 450 (Applied Numerical Methods) as a required course. Numerical Analysis is just one of many areas of applied mathematics. Requiring two courses in this area (CO 250 and CO 450) is more depth than is necessary. Dropping back to one course being required in this area (CO 250) allows for more breadth in the applied mathematics curriculum, namely, the addition of MA 216. CO 450 is kept as a course in one of the optional sequences among the controlled electives.

5. Adding a required sequence. Currently, the applied math major requirements allow a student to take a hodgepodge of courses without exploring any area of mathematics in any depth. While this outcome is usually avoided with careful advising, not all advisors are equally conscientious and not all students take their advisor's advice.

6. Adding a specified list of math elective courses. The current catalog refers to "major courses." To clarify which courses would be appropriate courses for the applied math major as electives, a list is given.

Current		Proposed	

Bachelor of Science - Applied Mathematics
Liberal Studies: As oulined in Liberal Studies 50-52
section with the following specifications:
   Mathematics: (included in major)
   Liberal Studies electives
      no courses with MA prefix

College:
   Foreign Language Intermediate level (1)

Major:		36
Required Courses:		
MA 127 Calculus I	4sh	
MA 128 Calculus II	4sh	
MA 171 Intro to Linear Algebra	3sh	
MA 227 Calculus III	4sh	
MA 271 Intro to Algebraic Struct	3sh	
Controlled electives:		
Two courses from list:	6sh	
MA 371,421,422,423,424,427, 476,477		
Additional MA credit from major courses	12sh(2)	

Other Requirements:		9
Computer Science:		
CO110 Problm Solvg & Structrd Progmg	3sh	
CO250 Intro to Numerical Methods	3sh	
CO450 Applied Numerical Methods	3sh	

Free Electives:		21-29

Total Degree Requirements:		124

(1) Intermediate-level Language may be included in
Liberal Studies elective.
(2) A student may select courses to fulfill
requirements for specialized track.
  a) actuarial/statistics:
    MA363,364,421,422,446,465
  b) scientific/engineering:
    MA241,342,363,364,371,423,445,446
  c) math analyst
    MA241,342,363,364,371,445or446,476, with
    CO minor.

Proposed

Bachelor of Science - Applied Mathematics
Liberal Studies: As oulined in Liberal Studies 50-52
section with the following specifications:
   Mathematics: (included in major)
   Liberal Studies electives
      no courses with MA prefix
      Foreign Language Intermediate level

Major:		40-41
Required Courses:		
MA 127 Calculus I	4sh	
MA 128 Calculus II	4sh	
MA 171 Intro to Linear Algebra	3sh	
MA 216 Prob & Stats for Nat Sci	4sh	
MA 227 Calculus III	4sh	
MA 241 Differential Equations	3sh	
MA 271 Intro to Algebraic Struct	3sh	
Controlled electives:		
Two courses from list:	6sh	
MA371,421,422,423,424,427, 467,477		
One of the following two-course sequences:	6-7sh	
MA342/CO450, MA363/MA364, MA445/MA446		
A minimum of three additional semester hours from the list of controlled electives above or one of the following: MA353,425,447,465,481	3sh	

Other Requirements:		6
Computer Science:		
CO110 Prblm Solvng & Strctrd Prgmg	3sh	
CO250 Intro to Numerical Methods	3sh	

Free Electives:		25-28

Total Degree Requirements:		124

To: Dr. Gerald Buriok, Chairman
             Mathematics Department

From: Curriculum Committee
             Computer Science Department

Date: March 25, 1992

Subject: CO450 Applied Numerical Methods

     The Computer Science Department Curriculum Committee has
considered the changes in the requirements for Applied Mathematics
majors.

     We agree that the pairing of MA342 Advanced Calculus for
Applications and CO450 Applied Numerical Methods as a sequence is
an appropriate option for your majors. Our department chairmen
should coordinate the scheduling of these courses.

cc: Dr. John Steelman, Mathematics Department
             Mr. Gary Buterbaugh, Chairman
                 Computer Science Department

To: Mr. Gary Buterbaugh, Chairman
      Computer Science Department

From: Gerald Buriok, Chairman
       Mathematics Department

Date: March 5, 1992

Subject: CO 450 Applied Numerical Methods

At the meeting of the Mathematics Department on January 30, 1992, a change which will affect the Computer Science Department was approved for Applied Mathematics majors.   The Mathematics Department will no longer require CO 450 but will include it as an option for Applied Mathematics majors.

If the changes approved by the Department are eventually approved by the University Senate, Applied Mathematics majors will have as additional requirements MA 216 Prob & Stat for Natural Sciences and MA 241 Differential Equations. These students will also be required to select one sequence from the following:
a) MA 342 and CO 450;   b) MA 363 and MA 364;   c) MA 445 and MA 446.

We will submit this proposal to the College of Natural Sciences and Mathematics in the near future, and if approval is forthcoming, to the University Senate Curriculum Committee. We would welcome a response from the Computer Science Department.

cc: Dr. Charles Shubra, Computer Science
      Dr. John Steelman, Mathematics Department

From: GROVE::WGCALE   "WILLIAM CALE"
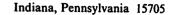To: GROVE::ZEXPAWN
CC: AKANIAST
Subj: RE: Mathematics Curriculum Change Proposals

The proposed changes in the Mathematics curriculum will require no additional resources to implement.

William G. Cale, Dean
College of Natural Sciences and Mathematics

Date: October 19, 1992

To: Dr. Hilda Richards
           Provost

From: Aleksandra B. Kaniasty
           Assistant to the Dean, NS&M   *AK*

Re.:   Mathematics Curriculum Change Proposals

Enclosed is information you have requested regarding
justification of the proposed curriculum changes for the B. S.
in Mathematics and B. S. in Applied Mathematics programs. I
am also enclosing a copy of a memo from Dr. Buriok originally
submitted to Dr. Cale in April. Please let us know if we can
further assist you in this matter.

To: William Cale, Dean
      College of Natural Sciences and Mathematics

From: Gerald Buriok, Chairman
      Mathematics Department   *GmB*

Date: October 15, 1992

Subject: Curriculum Proposals

     Attached to this memo are the copies of the proposed
curriculum changes for the B.S. in Mathematics and the B.S. in
Applied Mathematics which were approved by the College Curriculum
Committee and are on the docket for the B-2 Senate Curriculum
Committee. In response to a request from your office, I have also
attached a copy of the memo dated April 13, 1992 in which I
indicated the impact the proposed change of requiring MA 216 in
both of these programs would have on course scheduling.

     The memo does not refer to the impact the proposed change of
requiring MA 241 in both programs would have on scheduling, so let
me describe that here. We offer two sections of MA 241 each fall,
and have been offering one section during a summer session. No
sections have been offered in the spring semester for a number of
years. The enrollments for the past three years are:

Year	Section 1 Enrollment	Section 2 Enrollment
1990	29	28
1991	19	20
1892	18	33

     As you can see, the sections have not been overloaded. Due to
a quirk in requirements, the Applied Mathematics majors have all
been taking MA 241 anyway. It has not been required in the
Mathematics Department, but is a prerequisite for CO 450, a
computer science requirement for these majors. In fact, this is
what precipitated our recommending the change to state up front
that these students would be required to take MA 241. Thus the
only new students will be those whose major is Mathematics and who
would not have chosen this as a mathematics elective. Since we
have approximately twelve Mathematics majors at each level
(freshman, sophomore, etc.), there would not appear to be a problem
absorbing these with the current offerings. I do not foresee a
need to offer additional sections of MA 241, although we may change
the pattern to offer one section each semester rather than offering
both in the fall.

To: Dr. William Cale, Dean
    College of Natural Sciences and Mathematics

From: Gerald Buriok, Chairman
      Mathematics Department

Date: April 13, 1992

Subject: Additional Section of MA 216

Last week the Advisory Committee of the College of Natural
Sciences and Mathematics approved a curricular change for
Mathematics majors and Applied Mathematics majors. Specifically,
MA 216 will be required of students in both of these tracks. It is
my understanding you would not sign the Curriculum Proposal Cover
Sheet until an explanation was forthcoming as to what would be cut
so that an additional section of MA 216 could be placed on the
schedule.

I am providing a table showing the number of students in each
track for our department.

	Sec. Math. Ed.	Math	Applied Math	Total
FR	35	15	2	52
SO	47	8	3	58
JR	51	13	9	73
SR	47	11	7	65
TOT	180	47	21	248

It is not unreasonable to estimate that we will only be adding
around ten students to the MA 216 classes each semester with the
proposed changes. As you recall, the new Computer Science program
passed the University Senate last week, and it contains MA 216 as
a requirement for students in that major, too, although other
statistics courses remain an option. I expect a small increase in
the enrollment in MA 216 due to this change, too. Based on these
numbers, I believe we will need to offer three sections of MA 216
each semester, beginning in the fall of 1993, instead of the two
sections we are currently offering.

During recent semesters, I have cut back on the sections of
calculus for majors. Prior to the 1991-92 academic year, we
offered two sections of each course, MA 127, MA 128, and MA 227,
each semester. We have gone to the following pattern:

	MA 127	MA 128	MA 227
= fall sections	1	2	1
= spring sections	2	1	1

This represents a savings of two sections of four credit
courses per semester. We will continue scheduling according to
this pattern. Also, we normally offer about fifteen sections of MA

121 Calculus for Natural, Social Sciences and Business, along with two or three sections of MA 122 Calculus II for Nat, Soc Sci, Bus. These courses offer additional flexibility with regard to the scheduling of four credit courses. Finally, we will carefully monitor our MA 481 Special Topics courses and attempt to offer only one per semester instead of two, as has been a fairly common practice.

I hope this satisfies your request for information on how we will handle a new section of MA 216. If you need further information, I trust you will contact me.

cc: Dr. J.H. Steelman