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LIBERAL STUDIES

UWUCC USE Only
Number: 97-35a
Submission Date: _____
Action-Date: App 12/16/97
Senate app. 2/3/98

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Gerald Buriok Phone 2608

Department Mathematics

II. PROPOSAL TYPE (Check All Appropriate Lines)

_____ COURSE _____
Suggested 20 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* Applied Mathematics
Program Name

____ Program Deletion* _____
Program Name

____ Title Change _____
Old Program Name

_____
New Program Name

III. Approvals (signatures and date)

Department Curriculum Committee — 9/17/97

Department Chair — 9/17/97

College Curriculum Committee — 10/15/97

College Dean — 10/15/97

÷Director of Liberal Studies (where applicable)

*Provost (where applicable) — 10/24/97

Part II. Description of Curriculum Change

1. Catalog description for the revised program in the appropriate form.

Bachelor of Science - Applied Mathematics

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

Major:			**40-41**
Required courses:			
MA 123	Calculus I for Physics, Chemistry, and Mathematics		4sh
MA 124	Calculus II for Physics, Chemistry, and Mathematics		4sh
MA 171	Introduction to Linear Algebra		3sh
MA 216	Probability and Statistics for Natural Science		4sh
MA 241	Differential Equations		3sh
MA 271	Introduction to Mathematical Proofs I		3sh
MA 272	Introduction to Mathematical Proofs II		3sh
MA 480	Senior Seminar		1sh
Controlled electives:			
Two courses from the list:		6sh	
MA 371, 421, 422, 423, 424, 427, 476, 477			
One of the following two course sequences:		6-7sh	
MA342/CO450 or CO451 or MA451; MA363/MA364: MA445/MA446			
A minimum of three additional semester hours from the list of controlled electives above or the following: MA 353, 425, 447, 465, 481		3sh	

Other requirements:			**6-12**
Computer Science:			
CO 110	Problem Solving and Structured Programming	3sh	
CO 250	Introduction to Numerical Methods	3sh	
Foreign Language Intermediate level (1)		0-6sh	

Free Electives: **19-28**

Total Degree Requirements **124**

(1) Intermediate-level Foreign Language may be included in Liberal Studies electives.

(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, 451.
c. Math Analyst: MA342, 363, 364, 371, 445 or 446, 451, 476, CO minor.

2. Summary of changes:

a. Table comparing old and new programs

Required courses:

Old Program	New program
MA 127 Calculus I (4sh)	MA 123 Calculus I for Physics, Chemistry, Math (4sh)
MA 128 Calculus II (4sh)	MA 124 Calculus II for Physics, Chemistry, Math (4sh)
MA 227 Calculus III (4sh)	
MA 171 Intro to Linear Algebra (3sh)	MA 171 Intro to Linear Algebra (3sh)
MA 216 Prob & Stats Nat. Sci. (4sh)	MA 216 Prob & Stats Nat. Sci. (4sh)
MA 241 Differential Equations (3sh)	MA 241 Differential Equations (3sh)
MA 271 Algebraic Structures (3sh)	MA 271 Intro to Mathematical Proofs I (3sh)
	MA 272 Intro to Mathematical Proofs II (3sh)
	MA 480 Senior Seminar (1sh)
[25 sh required]	[25 sh required]
Controlled electives:(2)	Controlled electives:(2)
Two courses from the list:	Two courses from the list:
MA371,421,422,423,427,476,477	MA371,421,422,423,427,476,477
One of two course sequences:	One of the two course sequences:
MA342,CO450	MA342/CO450 or CO451 or MA451
MA363/364, MA445/446	MA363/364, MA445/446
A minimum of three additional hours from the list of controlled electives above or the following:	A minimum of three additional hours from the list of controlled electives above or the following:
MA353,425,447,465,481	MA353,425,447,465,481
Other requirements:	Other requirements:
CO110,CO250, foreign language	CO110,CO250, foreign language
Specialized tracks:	Specialized tracks:
a. MA363,364,421,422,446,465	a. MA363,364,421,422,446,465
b. MA241,342,363,364,371,423,445,446	b. MA241,342,363,364,371,423,445,446,451
c. MA241,342,363,364,371,445 or 446 476, CO minor	c. MA241,342,363,364,371,445 or 446 451, 476, CO minor

b. List of all associated course changes:

These courses will be deleted from the list of required courses:

MA 127 Calculus I (4sh)
MA 128 Calculus II (4sh)
MA 227 Calculus III (4sh)

These courses will be added to the list of required courses:

MA 123 Calculus I for Physics, Chemistry, and Mathematics (4sh)
MA 124 Calculus II for Physics, Chemistry, and Mathematics (4sh)
MA 272 Introduction to Mathematical Proofs II (3sh)
MA 480 Senior Seminar (1sh)

This course will be added to the list of electives and specialized tracks (b) and (c), and an option in the two-course sequences:MA 451 Numerical Methods for Supercomputers

The title and content of the following course will be changed: MA 271 Algebraic Structures (to MA 271 Intro to Mathematical Proofs I).

3. Rationale for Change.

One of the objectives of the various mathematics programs is to give students a rigorous understanding of the nature of mathematic and mathematical proofs. 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 applications oriented two semester sequence for the rest of the sciences. In recent years, the Mathematics Department has found this dual approach to be a stumbling block in handling students wishing to transfer or change majors into mathematics. On a number of occasions, students entering or leaving our major midway through one of the calculus sequences has had 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 in the two semester calculus sequence for the sciences. To make up for the reduced exposure to mathematical proofs, the faculty has proposed expanding its one semester introduction to proofs course (the former MA 271 Algebraic Structures) into a two semester sequence (proposed as MA 271-272) and add a one credit senior seminar "capstone" course. The expanded proof sequence will contain the more theoretical material from the three semester calculus sequence. Moving this material into the "proof" courses will further benefit the students in that they will have had more time to mature mathematically before grappling with abstractions. Also, having mathematics majors and science majors in the same calculus sequence is more in line with mathematics curricula elsewhere in the nation.

The senior seminar is meant to broaden students' views of mathematics by analyzing problem solving skills and considering the general nature of mathematics. It will also focus on extending their understanding of these topics. The senior seminar will also be used by the faculty of the Mathematics Department as an outcomes assessment tool for the Mathematics and Applied

Mathematics programs.

Regarding the addition of MA 451 Numerical Methods for Supercomputers to the list of electives and as an option in the two-course sequences, the number of Applied Math majors is very small and few students in other majors, including Computer Science, take CO 450. Allowing MA 451 to replace CO 450 removes from the Computer Science Department the burden of offering a course which attracts small numbers of students, few of whom are their majors. The content of MA 451, although different from CO 450, is valuable in that it provides students experience at working with computers from the Pittsburgh Supercomputer Center. MA 451 also exposes students to numerical algorithms for parallel processing computers, an important and growing area in mathematics. It should be noted that MA 451 is also approved as a Computer Science class, CO 451, and that each semester the class is offered, it is dual listed with these department prefixes and numbers. MA 451 has been added to the lists for specialized tracks b) Scientific/Engineering and c) Math Analyst since the course will be of value to students in both tracks. These tracks deal with applied mathematics, which is à computer intensive field.

Part III. Implementation.

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

The program revision will become effective with students entering the University in the fall of 1998. 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. They will be encouraged to take MA480 Senior Seminar as an elective. After that, MA 127, 128, and 227 will be come inactive and will eventually be deleted from the master list of courses.

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.

The affect on faculty teaching loads will be almost negligible. Here is a listing of current offerings and proposed offerings under the revised program.

	Current Course Offerings	Revised Course Offerings
Fall:	MA 123 (2-3 sections)	MA 123 (3-4 sections)
	MA 124 (1-2 sections)	MA 124 (2-4 sections)
	MA 127 (1 section)	
	MA 128 (1-2 sections)	
	MA 227 (1 section)	
	MA 271 (1 section)	MA 271 (1 section)
		MA 272 (1 section)

	Total: (7 - 10 sections)	Total: (7-10 sections)
Spring:	MA 123 (2 sections)	MA 123 (4 sections)
	MA 124 (2 sections)	MA 124 (3 sections)
	MA 127 (2 sections)	
	MA 128 (1 section)	
	MA 227 (1 section)	
	MA 271 (1 section)	MA 271 (1 section)
		MA 272 (1 section)
		MA 480 (1 section)
	Total: (9 sections)	Total: (10 sections)

Note: Since MA 227 is four credits and MA 272 is three credits, there will be a savings of one credit in faculty workload each semester. MA 480 Senior Seminar will be offered spring semesters only, and will be covered by one of the credits saved. (The courses MA 123, 124, 127, 128, 227 are all four credit courses, while MA 271 and 272 are three credits.) No additional faculty are necessary. Adequate seats will be provided by offering sections of MA 123 and 124 in place of current offerings of MA 127 and 128 respectively.

3. Are other resources adequate?

Yes. No other resources are needed.

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

We do not believe the revisions will have any impact on the number of students taking these courses.

Part IV. Course Proposals

Attached.

Part V. Letters of Support

A letter from the Computer Science Department is attached.

17 March 1997

To: Gerald Buriok
Chair Mathematics Department

From: Jim Wolfe
Chair Curriculum Committee of the Computer Science Dept
Bill Oblitey
Chair Computer Science Department

Subject: Revision in Applied Mathematics Program

The Computer Science Department supports the revision of one of the course sequences for Applied Mathematics majors to change from MA342/CO450 to MA342/CO450 or MA451.

Recent offerings of CO450 have had too few registrants to be taught. However, the problem is not that Applied Mathematics students (who are historically the bulk of the students that register for CO450) have chosen other course sequences. Rather, the number of Applied Mathematics majors has become very small, too small to warrant offering a section of CO450. Few Computer Science majors take CO450; whereas, many Computer Science majors take CO451 (dual listed as MA451). So, we see adding MA451 as an option on a course sequence for Applied Mathematics majors as adding a few more prospective students to a course (MA451/CO451) that we would like to see grow. Losing a few prospective students from CO450 will not make any difference based on the recent history of registrations.