SIMON FRASER UNIVERSITY

MEMORANDUM

S.76-164

To SENATE

From SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Subject Course and Program Changes - Department of Mathematics

Date 18th November, 1976

Action taken by the Senate Committee on Undergraduate Studies at its meeting of November 9, 1976 gives rise to the following motion:

MOTION

That Senate approve, and recommend approval by the Board of Governors, proposed Mathematics changes as set forth in S.76-164 including i) change in Major program, ii) change in Honors program, iii) change in Minor program, iv) title change for MATH.141-2, v) prerequisite change for MATH 320-3.

Daniel R. Birch

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SCUS 76-42E

SIMON FRASER UNIVERSITY

MEMORANDUM

F-76-15

To J.M. Webster
Dean of Science

From N. Heath
Administrative Assistant

Subject Mathematics Calendar Changes
Course + Program Changes

Date 7 October 1976

The F.U.G.C.C. approved changes in the Mathematics Calendar entry as follows:

1). Proposed changes in degree requirements. See N.R. Reilly's memo dated 29 June 1976 (attached).

2). Change in course title of MATH 141-2. This change is dependent upon the approval of the proposed new course MATH 242-3. The rationale for the change is given in the documentation for MATH 242-3. (see F-76-12). A SCUS form is attached giving details of the change.

3). Change in prerequisite of MATH 320-3. It is proposed to make MATH 242-3 (subject to approval) or MATH 241-2 an additional prerequisite. The rationale for this change is given in the documentation for MATH 242-3 (see F-76-12). A SCUS form is attached.

CHANGE IN COURSE TITLE ONLY

Appendix B_3

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE PROPOSAL FORM

Calendar Information

Department: Mathematics

Abbreviation Code: MATH Course Number: 141-2 Credit Hours: 2 Vector: 2-1-0

Title of Course: Introduction to Pure Mathematics (formerly Pure Mathematics I)

Calendar Description of Course:

An introduction to some of the fundamental concepts of mathematics.

Nature of Course Lecture/tutorial

Prerequisites (or special instructions): B.C. High School Math 12, or MATH 100-3, or permission of the Department.

What course (courses), if any, is being dropped from the calendar if this course is approved: None

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible:

3. Objectives of the Course

NOTE: Rationale for change in course title can be found in the covering memo.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: September 22, 1976 20/10/76

Norman R. Reilly
Department Chairman

Dean

Chairman, SCUS

SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a. Attach course outline).

CHANGE IN PREREQUISITE ONLY

Appendix B_3

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

COURSE PROPOSAL FORM

1. Calendar Information

Department: Mathematics

Abbreviation Code: MATH Course Number: 320-3 Credit Hours: 3 Vector: 3-1-0

Title of Course: Theory of Convergence

Calendar Description of Course:

Sequences and series of functions; uniform convergence; consequences of uniform convergence; improper integrals; additional applications of convergence.

Nature of Course Lecture/tutorial

Prerequisites (or special instructions): Math 242-3 (or 241-2) and MATH 253-4.

∂ (former prerequisite: MATH 253-4)

What course (courses), if any, is being dropped from the calendar if this course is approved:

None

2. Scheduling

How frequently will the course be offered?

Semester in which the course will first be offered?

Which of your present faculty would be available to make the proposed offering possible:

3. Objectives of the Course

Rationale for change in prerequisite can be found in covering memo.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty

Staff

Library

Audio Visual

Space

Equipment

5. Approval

Date: September 22, 1976 20/10/76

Department Chairman Dean Chairman, SCUS

SCUS 73-34b:- (When completing this form, for instructions see Memorandum SCUS 73-34a. Attach course outline).

SIMON FRASER UNIVERSITY

MEMORANDUM

To: David Ryeburn
Chairman, Faculty of Science
Undergraduate Curriculum Committee

From: Dr. N.R. Reilly
Chairman
Mathematics Department

Subject: Proposed Changes in Mathematics Degree Requirements

Date: June 29, 1976

The Mathematics Department wishes to change the requirements for major and honors degrees in Mathematics and the requirements for a minor in Mathematics to those presented below.

Proposed Mathematics degree requirements to replace those on pp. 372 and 373 of the 1976-1977 calendar.

MAJORS AND HONORS

(i) to obtain credit for Mathematics 151-3, 152-3, 232-3, 253-4 and at least 6 additional hours in Mathematics (MATH 100-3 and MATH 190-3 may not be included) or Computing Science 103-3, 105-3. This requirement would normally be met by the end of the fourth level.

Note: Students who have been or who have intended to be major or honors students in Biological Sciences programs and who have satisfactorily completed MATH 154-3 or 155-3 will not take MATH 151-3 or 152-3 respectively.

Students who have been, or who have intended to be, major or honors students in the social sciences and who have completed MATH 150-3 with a grade of A or B will not take MATH 151-3.

(ii) to obtain at least six semester hours of credit in courses other than Mathematics offered by the Faculty of Science. (Physics courses which are recommended for the Applied Mathematics option, as described in the Student Guide issued by the Mathematics Department, can be used for the satisfaction of this requirement.)

(iii) in the case of major students - to obtain a total of at least 44 (B.Sc.) or 45 (B.A.) semester hours of credit in upper division courses, of which at least 30 hours must be in upper division Mathematics courses; Mathematics majors will be required to take at least three 400 division courses. Any upper division courses used to satisfy condition (i) above may not be counted as part of the 30 hours, and MATH 302-3 and 450-8 also may not be counted as part of the 30 hours.

(iv) in the case of honors students - to obtain a total of at least 60 semester hours of credit in upper division courses, of which at least 50 hours must be in upper division Mathematics courses; Mathematics honors students will be required to take at least five 400 division courses. Any upper division courses used to satisfy condition (i) above may not be counted as part of the 50 hours, and MATH 302-3 and 450-8 also may not be counted as part of the 50 hours.

For the purpose of satisfaction of conditions (i), (iii) and (iv) above, PHYS 411-4 may be counted as a Mathematics course.

Mathematics students are expected to obtain a grade of C- or better in their courses, as they will normally not be permitted to enrol in any Mathematics course for which a D grade or lower was obtained in any prerequisite.

Mathematics Major and Honors students should consult an adviser in the Mathematics Department for further information before planning their programs in detail. Although no specified upper division courses are required in order to satisfy conditions (iii) or (iv) above, students will find that certain combinations of courses will form more cohesive programs than others. Reading the Student Guide issued by the Mathematics Department and discussing these topics with an adviser is highly recommended.

MINOR PROGRAM

(i) to obtain at least 11 semester hours credit for Mathematics courses numbered 101 through 299 inclusive. These courses will normally include MATH 151-3 (or 150-3 or 154-3), 152-3 (or 155-3), and 232-3.

(ii) to obtain credit in at least 15 semester hours of upper division Mathematics courses. These courses may not include MATH 302-3 or 450-8, or PHYS 411-4. Students are cautioned that although overlap of content requirements between a minor program and a major or honors program is permitted (i.e. if the same specific course is required for both programs, it need not be taken twice), the 15 hours of upper division credit referred to must be separate and distinct from the 28 to 30 hours of upper division credit required for the major or the 50 hours of upper division credit required for the honors degree.

RATIONALE

The differences between the existing and proposed requirements are as follows.

(1) Section (i), on page 372 of the calendar, which reads

(i) to obtain credit by the end of the fourth level for the following lower division Mathematics courses:

MATH 151-3, 152-3, 232-3, 253-4 and at least three of MATH 141-2, 142-2, 161-3, 180-3, 194-3, (195-3), 196-3, 241-2, CMPT 103-3 (or 102-2) and CMPT 105-3 (or 100-3). Of these three courses at most one may be a geometry course (MATH 194-3, 195-3, 196-3) and at most one may be a Computing Science course (CMPT 100-3, 102-2, 103-3, 105-3).

(In choosing courses from this list, students should note that MATH 161-3 and 241-2 are prerequisites for certain upper division mathematics courses. In particular, honors students are advised that MATH 241-2 is a prerequisite for 421-4.)

Note: Students who have been or who have intended to be major or honors students in Biological Sciences programs and who have satisfactorily completed MATH 154-3 or 155-3 will not have to take MATH 151-3, or 152-3

respectively if they elect to change their major or honors programs to Mathematics.

Students who have been, or who have intended to be, major or honors students in the social sciences and who have completed MATH 150-3 with a grade of A or B will not have to take MATH 151-3.

is to be replaced by

(i) to obtain credit for Mathematics 151-3, 152-3, 232-3, 253-4 and at least 6 additional hours in Mathematics (MATH 100-3 and MATH 190-3 may not be included) or Computing Science 103-3, 105-3. This requirement would normally be met by the end of the fourth level.

Note: Students who have been or who have intended to be major or honors students in Biological Sciences programs and who have satisfactorily completed MATH 154-3 or 155-3 will not take MATH 151-3 or 152-3 respectively if they elect to change their major or honors programs to Mathematics. Students who have been or who have intended to be major or honors students in the social sciences and who have completed MATH 150-3 with a grade of A or B will not take MATH 151-3.

The principal effect of this change is to allow any additional six hours of Mathematics courses (other than 100-3 or 190-3) or Computing Science 103-3 or 105-3 to be used in place of the three courses from a list of nine (141-2, 142-2, 161-3, 194-3, 196-3, 241-2, Computing Science 103-3, and Computing Science 105-3). Mathematics majors and honors students now are or soon will be able to pursue their studies with concentrations in Applied Mathematics, Computational Mathematics, Pure Mathematics, Statistics, or combinations of these fields, and whatever reasons there may have been for demanding course choices from the smaller list seem no longer to pertain. You will note that the six additional hours or work need not be chosen from lower divisional courses but if upper division courses are used to satisfy part or all of this requirement, such courses may not also be counted as part of the 30 or 50 hours of upper division work required under (iii) or (iv).

The requirement that the courses referred to in (i) be completed by the end of the fourth level (an unenforceable one, unless we are to deny the opportunity to major or take honors in Mathematics to students completing 60 hours of work before meeting the requirement) is replaced by the recommendation that normally the courses will be taken by the end of the fourth level.

(2) Section (ii), on page 372 of the calendar, which reads

(ii) to obtain at least six semester hours of credit in courses other than Mathematics offered by the Faculty of Science. (Physics courses which are required for the Applied Mathematics option can be used for the satisfaction of this requirement.)

is to be replaced by

(ii) to obtain at least six semester hours of credit in courses other than Mathematics offered by the Faculty of Science. (Physics courses which are recommended for the Applied Mathematics option, as described in

the Student Guide issued by the Mathematics Department, can be used for the satisfaction of this requirement.)

There is no real change here, since there never have been any Physics courses required for the Applied Mathematics option. This option is described in the Student Guide, not in the calendar, and to refer to it in the calendar without further comment is confusing.

(3) Section (iii), on page 372 of the calendar, which reads

(iii) in the case of major students - to obtain a total of at least 45 (for the B.A. degree) or 44 (for the B.Sc. degree) semester hours of credit in upper division courses, of which at least 30 hours must be in upper division Mathematics courses.

is to be replaced by

(iii) in the case of major students - to obtain a total of at least 44 (B.Sc.) or 45 (B.A.) semester hours of credit in upper division courses, of which at least 30 hours must be in upper division Mathematics courses; Mathematics majors will be required to take at least three 400 division courses. Any upper division courses used to satisfy condition (i) above may not be counted as part of the 30 hours, and MATH 302-3 and 450-8 also may not be counted as part of the 30 hours.

Mathematics

The condition that at least three upper division courses used to satisfy the 30 hour requirement be at 400 division is new. With the increase in number of 300 division courses offered by the department, it has become possible to accumulate as many as 32 hours of 300 division credit (not counting Mathematics 302-3). Until recently, no such regulation was needed, since not enough 300 division Mathematics courses were offered to make it necessary. Generally speaking, 400 division Mathematics courses involve a higher degree of sophistication than 300 division courses, and the department believes that every Mathematics major should take at least three such 400 division courses.

The prohibition on the use of Mathematics 302-3 or 450-8 to satisfy the 30 hour requirement merely repeats, under the overall degree requirements, prohibitions already stated under the individual calendar entries for these courses.

The final sentence in the section is made necessary by the changes in section (i), as has been noted.

(4) Section (iv), on page 372 of the calendar, which reads

(iv) in the case of honors students - to obtain credit in the following upper division Mathematics courses:
MATH 310-3, 312-4, 320-3, 421-4, 422-4, and at least one of 431-4 or 432-4.

is to be replaced by

(iv) in the case of honors students - to obtain a total of at least 60 semester hours of credit in upper division courses, of which at least 50 hours must be in upper division Mathematics courses; Mathematics honors students will be required to take at least five 400 division courses. Any upper division courses used to satisfy condition (i) above may not be counted as part of the 50 hours, and MATH 302-3 and 450-8 also may not be counted as part of the 50 hours.

The condition that at least five upper division courses used to satisfy the 50 hour requirement be at 400 division is new. At the moment, since only 32 hours are available at the 300 division (not counting Mathematics 302-3), the requirement is superfluous; four four-credit 400 division courses would only give 16 of the necessary 18 additional hours. This requirement would however no longer be superfluous if we were to introduce two more hours of 300 division work. The reasons for insisting upon 400 division work are similar to those advanced for majors, and we believe that the number of such courses (five) is an appropriate minimum requirement for an honors degree.

Current regulations require honors students to take certain specified courses (310-3, 312-4, 320-3, 421-4, 422-4, and at least one of 431-4 or 432-4); there is an escape clause allowing one or more of these courses to be waived for good reasons. The proposed regulations do not list any required upper division courses for honors students. The reasons for this change are the same as those advanced in support of the changes in section (i).

(5) Section (i), on page 373 of the calendar, dealing with the minor program, which reads

(i) to obtain credit for 11 semester hours of mathematics courses numbered 101 through 299 inclusive. These would normally consist of the following courses:
MATH 151-3 or 154-3, and 152-3 or 155-3, and 232-3, and either CMPT 103-3 (or CMPT 102-2) or MATH 161-3 or 241-2 or 253-4.

is to be replaced by

(i) to obtain at least 11 semester hours credit for Mathematics courses numbered 101 through 299 inclusive. These courses will normally include MATH 151-3 (or 150-3 or 154-3), 152-3 (or 155-3), and 232-3.

Note that the calculus and linear algebra requirements are the same, but under the proposal the remaining two or more hours may be chosen more freely. For some students (for example, those interested in certain aspects of statistics or of computational mathematics) the choices of Computing Science 103-3 or Mathematics 161-3, 241-2, or 253-4 may not be the best ones.

(6) Section (ii), on page 373 of the calendar, which reads

(ii) to obtain credit in at least 15 semester hours of upper division Mathematics courses. (PHYS 411-4 may not be used to satify this requirement.) (Students will be expected to complete all of the

prerequisites for those upper division mathematics courses they wish to include in their minor programs.)

is to be replaced by

(ii) to obtain credit in at least 15 semester hours of upper division Mathematics courses. These courses may not include MATH 302-3 or 450-8, or PHYS 411-4. Students are cautioned that although overlap of content requirements between a minor program and a major or honors program is permitted (i.e. if the same specific course if required for both programs, it need not be taken twice), the 15 hours of upper division credit referred to must be separate and distinct from the 28 to 30 hours of upper division credit required for the major or the 50 hours of upper division credit required for the honors degree.

The prohibition on the use of Mathematics 302-3 or 450-8 to satisfy the upper division requirements for a Mathematics minor parallels the ones in Sections (iii) and (iv) of the requirements for majors and honors students. Its absence from the current calendar is an oversight. The status of Physics 411-4 for a minor in Mathematics is unchanged. The statement about upper division credit hour overlap makes clear to prospective Mathematics minors a general University policy about which there has been some confusion in the past; it might be well for the University to make this policy better known to students in other disciplines too, but until that is done we should like to protect our own students by bringing this regulation to their attention.

Norman R. Reilly

N.R. Reilly

NRR/lh

MRK/lb