

# SIMON FRASER UNIVERSITY

S. 77-84

## MEMORANDUM

To SENATE

From SENATE COMMITTEE ON UNDERGRADUATE STUDIES

- Subject
1. MATH 158-3 - NEW COURSE
  2. MATH 157-3 (RENUMBERING OF MATH 150)
  3. PREREQUISITE CHANGES

Date JUNE 16, 1977

### MOTION:

"That Senate approve and recommend approval to the Board of Governors, as set forth in S. 77-84,

1. The new course, MATH 158-3 - Calculus for Social Sciences II
2. The renumbering of MATH 150-3 to MATH 157-3
3. The changes in prerequisites arising from the above."

(SCUS approved waiver of the time lag requirement in order that these changes may be effective from Spring 78-1. If the changes are approved the adjusted prerequisites would be included in Course Guide.)

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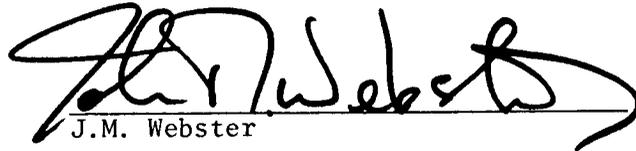
SIMON FRASER UNIVERSITY

SCUS 77-28

MEMORANDUM

To..... H. Evans	From..... J.M. Webster
..... Secretary to SCUS	..... Dean of Science
Subject 1. MATH 158-3 <i>New course -</i>	Date..... May 30, 1977
2. MATH 157-3 <i>Renumbering of 150</i>	
3. <i>Pre-requisite changes.</i>	

The attached proposal for a new course MATH 158-3, "Calculus for Social Sciences" was approved by the Faculty of Science at its meeting of May 19, 1977 and is forwarded herewith for further consideration by the Senate Committee on Undergraduate Studies. We are requesting a waiver of the time lag requirement in order that this course may be offered in the Spring Semester 78-1. Also attached is a proposal for change of number for MATH 150-3 to MATH 157-3.



J.M. Webster

JMW/pel  
Encl.

RECEIVED

MAY 31 1977

STRAR'S OFFICE  
MAIL ROOM

*Waivers for Spring 78-1. Adjust prerequisites in course guide.*

# SIMON FRASER UNIVERSITY

## MEMORANDUM

To Dr. N. Reilly, Chairman  
Mathematics Department  
Subject MATH 158-3  
CALCULUS FOR SOCIAL SCIENCES

From C.Y. Shen, Chairman  
Undergraduate Studies Committee  
Mathematics Department  
Date April 5, 1977  
(revised April 26, 1977)

Based on the increasing enrollment in Math 150-3 (for example, Spring 75, 76, 77 the enrollments were 58, 90, and 111, respectively), the Undergraduate Studies Committee formed a sub-committee to determine whether a follow-up course would be feasible. An informal survey taken from students revealed that they would be interested in such a follow-up course. Also certain other departments (e.g. Geography, Economics) were consulted and they favored the idea of such a course.

For these reasons we feel there is a market for this course as well as practical merit.

We will re-number Math 150-3 to MATH 157-3 (Calculus for Social Sciences I) so that the two courses will be in sequence.

With this course being offered once a year, we plan to cut back on the frequency of offering Math 154-3 and 155-3 (Calculus for the Biological Sciences).

If the Math 157-3 and 158-3 course proposals are approved, further calendar changes will be required for those courses which have lower level calculus prerequisites. Specifically the changes required are as follows:

1. Math 151-3 prerequisite statement "Students who have obtained credit for Math 150-3 or 154-3 cannot receive credit for 151-3." Should now read:

"Students who have obtained credit for Math 154-3 or 157-3 (or 150-3) cannot receive credit for 151-3."

2. Math 152-3 prerequisite statement "Math 150-3 (with a grade of A or B) or 151-3 or 154-3. Students who have obtained credit for Math 155-3 cannot receive credit for 152-3." Should now read:

"Math 151-3 or Math 154-3; or, with a grade of A or B Math 157-3 (or 150-3). Students who have obtained credit for Math 155-3 or 158-3 cannot subsequently receive credit for 152-3."

3. Math 154-3 prerequisite statement "Students who have obtained credit for either Math 150-3 or 151-3 cannot receive credit for 154-3." Should now read:

"Students who have obtained credit for either Math 151-3 or 157-3 (or 150-3) cannot receive credit for Math 154-3."

4. Math 155-3 prerequisite statement "Math 150-3 (with a grade of A or B) or Math 151-3 or 154-3." Should now read:

"Math 151-3 or 154-3; or, with a grade of A or B, Math 157-3 (or 150-3). Students who have received credit for Math 152-3 or 158-3 cannot subsequently receive credit for Math 155-3."

5. Math 190-3 prerequisite statement "those students who have received credit for Math 150-3, 151-3 or 154-3 and those who are Mathematics Major or Honor students cannot take this course for credit." Should now read:

"Those students who have received credit for Math 151-3 or 154-3 or 157-3 (or 150-3) and those who are Mathematics Major or Honor students cannot take this course for credit."

6. Math 232-3 prerequisite statement "Math 150-3 or 151-3 or 154-3." Should now read:

"Math 151-3 or 154-3 or 157-3 (or 150-3)."

7. Math 242-3 prerequisite statement "Math 152-3 or 155-3 must precede or be taken concurrently". Should now read:

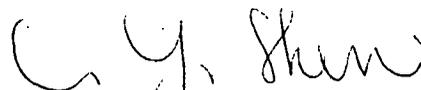
"Math 152-3 or 155-3 or 158-3 must precede or be taken concurrently."

8. Math 253-4 prerequisite statement "Math 152-3 or 155-3." Should now read:

"Math 152-3 or 155-3 or, with a grade of A or B, Math 158-3."

9. Math 371-3 prerequisite statement "Math 152-3 or 155-3." Should now read:

"Either Math 152-3 or 155-3 or 158-3."

  
C.Y. Shen

SENATE COMMITTEE ON UNDERGRADUATE STUDIESCOURSE PROPOSAL FORM1. Calendar InformationDepartment: MATHEMATICSAbbreviation Code: MATH Course Number: 158 Credit Hours: 3 Vector: 3-1-0Title of Course: Calculus for Social Sciences II

Calendar Description of Course: Theory of integration and its applications; introduction to differential equations with emphasis on some special first order equations and their applications to economics and social sciences; algebraic operations with matrices, systems of linear equations, determinants, discussion of linear programming.

Nature of Course Lecture/Tutorial

Prerequisites (or special instructions):

MATH 151-3 or 154-3 or 157-3 (or 150-3). Students who have received credit for Math 152-3 or 155-3 cannot subsequently receive credit for Math 158-3.

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

2. SchedulingHow frequently will the course be offered? Once a yearSemester in which the course will first be offered? Spring 1978

Which of your present faculty would be available to make the proposed offering possible: Drs. Bojadziew, Freedman, Gerber, Shen and others

3. Objectives of the Course

- (i) To discuss integral calculus and its applications; consequently, to provide, together with Math 157-3, the students with a more complete treatment of calculus.
- (ii) To familiarize the students with the particular areas of mathematics, such as differential equations, linear algebra, which are of special use to a social scientist or economist.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty - If this course is offered once a year and no additional faculty is granted, we plan to cut back on the frequency of offering Math 154-3 and 155-3 (Calculus for the Biological Sciences).

Library

Audio Visual NONE

Space

Equipment

5. ApprovalDate: April 22/77 30/5/77 14 June 77

EMJ  
Department Chairman

J.P. Welton  
Dean

Y. A. Smith  
Chairman, SCUS

MATHEMATICS 158-3

CALCULUS FOR SOCIAL SCIENCES II

INTEGRAL CALCULUS:

1. The indefinite integral
2. Formulae for integration
3. Integration of  $e^{g(x)}$
4. Integration by parts
5. Applications of the indefinite integral
6. Fundamental Theorem of the Calculus and its relation to areas
7. Area between two curves
8. Improper integrals
9. Application of definite and improper integrals, especially to probability theory (e.g. continuous probability distributions, random variables and expectations)
10. Numerical methods

SOME ASPECTS OF LINEAR ALGEBRA:

11. Matrix addition, multiplication, and applications
12. Systems of linear equations and applications
13. Reduced matrix, Gauss-Jordan elimination method
14. Inverse of a matrix by elementary row operations
15. Determinants
16. Cofactor expansion of a determinant. Finding the inverse of a matrix by using cofactors.
- \*17. Eigenvalues and eigenvectors of a matrix and their applications
18. Discussion of linear programming

INTRODUCTION TO FIRST ORDER DIFFERENTIAL EQUATIONS:

19. Differential equations - general and particular solutions, initial value problems
20. Separation of variables. The differential equation  $dx/dt = ax$  (equation of natural growth and decay)
21. The differential equation  $dx/dt = kx(L-x)$
22. Malthus vs. saturation and the logistic curve. Growth of population, industries, railroad networks, sales of new products, numbers entering new professions, the development of a technology, etc.
23. Disturbing forces:  $dx/dt = kx(L-x) + F(t)$
24. Systems of first order linear differential equations with constant coefficients
25. Species competition
26. Richardson's theory of war modeled by  $dx/dt = ky-ax+g$ ,  $dy/dt = lx-\beta y+h$
27. Applications in economics

PREREQUISITES: MATH 151-3 or MATH 154-3 or MATH 157-3 (or Math 150-3)

TENTATIVE TEXTBOOK: Mathematics for Economists by Taro Yamane  
PUB: Prentice-Hall

OR as listed on Textbook list in Mathematics Department

\* optional

SENATE COMMITTEE ON UNDERGRADUATE STUDIESCOURSE PROPOSAL FORM - RE-NUMBERING OF A COURSE1. Calendar InformationDepartment: MATHEMATICSAbbreviation Code: MATH Course Number: 157 Credit Hours: 3 Vector: 3-1-0Title of Course: Calculus for Social Sciences I

Calendar Description of Course: as for Math 150-3

Introduction to those concepts of differential calculus that are of value in the social sciences.

Nature of Course Lecture/Tutorial

Prerequisites (or special instructions): as for Math 150-3

B.C. High School Math 12 or MATH 100-3.

Students who have obtained credit for MATH 150-3 or MATH 151-3 or MATH 154-3 cannot subsequently receive credit for MATH 157-3

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

MATH 150-3

2. Scheduling

How frequently will the course be offered? Twice a year

Semester in which the course will first be offered? Spring 1978

Which of your present faculty would be available to make the proposed offering possible: Drs. Bojadziev, Freedman, Gerber, Shen and others

3. Objectives of the Course as 150-3 (as previously stated)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

NONE

5. ApprovalDate: April 22/77 36/5/77 14 June 77E.M.H.  
Department ChairmanJ.P. Webster  
DeanW.K. Birch  
Chairman, SCUS

MATHEMATICS 157-3

Calculus for Social Sciences I

1. Functions
2. Graphing of functions
3. The slope of a straight line
4. The equation of a straight line
5. Limits
6. Application of Limits
7. Continuity
8. The derivative
9. Applications of the Derivative
10. Maximum and Minimum Points
11. Curve Sketching
12. Higher Derivatives
13. Functions of Several Variables
14. The maximum and minimum of a function of two independent variables
15. Differentiation of implicit equations using partials
16. Logarithms
17. Differentiation of Logarithmic functions

TEXTBOOK: Elementary Calculus for Business, Economics and Social Sciences  
by Chaney Anderson and R.C. Pierce, Jr.

PUB: Houghton Mifflin

OR as listed on the Textbook list in the Mathematics Department