S.72-14

SIMON FRASER UNIVERSITY

MEMORANDUM

To SENATE

From

Subject CURRICULUM AND CALENDAR CHANGES - DEPARTMENT OF MATHEMATICS

Date DECEMBER 16, 1971

MOTION: "That Senate approve, as set forth in S.72-14

PROPOSAL I. Degree Requirements for Majors and Honors in Mathematics.

PROPOSAL II. Degree Requirements for a Minor Program in Mathematics.

PROPOSAL III. Adjustment to the Calculus Sequence - with discontinuance of Mathematics 251-3, replaced by Mathematics 253-4.

PROPOSAL IV. Discontinuance of Mathematics 411-4, replaced by Mathematics 311-4 (renumbering).

PROPOSAL V. Change in Prerequisite for Mathematics 422-4.

PROPOSAL VI. New Course Proposal - Mathematics 302-3 - with discontinuance of Mathematics 102-3."

S72-14

SIMON FRASER UNIVERSITY

MEMORANDUM

To SENATE

From SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Subject CURRICULUM AND CALENDAR CHANGES - DEPARTMENT OF MATHEMATICS

Date DECEMBER 16, 1971

The Senate Committee on Undergraduate Studies approved the submission of the Department of Mathematics, as set forth in SCUS 71-27, and recommends approval to Senate.

SCUS 71-27

SIMON FRASER UNIVERSITY

MEMORANDUM

To: H. Evans, Secretary
Senate Committee on Undergraduate Studies

From: S. Aronoff, Chairman
Faculty of Science Executive Committee

Subject: Agenda Item for SCUS: ~~Faculty of Science -- Proposals~~ for Changes in Mathematics Undergraduate Calendar Submission (including new course proposal).

Date: November 23, 1971

Enclosed please find the paper entitled "Proposals for Changes in Mathematics Undergraduate Calendar Submission". These proposals have been approved by the Faculty of Science Undergraduate Curriculum Committee and the Executive Committee, acting on behalf of the Faculty.

The paper is now being forwarded for the approval of the Senate Committee on Undergraduate Studies and Senate.

SA:la

Enclosure

cc: J. Chase, Chairman of SCUS
R. Lardner, Acting Chairman of Mathematics

U-71.24

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. S. Aronoff, Chairman
Undergraduate Studies Committee
Faculty of Science

From: Dr. R.W. Lardner
Acting Head
Mathematics Department

Subject: PROPOSALS FOR CHANGES IN MATHEMATICS UNDERGRADUATE CALENDAR SUBMISSION

Date: September 21, 1971

The Mathematics Department wishes to recommend that a number of changes be made in its undergraduate calendar submission. They are:

I. Degree requirements for Majors and Honors in Mathematics

II. Degree requirements for Minors in Mathematics

III. Adjustment to the calculus sequence

IV. Renumbering of Mathematics 411-4

V. Change in prerequisite for Mathematics 422-4

VI. New course proposal - Mathematics 302-3.

The first is a proposal to change the degree requirements for students majoring or taking honors in mathematics. It is the result of a critical evaluation of the Department's present degree requirements, combined with a comparison of mathematics degree requirements at the Universities of British Columbia and Victoria. The Department wishes to adopt these new requirements in order to increase the flexibility for undergraduate students who complete all of their mathematics degree requirements here, and in order to make it easier for students to transfer to this University from the B.C. regional colleges. Details of the other proposals appear on the attached pages.

Robin Lardner

R.W. Lardner

RWL/ses

See SCUS 71-27 & Nov 3

Mathematics Department
September 21, 1971
PROPOSAL I

It is proposed that the requirements for undergraduate students majoring or taking honors in Mathematics be changed to read as follows:

REQUIREMENTS FOR STUDENTS MAJORING OR TAKING HONORS IN MATHEMATICS

Students majoring or taking honors in Mathematics are subject to the general regulations of the Faculty of Science. They will normally be required by the Mathematics Department -

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

151-3, 152-3, 232-3, 251-3 (formerly 251-3),

and, at least three of the following courses:

106-3, 141-2, 142-2, 161-3, 180-3, 195-3, 241-2, 261-3

(In choosing courses from this list students should note that 106-3, 241-2 and 261-3 are prerequisites for certain upper division mathematics courses. In particular, honors students are advised to note that 241-2 is a prerequisite for 421-4.)

(ii) to obtain at least six semester hours of credit in Science courses other than Mathematics. (Physics courses which are required for the Applied Mathematics option, see "Programs of Study" below, can be used if desired for the satisfaction of this requirement.)

(iii) in the case of major students - to obtain a total of at least 44 semester hours of credit in upper division courses of which at least thirty must be in upper division Mathematics courses.

(iv) in the case of honors students - to obtain credit in the following upper division Mathematics courses:

352-2, 411-4, 421-4, 422-4, and
one of 431-4, 432-4

(NOTE: Any student with honors standing may, on application to the Departmental Undergraduate Studies Committee, be permitted to complete a program of studies in a specialized area, for which one or more of the above courses may be waived.)

Honors students will be required to obtain a total of at least 60 semester hours of credit in upper division courses of which at least 50 hours (including those specified above) must be in upper division Mathematics courses.

For the purposes of the satisfaction of conditions (iii) and (iv) above, Physics 411-4 may be counted as a Mathematics course. Mathematics students are expected to obtain a grade of C- or better in their courses; they will not normally be permitted to enroll in any course for which a D grade or lower was obtained in any prerequisite.

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. S. Aronoff
Dean of Science

From: Dr. R.W. Lardner
Acting Head
Mathematics Department

Subject: CHANGES IN DEGREE REQUIREMENTS FOR MAJORS AND HONORS STUDENTS IN MATH

Date: November 18, 1971

At the Executive Committee Meeting on Tuesday you requested a brief summary of our reasons for proposing a change in the degree requirements for undergraduate students majoring or taking honors in Mathematics. These are as follows:

It has become apparent that difficulties were being created for students who transferred from regional colleges in this province, since none of these colleges offer courses similar to our Mathematics 161 and/or 261. Douglas College, potentially our largest source of transfer students, attempted to mount a course similar to our Math 161 and were forced to cancel it since no students registered for the course. The proposed changes will now make it possible for transfer students to complete all of their lower level mathematics requirements before transferring to this University to complete a B.Sc. in Mathematics. In addition enrollments in 161 and 261 at this University have never been very large, and there has been pressure to remove their status as required courses.

The proposed changes were also the result of a comparison of this Department's requirements with those of the Mathematics Departments of the Universities of B.C. and Victoria. The changes reflect an attempt to align this Department's requirements with those of the other mathematics departments in the other B.C. universities. A comparison of the requirements for undergraduates majoring or taking honors in Mathematics at the three B.C. Universities is as follows:

	U.B.C.	U. VIC.	S.F.U. Present	S.F.U. New
1. No. of required hours of 100 and 200 level Math courses - MAJORS	18	18	21	19-22
2. No. of required hours of 100 and 200 level Math courses - HONORS	20	18	21	19-22
3. No. of required hours of 300 and 400 level Math courses - MAJORS	24	30	30	30
4. No. of required hours of 300 and 400 level Math courses - HONORS	42	48	50	50

. . . 2

In addition the other Universities allow their mathematics majors much greater freedom in their choice of mathematics courses than we have done in the past. The new degree requirements we are proposing will give our students a flexibility in this respect which will match that of U.B.C. Hopefully they will put us in a more competitive position as regards attracting transfer students from the junior colleges.

Robin Lardner

Dr. R.W. Lardner

SCUS 71-27 a

SIMON FRASER UNIVERSITY

MEMORANDUM

To H. Evans
Secretary to Senate

From S. Aronoff
Dean of Science

Subject Paper SCUS 71-27, Proposals for Changes in Mathematics Undergraduate ~~Calendar Submission~~

Date November 30, 1971

Attached please find a memo from the Department of Mathematics relating to the Proposals for Changes in Mathematics Undergraduate Calendar Submission (Paper SCUS 71-27), specifically Proposal I of that paper.

May we request that this memo be included as supplementary material in the submission which goes to Senate.

la

Enclosure

SCAS 71-276

MATHEMATICS DEPARTMENT
November 30, 1971

PROPOSAL II (Revised)

The Mathematics Department wishes to implement a minor program in Mathematics. The following would be the calendar entry for such a program:

REQUIREMENTS FOR STUDENTS COMPLETING A MINOR PROGRAM IN MATHEMATICS

Students completing a minor program in Mathematics are subject to the general regulations of the Faculty in which they are registered. They will normally be required by the Mathematics Department -

(i) to obtain credit for 11 semester hours of mathematics courses numbered between ~~101 and 299~~ 101 through 299 inclusive. These would normally consist of the following courses:

151-3 and 152-3 and 232-3, and
either 106-3 or 161-3 or 241-2 or 253-4 (formerly 251-3)

(ii) to obtain credit in at least 15 semester hours of upper division Mathematics courses. (Physics 411-4 may not be used to satisfy this requirement.) (Students will be expected to complete all of the prerequisites for those upper level mathematics courses they wish to include in their minor programs.)

Students will be expected to obtain a grade of C- or better in their courses. They will not normally be permitted to enroll in any course for which a grade of D or lower was obtained in any prerequisite.

Students may specialize in Applied Mathematics, Probability and Statistics, or Pure Mathematics. Further information is available from the Mathematics Departmental Office.

An advisory service will be available to assist students in the selection of courses most appropriate to their programs.

Mathematics Department
September 21, 1971
PROPOSAL III

The Mathematics Department requests that 1 semester hour of credit be added to the course Mathematics 251-3, Calculus III, which would then become Mathematics 253-4, Calculus III. The topic 'infinite series', which is now taught in Mathematics 152-3, Calculus II, would then be taught in Mathematics 253-4. More material on applications of differentiation and integration of functions of one variable would then be taught in Mathematics 151-3 and 152-3.

The reasons for the proposed change are:

(a) The inclusion of infinite series in Mathematics 152-3 has resulted in severe limitations on the time spent on applications of integration. The proposed change would permit more applications of calculus of one variable to be taught in Mathematics 151-3 and 152-3 and allow a fuller exposition of infinite series in Mathematics 253-4 for those students (particularly in Mathematics, Physics, and Chemistry) whose work requires this topic.

(b) It would ease transfer arrangements for students coming from junior colleges, since infinite series are not taught in first year calculus courses in many colleges.

Finally, it should be noted that the proposed changes in the syllabuses for these calculus courses have been discussed with representatives of the Biology, Chemistry and Physics Departments, and that they were amenable to these changes.

Students who have taken Math 251-3 may not take Math 253-4 for further credit

MATHEMATICS 151-3

TEXT: Purcell - CALCULUS WITH ANALYTIC GEOMETRY

Chapter 1 - NUMBERS

Section	1.1	Real Numbers
	1.2	Sets
	1.3	Inequalities
	1.4	Bounded Sets
	1.5	The coordinate line
	1.6	Absolute values
	1.7	Directed distance

Estimated time 4 hours.

Chapter 2 - CARTESIAN COORDINATES IN THE PLANE

Section	2.1	Rectangular coordinates
	2.2	Distance between two points
	2.3	Directed distances. Midpoint formula
	2.4	Slope
	2.5	The graph of an equation
	2.7	Sketching graphs
	2.8	The straight line
	2.9	Distance between a point and a line
	2.10	The circle

Estimated time 4 hours.

Chapter 3 - FUNCTIONS AND THEIR GRAPHS

Section	3.1	Functions
	3.2	Operations on functions
	3.3	Special functions

Estimated time 2 hours.

Chapter 4 - LIMITS AND CONTINUITY

Section	4.1	The Limit of a function
	4.2	Definition of Limit
	4.3	Theorems on limits
	4.4	Continuity
	4.5	Limits as $x \to \infty$. One-sided limits
	4.6	Asymptotes
	4.7	Increments

Sections 4.5, 4.6 done very briefly or possibly omitted.

Estimated time 3 hours.

Chapter 5 - THE DERIVATIVE

Section 5.1 Tangent to a curve
5.2 Instantaneous velocity
5.3 The derivative
5.4 Rate of Change
5.5 The derivative and continuity

Estimated time 3 hours.

Chapter 6 - FORMULAS FOR DIFFERENTIATION OF ALGEBRAIC FUNCTIONS

Section 6.1 Derivative of polynomial function
6.2 Derivative of a product or quotient of functions
6.3 Chain rule for differentiating composite functions
6.4 Derivative of any rational power of a function
6.5 Derivatives of higher order
6.6 Implicit differentiation
6.7 Differentials
6.8 Differentials as approximations

Proofs not done in detail.

Estimated time 5 hours.

Chapter 7 - APPLICATIONS OF DERIVATIVES

Section 7.1 Tangents and normals
7.2 Acceleration in straight line motion
7.3 Related rates
7.4 Newton's method for determining the roots of $f(x) = 0$.
7.5 Absolute maximum and minimum values of a function
7.6 Extrema
7.7 The first derivative test for extrema
7.8 Rolle's theorem and the mean value theorem
7.9 Second derivative test for extrema
7.10 Applied problems in maxima and minima
7.11 Maxima and minima by implicit differentiation
7.12 Concavity. Points of inflection
7.13 Curve sketching

Estimated time 12 hours.

Chapter 12 - TRANSCENDENTAL FUNCTIONS

Section 12.7 Trigonometric functions
12.8 Some trigonometric limits
12.9 Derivatives of the trigonometric functions

Estimated time 3 hours.

The chief change from the previous syllabus is the increased material and estimated time in Chapter 7 and the omission of most of Chapter 12.

TEXT: Purcell - CALCULUS WITH ANALYTIC GEOMETRY

Chapter 8 - ANTIDERIVATIVES

Section 8.1 Introduction
8.2 Finding antiderivatives
8.3 Generalized power formula for antiderivatives
8.4 Some applications of antiderivatives

Estimated time 2 - 3 hours.

Chapter 9 - THE DEFINITE INTEGRAL

Section 9.1 Area
9.2 The sigma notation
9.3 The definite integral
9.4 Approximate integration by the trapezoidal rule
9.5 Properties of definite integrals
9.6 The mean value theorem for integrals
9.7 Integrals with variable upper limits
9.8 The fundamental theorem of integral calculus
9.9 Finding the exact value of a definite integral

Estimated time 5 hours.

Chapter 10 - APPLICATIONS OF DEFINITE INTEGRALS

Section 10.1 Plane areas
10.2 Volume of a solid revolution
10.6 Centroid of a plane region
10.8 Moment of inertia of a plane region
10.10 Arc length and differential of arc in rectangular coordinates

Estimated time 5 hours.

Chapter 11 - CONICS

Section 11.3 The parabola ($e = 1$)
11.7 The ellipse ($e < 1$)
11.9 The hyperbola ($e > 1$)

Only the standard forms of parabola, ellipse and hyperbola.

Since these sections are closely connected to others it may not be advisable to follow the book.

Estimated time 3 - 4 hours.

Chapter 12 - TRANSCENDENTAL FUNCTIONS

Section 12.1 The natural logarithmic function
12.2 Graph of the natural logarithmic function
12.3 Logarithmic differentiation
12.4 Inverse of a function
12.5 The exponential function
12.6 Exponential and logarithmic functions with bases other than e
12.10 Inverse trigonometric functions
12.11 Graphing by addition of ordinates
12.12 Hyperbolic functions
12.13 Inverse hyperbolic functions

Equation 12.6.5 may be omitted.

Estimated time 7 hours.

Chapter 13 - TECHNIQUE OF INTEGRATION

Section 13.1 Introduction
13.2 The basic integration formulas
13.3 Integration by substitution
13.4 The first four basic formulas of integration
13.5 The basic trigonometric formulas
13.6 The basic inverse trigonometric forms
13.7 Integration by parts
13.8 Integrals involving $\sqrt[n]{ax + b}$
13.9 Definite integrals. Change of limits
13.10 Some trigonometric integrals
13.11 Integrals involving $\sqrt{a^2 - u^2}$, $\sqrt{a^2 + u^2}$, or $\sqrt{u^2 - a^2}$
13.12 Integrals of $\int \frac{(Ax + B)dx}{(ax^2 + bx + c)^n}$
13.13 Integration of rational functions by partial fractions
13.14 Integration by partial fractions (continued)
13.15 Rational functions of sin x and cos x
13.16 Tables of integrals
13.17 Simpson's rule

Section 13.13 done briefly.

Estimated time 10 hours.

Chapter 14 - POLAR COORDINATES

Section 14.1 Polar coordinates of a point
14.2 Graph of a polar equation
14.3 Relations between Cartesian and polar coordinates
14.4 The straight line and circle in polar coordinates

Estimated time 3 hours.

Chapter 15 - PARAMETRIC EQUATIONS AND VECTORS IN THE PLANE

Section 15.1 Parametric equations of a curve
15.2 The cycloid
15.3 Functions defined by parametric equations

15.2 done briefly.

Estimated time 2 hours.

The chief changes from the previous syllabus are the increased material and time in Chapter 10, the inclusion of Chapter 12 and the omission of Chapter 16 and 21.

Chapter 16 - IMPROPER INTEGRALS. INDETERMINATE FORMS

Section 16.1 Infinite limits of integration
16.2 Infinite integrands
16.3 Extended mean value theorem
16.4 Indeterminate forms
16.5 L'Hopital's rules
16.6 Other indeterminate forms

Estimated time 4 hours.

Chapter 17 - ANALYTIC GEOMETRY OF THREE-DIMENSIONAL SPACE

Section 17.1 Cartesian coordinates in three-space
17.2 Distance formulas
17.3 Direction angles and direction cosines
17.4 Direction numbers
17.5 The two fundamental problems in space
17.6 Equation of a plane parallel to a coordinate plane
17.7 Normal equation of a plane
17.8 Graph of a first-degree equation
17.9 Parallel and perpendicular planes
17.10 Conditions that determine a plane
17.11 General equations of a line in space
17.13 Symmetric equations of a line
17.14 Parametric equations of a line in space
17.15 The sphere
17.16 Surfaces and curves
17.17 Cylinders
17.18 Surfaces of revolution
17.19 Symmetry, traces and plane sections of a surface
17.20 Quadric surfaces
17.21 Procedure for sketching surface

1716 should perhaps be augmented with other materials.

Estimated time 12 hours.

Chapter 18 - VECTORS IN THREE-DIMENSIONAL SPACE

Section 18.1 Vectors in space
18.2 Cross product
18.3 Vector equations of planes and lines
18.4 Vector functions in three dimensions
18.5 Velocity and acceleration
18.6 Arc length. Curvature

Two dimensional vectors (15.5 Vectors in the plane, 15.6 Scalars, dot product, and basis vectors. 15.7 Vector functions, 15.8 Curvilinear motion, Vector arc length.) should be done also.

Estimated time 5 hours.

Chapter 19 - PARTIAL DIFFERENTIATION

Section	19.1	Functions of two or more variables
	19.2	Partial derivatives
	19.3	Limits and continuity
	19.4	Increments and differentials of functions of two variables
	19.5	Chain rule
	19.6	Directional derivative
	19.7	Gradient. Tangent plane to a surface.
	19.8	Extrema of a function of two variables
	19.9	Line integrals.

Estimated time 8 hours.

Chapter 20 - MULTIPLE INTEGRALS

Section	20.1	Double integrals
	20.2	Iterated integrals
	20.3	Evaluation of double integrals by means of iterated integrals
	20.4	Other applications of double integrals
	20.5	Polar coordinates
	20.6	Triple integrals
	20.7	Applications in rectangular coordinates
	20.8	Cylindrical and spherical coordinates

Only the "area" and "volume" sections of 20.4, 20.7 respectively need be done.

Estimated time 8 hours.

Chapter 21 - INFINITE SERIES

Section	21.1	Sequences
	21.2	Infinite series
	21.3	Tests for convergence of series of positive terms
	21.4	Alternating series. Absolute convergence
	21.5	Power series
	21.6	Functions defined by power series
	21.7	Taylor's formula
	21.8	Other forms of the remainder in Taylor's theorem
	21.9	Complex variable

Estimated time 10 hours.

Chapters 16, 21 were previously taught in Math 152-3. To enable students to take Math 352-2 concurrently, Chapter 21 would have to be taught immediately after Chapter 16.

Mathematics Department
September 21, 1971
PROPOSAL IV

The Mathematics Department wishes to recommend that Mathematics 411-4, Methods I, be renumbered and noted in the undergraduate calendar as Mathematics 311-4. The reason for this request is that a change in number as is proposed would encourage students to take this course early in their upper level course work. This is particularly necessary for applied mathematics students since Mathematics 411-4 is a prerequisite for many of the upper division applied mathematics courses. In addition, we wish to make Mathematics 311-4 an alternate prerequisite for Mathematics 422-4 to allow more flexibility for mathematics students and for majors and honors students in Physics. There will be no change in the syllabus for this course.

Students who have taken Math 411-4 may not take Math 311-4 for further credit.

MATH 311-4 ADVANCED CALCULUS

1. Quick review of functions of several variables. (1½-1 week)

2. Vector field theory: Differential operator ∇, Gradient, divergence and curl of vector valued functions, the directional derivative, applications to analytic geometry. (1½ weeks)

3. Extrema of functions of several variables, extrema under constraints. (1 week)

4. Multiple integrals: Iterated integrals, double and triple integrals, Jacobians change of variable in multiple integrals cylindrical and spherical coordinates. (2 weeks)

5. Line and surface integrals: Simply or multiply connected regions, independence of the path. Green's Theorem, the divergence theorem, Stoke's theorem. (2 weeks)

6. Infinite series: Review of tests for absolute and conditional convergence of the series of constants, operation with series (Addition, multiplication, rearrangement, etc.), sequence and series of functions, absolute and uniform convergence, tests for convergence. (1-1½ weeks)

7. Power series: Radius and interval of convergence, the Taylor and MacLaurin series, forms of the remainder. (1 week)

8. Improper Integrals: Integrals of discontinuous functions, infinite integrals, absolute conditional and uniform convergence, Tests for convergence. (2 weeks)

9. Curvilinear coordinates: Coordinate curves and coordinate surfaces, the base vectors, orthogonal curvilinear coordinates. (2 weeks)

TEXTS: 1. Advanced Calculus by Watson Fulks
2. Advanced Calculus by J.M.H. Olmsted
3. Advanced Calculus by D.V. Widder

Mathematics Department
September 21, 1971
PROPOSAL V

The Mathematics Department wishes to request that the prerequisite for Mathematics 422-4, Complex Variable I, be changed to read as follows:

FROM: Mathematics 251-3 and 241-2 (or Mathematics 214-3 and 221-2).

TO : Mathematics 311-4, or Mathematics ~~251-3~~ 253-4 (formerly 251-3) and 241-2 (or Mathematics 214-3 and 221-2).

The reasons for this request are that more flexibility would exist for Mathematics and Physics students who either wish to, or are required to take Mathematics 422-4 as a part of their degree requirements.

SCUS 71-27C

FACULTY OF SCIENCE

NEW COURSE PROPOSAL

I CALENDAR INFORMATION

Department: Mathematics Course Number: 302-3

Title: Statistical Methods

Sub-title or Description:

Non-parametric statistics, analysis of variance and related topics which are intended to help the students understand the uses of statistics in experimental research.

Credit Hours: 3 Vector Description: 3-0-1

Pre-requisite(s): Mathematics 101-3 or Mathematics 371-3

(Mathematics major and honor students may not use this course to satisfy the required number of semester hours of upper division mathematics courses. However, they may include the course to satisfy the total number of required hours of upper division credit.)

Students who have taken Mathematics 102-3 may not take this course for further credit.

II ENROLMENT AND SCHEDULING

Estimated Enrollment: 20 per offering

Semester Offered (e.g. Yearly, every Spring; twice yearly, Fall and Spring):

Yearly, every Spring

When course will first be offered: Spring 1973

III JUSTIFICATION

A. What is the detailed description of the course including differentiation from lower level courses, from similar courses in the same department and from courses in other departments in the University?

It is a course in statistical methods with emphasis in the design and analysis of experiments, which is primarily designed to satisfy the needs of students in other departments of SFU.

B. What is the range of topics that may be dealt with in the course?

Analysis of variance, regression, correlation and non-parametric methods.

C. How does this course fit the goals of the department?

It is primarily a service course which will be offered to students of other departments.

D. How does this course affect degree requirements?

This course is not required for any Mathematics degree program.

E. What are the calendar changes necessary to reflect the addition of this course?

New entry and deletion of mathematics 102-3.

F. What course, if any, is being dropped from the calendar if this course is approved?

Mathematics 102-3.

G. What is the nature of student demand for this course?

It will fill out the demand for a course in statistical methods by upper level students, in areas other than mathematics. These students would not get full value from such a course if it were taken too early in their degree programs. One of the groups to which this case would be particularly beneficial is the Bioscience students.

H. Other reasons for introducing the course.

See the attached sheet.

IV BUDGETARY AND SPACE FACTORS

A. Which faculty will be available to teach this course?

Dr. R. Rennie, Dr. C. Villegas, Dr. D. Mallory

B. What are the special space and/or equipment requirements for this course?

The existing statistical laboratory facilities will suffice.

C. Any other budgetary implications of mounting this course:

None.

OTHER REASONS FOR INTRODUCING MATHEMATICS 302-3

Mathematics 302 is intended to be a statistical methods course which will cover the same topics as Mathematics 102, but in more depth.

Through teaching Mathematics 102 and advising advanced students on their statistical problems we have come to the conclusion that an upper levels service course is more desirable than a first year course. There are two basic reasons: students are usually not motivated towards the use of statistical methods until they reach upper levels and many of their problems need a deeper understanding than that which has been obtained in Mathematics 102.

Instead of performing a brief review of Mathematics 101 as we did in Mathematics 102, we shall, in reviewing Mathematics 101, place emphasis on a rigorous understanding of sample space, random variables, probability, expectation and distributions. In addition to providing a better base for discussion of all statistical problems this technique will allow us to deal with the more sophisticated and general approach to analysis of variance using linear models and expected mean squares.

Hence, the adoption of this course should attract more students to using correct statistical proceedure and give these students a deeper understanding than is now available.

Mathematics 302-3

STATISTICAL METHODS

1. Review of Math 101 with emphasis on a rigorous understanding of probability, random variables, expectation and distribution as applied to statistical understanding.

2. Analysis of variance - Linear models approach with E.M.S. calculations.

   One way, Two way, Factorial and Latin Square Designs,

   Fixed, Random, Mixed Models.

   Multiple Comparisons

3. Bivariate Linear Regression and correlation

4. Analysis of Covariance

5. Non-parametric Statistics

   Sign, Run, Rank-sum tests, Rank correlation,

   Tests of Randomness

SUGGESTED TEXTBOOKS:

Dixon and Massey: Introduction to Statistical Analysis

Fryer: Concepts and Methods of Experimental Statistics