SIMON FRASER UNIVERSITY

S.75-151

MEMORANDUM

To SENATE	From SENATE COMMITTEE ON UNDERGRADUATE STUDIES
Subject USE OF SPECIAL TOPICS COURSES - FOR INFORMATION	Date OCTOBER 14, 1975

Report from the Faculty of Science on the Use of Special Topics courses is provided herewith.

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Senate

From: S. Aronoff
Dean of Science

Subject: Use of Special Topics Courses

Date: October 14, 1975

In accordance with the motion passed at the Senate meeting of November 5, 1974, regarding the use of special topics courses, the following is a report from the Faculty of Science.

Biological Sciences

No special topics courses are offered in Biological Sciences in Semester 75-3.

Chemistry

No special topics courses are offered in Chemistry in Semester 75-3.

Mathematics

See attached report from J.H. Easton, Departmental Assistant.

Physics

PHYS 199-3 Periphysical Topics 3-1-0

Calendar Description: Selected topics from sciences closely allied with physics. Prerequisities: B.C. High School Physics 11 or equivalent and Mathematics 12.

Instructor for 75-3: Dr. Leigh Hunt Palmer

Topic: The Physics of Music

Text: Acoustical Foundations of Music by John Backus

Detailed Description: Music and Science are two very important aspects of our culture. That there has been strong interaction between science and music is not well known, but scientists from Ancient Greece to Contemporary Canada have engaged in a continuing examination of and contribtuion to music. What they have learned and given makes a fascinating tale, much of which will be told in

...continued

a course offered this Fall for the second time at Simon Fraser, Physics 199-3, the Acoustical Foundations of Music.

Starting with Pythagoras, dealing with the contributions of Franklin, Helmholtz, Rayleigh and others important in earlier musical science, we shall also see what is being done in the 1970's with synthesizers and computer-written and -generated music. Physical aspects of sound, together with the physical characteristics of instruments, sound reproducers, and concert halls form the most important part of the course. There will be many demonstrations and some guest lecturers in interesting areas which are more musical than physical.

Number of Students: Initial enrolment - 17 As of 2 October - 13.

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Encl.

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Elizabeth Lambert, Faculty Secretary

From: J. H. Easton, Departmental Assistant, Mathematics Department

Subject: SELECTED TOPICS IN MATHEMATICS

Date: October 3, 1975

As per your memo dated October 1, 1975 the following information applies:

1) Calendar description

MATH 495-4 - Selected Topics in Mathematics

The topics included in this course will vary from semester to semester depending on faculty availability and student interest. (4-1-0)

MATH 496-4 - Selected Topics in Mathematics

The topics included in this course will vary from semester to semester depending on faculty availability and student interest. (4-1-0)

2) MATH 495-4 (Experimental Design) Dr. D. Mallory

2 hour lectures, 2 evenings per week

(see attached course outline)

MATH 495-4 (Methods of Optimization) Dr. D.L. Sharma

2 hour lectures, 2 evenings per week

(see attached course outline)

MATH 496-4 (Introduction to Game Theory) Dr. B. Alspach

2-1/2 hour lectures, 2 evenings per week

(see attached course outline)

3) Number of students enrolled

MATH 495-4 (Experimental Design) - 11 students

MATH 495-4 (Methods of Optimization) - 11 students

MATH 496-4 (Introduction to Game Theory) - 14 students

MATHEMATICS 495-4

EXPERIMENTAL DESIGN

FALL 1975
(EC)

1.	Review of statistical methods	(2 weeks)
2.	Analysis of variance and completely randomized design	(2 weeks)
3.	Randomized block design	(1 week)
4.	Latin square design	(2 weeks)
5.	Factorial experiments	(1 week)
6.	Confounding in factorial design	(1 week)
7.	Partial confounding	(1 week)
8.	Fractional Replication	(1 week)
9.	Analysis of covariance	(1 week)
10.	Other special designs	(1 week)

Applications in different areas will be considered with each of these topics.

TEXT: Statistical Principles in Experimental Design
by Winer, Publisher: McGraw Hill

PREREQUISITES: An elementary course in Statistics or permission of Instructor.

MATHEMATICS 495-4

Selected Topics in Mathematics: Experimental Design

Fall Semester 1975

Experimental Designs are aimed to reduce the experimental error inherent in any scientific research. A properly designed experiment of modest size will often be more informative at a smaller cost than a considerable larger experiment poorly laid out. Historically, the principles of experimental design were developed with agricultural experiments but today it is being applied to many fields such as industrial experimentation, medical, biological and psychological research as well as in business and industry. This course intends to introduce to the students the basic principles of experimental design and make them aware of its applicability in various areas.

Course Content:

Review of Statistical Principles, concepts of randomization and replication, completely randomised, randomised block, Latin Square and factorial designs, analysis of Covariance, application of experimental designs in industrial, medical, biological experiments and other related fields.

Prerequisite:

An elementary course in Statistics or permission of instructor.

Further information can be obtained from the instructor, Dr. D. Mallory at 291-4816.

METHODS OF OPTIMIZATION

MATH 495-4

Fall 1975
(EC)

PREREQUISITES: *MATH 232, 253*

AIM OF COURSE: *To provide a treatment of the basic methods and techniques for solving optimization problems.*

CONTENTS:

1. *Matrix algebra.*
2. *n-dimensional geometry and convex sets.*
3. *Classical optimization.*
4. *Search techniques.*
5. *Linear programming.*
6. *Nonlinear programming.*
7. *Integer programming. Dynamic programming.*

SUGGESTED TEXTBOOK: *"Introduction to Methods of Optimization"*
by L. Cooper and D. Steinberg
pub. W.B. Saunders Company

MATH 495-4

Selected Topics in Mathematics: Methods of Optimization

Fall Semester 1975 Evening Course.

The aim of the course is to provide an introductory treatment of the basic methods and techniques for solving optimization problems. Optimization is defined as finding the best way to produce a desired result or to carry out an action. To achieve this, the given problem is expressed in mathematical terms which may contain one or more variables. The value of the mathematical expression which describes the problem is then maximized or minimized. Applications to mathematical physics, biology, management science and sociology will be presented.

Contents: Introduction, review of set notation and matrix algebra, n-dimensional geometry and convex sets, classical optimization, search techniques, linear programming, nonlinear programming, integer programming and dynamic programming.

Prerequisite: MATH 232-3, 253-4

Corequisite: MATH 310-3

Textbook: Introduction to Methods of Optimization by Cooper & Steinberg

Further information can be obtained from the instructor D. Sharma, Room 5124 AQ - 291-3370.

INTRODUCTION TO GAME THEORY

MATH 496-4

Fall 1975
(EC)

Prerequisites: Math 232-3 and Math 152-3. Math 253-4 Advisable.

1. *Introduction*

   Examples of games. Graphs. Games in extensive and normal form. Strategies, payoffs. Equilibrium points.

2. *Two-person zero-sum games*

   Pure and mixed strategies. The minimax theorem for finite games. Symmetric games.

3. *Computation of optimal strategies*

   Linear inequalities. Linear programming. Simplex algorithm. Duality. Non-linear programming.

4. *Continuous and stochastic games*

   Games on the square. Continuous kernel. Games of timing. Stochastic and differential games.

5. *n-person games and general-sum games*

   Cooperative and non-cooperative games. Domination. The core and stability. Prisoner's dilemma.

Mathematical analysis of two- or many-person games as a model of human behaviour and decision-making.

TEXT: *Game Theory* *by G. Owen, Publisher: W. B. Saunders Company, 1968*

Some topics in two-person games by T. Parthasarathy & T.E.S. Raghavan Publisher: American-Elsevier, 1971