S. 90 - 58

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Senate

FROM: J. Munro
Chair, Senate
Cttee on Academic Planning

SUBJECT: Curriculum Revisions - Faculty of Science

DATE: November 20, 1990

Action undertaken by the Senate Committee on Academic Planning and the Senate Committee on Undergraduate Studies, gives rise to the following motion:

MOTION: "that Senate approve and recommend approval to the Board of Governors, as set forth in S.90-58 curriculum revisions in the Faculty of Science as follows:

i)	S.90-58a	Proposal for a B.Sc. (General Science) Degree Program
ii)	S.90-58b	Change to Electives taken outside the Faculty of Science for Major and Honors students
iii)	S.90-58c	Proposal for a Minor in Physical Geography
iv)	S.90-58d	Department of Biological Sciences
v)	S.90-58e	Biochemistry Program
vi)	S.90-58f	Management and Systems Science Program
vii)	S.90-58g	Department of Mathematics and Statistics
viii)	S.90-58h	Department of Physics"

SIMON FRASER UNIVERSITY
MEMORANDUM

To: Ron Heath, Secretary to Senate

From: C.H.W.Jones, Dean Faculty of Science

Subject: **Proposed B.Sc. (General Science) Degree Programme**

Date: October 10, 1990

==========

Please find attached a proposal for a B.Sc. (General Science) Degree programme which has been approved by the Faculty of Science. This degree programme will use only currently existing courses - no new courses are required.

This degree programme will provide students with an opportunity to obtain a broad general science education in several fields, but with some specialization in at least two fields. The programme will be beneficial to students intending to pursue a career in secondary school teaching. However, it will also serve a wide range of students who would prefer breadth in their science education rather than depth in only one area. The number of required courses together with the prerequisites for the required minors is high and the programme overall is quite demanding.

CHW. Jones.

C.H.W. Jones

CHWJ:rh

Encl.

Proposed Calendar Entry for Bachelor of Science General Program, to be designated B.Sc. (General Science) on the transcript and B.Sc. on the degree

General Science Program
(120 semester hours)

The general science program provides the opportunity for a broad general education in several fields of study with some specialization in at least two fields.

- **Lower Level Requirements**

BISC 101, 102	8 semester hours
CHEM 102, 115, 103, 119; or 102, 115, 105, 118; or 102, 115, 150, 155	10 semester hours
PHYS 101, 102, 130; or 120, 121, 131	8 semester hours
MATH 154, 155; or 151,152	6 semester hours
STAT 102 or 270	3 semester hours
GEOG 111 or 112	3 semester hours
One of CMPT 101, 102, 103	3 semester hours

- **Upper Level Requirements**

STAT 302 or 330	3 semester hours

- **Other Requirements**

- A Faculty of Science Minor in each of two subject areas, including the lower division prerequisites, chosen from two of the six groupings noted below. Completion of two Minors will require a minimum of 28 semester hours, but some additional number of hours may be required depending on the stated individual requirements for the Minors chosen.
Choose one Minor from two of the following groupings:

1) Biological Sciences, Environmental Toxicology
2) Biochemistry, Chemistry
3) Mathematics, Statistics
4) Physics
5) Quaternary Studies, Physical Geography
6) Nuclear Science

The student must also satisfy the following general requirements:

- Additional upper division courses in Science (including Physical Geography) to give a minimum of 44 semester hours of upper division credit.

- A minimum of 12 semester hours taken outside the Faculty of Science and Physical Geography including a minimum of 6 semester hours from the Faculty of Arts.

- A grade point average of 2.00 in the upper division courses required for each of the two subject area minors with a minimum grade of C- in each course used for the subject area minors.

- Students should consult Departmental Advisors regarding the selection of upper division courses in their subject area minors. Students are encouraged to include Science-related courses such as PHIL 244, 341 and HIST 360, 361 in their programs.

SIMON FRASER UNIVERSITY
MEMORANDUM

To: C.H.W. Jones, Dean
Faculty of Science

From: K. Heinrich, Chair
Faculty of Science,
Undergraduate Curriculum
Committee

Subject: **General Science Program**

Date: September 26, 1990

==========

Subsequent to your request that the proposed B.G.Sc. program be distributed to faculty we received a request from Statistics to reconsider the program. We did so at the Faculty of Science Undergraduate Curriculum Committee meeting of September 24th and by an unanimous vote the motion:

> "That under Lower Level Requirements, it would read MATH 154, 155; or 151, 152 - 6 semester hours 'and 3 additional semester hours selected from: MATH 113, 144, 180,or STAT 102 or 200 level MATH, STAT or MACM' be replaced with STAT 102 or 270 - 3 semester hours' and that under Upper Level Requirements, it would read STAT 302 or 330 - 3 semester hours. "

was approved.

Some editorial changes were also made. I am submitting to you the revised version of the program to be brought forward at the next Faculty of Science meeting.

K. Heinrich

KH:rh
Enclosure

SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Heath, Secretary to Senate

From: Pablo Dobud, Assistant to the Dean of Science

Subject: Calendar Changes

Date: October 10, 1990

==========

This is to inform you that the Faculty of Science, at its meeting held on Tuesday October 9, 1990 has approved the following calendar changes . I would appreciate it very much if you would place this motion in the agenda of the next SCUS meeting for consideration and approval.

"To approve the following change to the electives, to be taken outside the Faculty of Science, required for Major and Honor students

From: A minimum of 6 semesters hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401, 402, 405 and 406).

To: A minimum of 12 semester hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401 to 407), including a minimum of 6 semester hours taken in the Faculty of Arts."

(Paper FSC 7-90)

Thank you

cc: Dr. K. Heinrich, Chair, Faculty of Science Undergraduate Curriculum Committee.

FSC 7-90

SIMON FRASER UNIVERSITY
MEMORANDUM

To: C.H.W. Jones, Dean
Faculty of Science

From: K. Heinrich, Chair
Faculty of Science,
Undergraduate Curriculum
Committee

Subject: **Rationale for 12 hours electives outside the Faculty of Science**

Date: October 10, 1990

==========

The goal of this change is to broaden the students' knowledge outside of science and science based disciplines and at the same time to give them the opportunity to enhance their language skills. Hopefully students will also take advantage of those courses in History, Political Science and Philosophy which discuss science and its relationship with other disciplines.

KH:rh

K. Heinrich

SIMON FRASER UNIVERSITY
MEMORANDUM

To: C.H.W. Jones, Dean
Faculty of Science

From: R.F. Frindt, Chair
Faculty of Science,
Undergraduate Curriculum
Committee

Subject: **Electives Outside the Faculty of Science**

Date: July 18, 1990

==========

The Faculty of Science Undergraduate Curriculum Committee has considered the electives required outside the Faculty of Science and recommends the following:

That the requirement for electives taken outside the Faculty for Major and Honors students be changed,

From:

A minimum of 6 semester hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401, 402, 405 and 406).

To:

A minimum of 12 semester hours of electives in subjects taken outside the Faculty of Science (excluding EDUC 401 to 407), including a minimum of 6 semester hours taken in the Faculty of Arts.

Since students can satisfy our current requirement by taking Computing Science and other science-related courses, the Committee felt that the revised requirement would encourage our students to explore areas outside the Science/Computing Science disciplines.

R Frindt

R.F. Frindt

RFF:rh:

c.c. Faculty of Science Undergraduate
Curriculum Committee Members

SIMON FRASER UNIVERSITY
MEMORANDUM

To: Members of
Faculty of Science
Undergraduate Curric.
Committee

From: K. Heinrich, Chair
Faculty of Science,
Undergraduate Curriculum
Committee

Subject: **Geography Minor**

Date: October 2, 1990

The Geography Department has now approved a minor in Physical Geography (as attached). In order to satisfy the upper level requirements, the student would need to take between 3 and 9 additional hours of 200 level Geography (and it seems highly unlikely that a student in the B.Sc. (General) would take all nine hours). In fact a student taking GEOG 213 would then be able to take 6 of the listed upper division courses (only four being required). I feel we should approve this.

Please indicate your approval/disapproval of acceptance of this minor for the B.Sc. (General) to Rosemary (3772) by Friday, October 5th.

per R. Hould
K. Heinrich

KH:rh:Encl

c.c. C.H.W. Jones
P. Dobud

Responses received from:

D. Moore - yes

D. Boal - yes

A. Beckenbach- yes

K. Heinrich - yes

R.G. Korteling - yes

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: Dr. K. Heinrich, Chair
Fac. of Science C.C.

FROM: R.B. Horsfall, Chair
Undergraduate Studies
Dept. of Geography

SUBJECT: Geography Minor

DATE: October 1, 1990

At a Department Meeting on Thursday, September 27, 1990, the Department approved the following Minor in Physical Geography:

MINOR PROGRAM IN PHYSICAL GEOGRAPHY

Lower Division Requirements: GEOG 100, 111, and 250 or 253, plus the 200 level prerequisites required for the upper division courses selected.

Upper Division Requirements: A minimum of 16 hours from the following courses: GEOG 311-4, 313-4, 314-4, 315-4, 317-4, 412-4, 413-4, 414-4 415-4, 416-4, 418-4, 419-4.

Note: GEOG 316-4, Ecosystem Biogeochemistry, is a new course in the process of being approved by the Faculty of Arts. It will be included in the list when it has passed Senate. GEOG 417-4 is being dropped from the Calendar.

cc: Pablo Dobud, D. Moore

S. 90 - 58d

Department of Biological Sciences
Summary of Curriculum Revisions

SCUS Reference: SCUS 90-33

SCAP Reference: SCAP 90-49

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1. New Courses -
   i) MASC 470 to MASC 479 inclusive (10 Special Topic Courses in Marine Sciences)
   ii) BISC 100-4 (with waiver to permit offering of BISC 100-4 in the 1990-2 Semester)

2. Deletion of MASC 401-6, MASC 402-6

3. Change of Title, Course Description and Prerequisite - BISC 101-4, BISC 102-4

4. Revision of the Chemistry requirements for students taking a Major or Honors in Biological Sciences

SCUS 90-33

SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Heath, Secretary to Senate

From: P. Dobud, Administrative Assistant to the Dean of Science

Subject: Calendar Change: Department of Biological Sciences

Date: October 10, 1990

This is to inform you that the Faculty of Science, at its meeting held on October 9, 1990 has approved the following calendar changes for the Department of Biological Sciences. I would appreciate it very much if you would place these motions in the agenda of the next SCUS meeting for consideration and approval.

A) ***"To approve 10 Special Topics courses for the Department of Biological Sciences, MASC 470 to MASC 479 inclusive(with 3 or 6 credit hrs.), and to delete MASC 401-6 and MASC 402-3."***

(Paper FSC 10-90)

B) ***"To approve the new course proposal for BISC 100-4 and the calendar revisions to BISC 101-4 and BISC 102-4 as specified in Paper FSC 11-90."***

(Paper FSC 11-90)

C) ***"To approve the change in the Chemistry requirements for students taking a Major or Honors in Biological Sciences as stated in Paper FSC 12-90."***

(Paper FSC 12-90)

Thank you.

cc: Dr. B. McKeown, Chair ,Department of Biological Sciences.
Dr. A. T. Beckenbach, Department of Biological Sciences.
Dr. K. Heinrich, Chair, Faculty of Science Undergraduate Curriculum Committee.

FSC 10-90

13 Sept. 1990
Revised 10 Oct. 1990

MARINE SCIENCES SPECIAL TOPICS COURSES

Proposal:

For administrative purposes, more special topics course numbers are required for Marine Sciences. Therefore, the Department of Biological Sciences proposes to add ten special topics courses to the calendar listing: MASC 470 - MASC 479, inclusive. These courses will have variable credit hours (3 or 6) for each course number. The creation of these course numbers was suggested by the Registrar's Office. A comparable proposal was approved for Education Special Topics and now appears in the Calendar (1990/1991, pp. 170-171) as EDUC 495-(3, 4 or 6)/496-(3, 4 or 6)/497-(3, 4 or 6)/ 498-(3, 4 or 6) Special Topics.

Rationale:

Each summer, Bamfield Marine Station offers a series of courses available to students from all of the member universities. Some of these courses are offered on a regular basis and have current Calendar entries. Other courses are offered on a one time only basis. During the summer semester, 90-2, eight such courses were offered, each carrying either 3 or 6 credits. This proposal will allow us to assign a separate course number to each course when the topics and credit assignments are announced each year.

Proposed Calendar Entry:

> MASC 470 - 479 (3 or 6) Special topics in Marine Biology
> Offered, as opportunities arise, by visiting scientists who are working at the Bamfield Marine Station and are prepared to offer a course of either 3- or 6-weeks. Courses will be of a specialized nature.
> Prerequisite: Will vary and will be announced in advance of the course offering.

Courses to be dropped if MASC 470-479 are approved:

MASC 401-6 Special Topics in Marine Biology
MASC 402-3 Special Topics in Marine Biology

Comments:

1. This proposal does not actually create new courses, only numbers. The courses themselves are created by the Academic Planning Committee of WCUMBS (Western Canadian Universities Marine Biological Society) each year. This proposal simply provides a mechanism by which these courses can be given Simon Fraser course numbers and credit, greatly simplifying the administrative task of opening these courses to our students. At present there are only two special topics courses available, so that multiple titles must be given to each course. It is particularly awkward for students wishing to take two 3-credit courses in one summer, i.e., two sections of MASC 402-3.

For Reference —
I have circled my additions.
Cindy

13 Sept. 1990
Revised 10 Oct. 1990

MARINE SCIENCES SPECIAL TOPICS COURSES

Proposal:

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Comments (continued):

2. Quality control over the courses is exercised by the Academic Planning Committee of WCUMBS, at the time the courses are created. The courses are full-time for three or six weeks. The students usually have 3 or 4 hours of lecture each morning and laboratories or field trips in the afternoons and weekends. The credit assignment of 1 unit per week is comparable to a normal full course load at Simon Fraser University: 15 credits in 13 weeks, plus finals.

3. It is clear from the proposed Calendar Description (above), that these course numbers may be used only for full-time courses offered at Bamfield Marine Station.

4. No additional resources are required. The courses have previously been judged to meet the academic requirements of the Department of Biological Sciences.

A.T. Beckenbach, Chairman DUCC
Department of Biological Sciences

FSC 11 90

Department of Biological Sciences
MEMORAMDUM

From: A.T. Beckenbach, Chair, Department Undergraduate Curriculum Committee.

To: Dr. K. Heinrich, Chair, Faculty Undergraduate Studies Committee

Re: Revisions of the 100 Level Biological Science Course Offerings

Date: 11 Oct. 1990

The Department of Biological Sciences has approved the following changes to its first year course offerings. This memorandum provides a proposal describing these changes.

This proposal has two main objectives:

1. To propose a new lecture/laboratory course, BISC 100-4, Introduction to Biology, to serve the needs of students with little or no biological background;

2. To upgrade and revise the existing first year Biology courses, BISC 101-4 and BISC 102-4, including the addition of prerequisites and a change in course title.

Background:

The Introductory Biology courses, BISC 101 and 102, currently have no prerequisites, and can be taken in either order. The practical consequence of this fact is that both courses contain students with an extreme diversity of scientific backgrounds. Some students, particularly mature students from other Faculties, have never taken a course in any science, at any level. At the other extreme are students who have completed two years of High School Biology, Chemistry, Physics and Mathematics, as well as CHEM 102/115, perhaps PHYS 120 and the other of the BISC 101/102 series. This disparity of student backgrounds makes the teaching of these courses extremely difficult. In 1984, Dr. A.T. Beckenbach completed a review of BISC 101 and 102 and recommended the creation of a new elementary level lecture/laboratory course, BISC 100. The new course would remove from BISC 101 and 102 those students who are not prepared for University level Biology courses. BISC 101 and 102 could then be upgraded in two ways: 1. To assume a basic level of knowledge of all students, and 2. To omit topics that are extensively covered in High School Biology 11 and 12, and in BISC 100. The time saved will be used to cover a smaller number of topics in greater depth.

This recommendation was approved by the Department, and the Department's intention to go forward with this recommendation was included as part of its Planning Document. During the External Review of the Department of Biological Sciences, the Review Committee concurred with the recommendation and so noted in its Report.

BISC 100-4 Introduction to Biology.

Dr. Joan Sharp has developed an outline of the proposed new course, BISC 100-4 (attached). The course has two primary purposes: 1. To provide a lecture/laboratory course suitable for students who lack a basic background in Biology; and 2. To provide an entry route into University level Biology courses (the revised BISC 101 and 102). While it may seem unrealistic to accomplish both goals in a single course, our present system attempts not only to accomplish those goals, but to provide University level instruction simultaneously, in both BISC 101 and 102. We believe that the establishment of a BISC 100 course, together with the necessary upgrading of BISC 101 and 102, will allow us to separate the elementary and University levels, and to provide far greater service to our students.

BISC 101-4 and BISC 102-4 Revisions:

By introducing prerequisites to BISC 101 and 102, we will be compelled to upgrade the existing courses. The most important change is that it will no longer be necessary to cover basic terminology and concepts. Students will have encountered the scientific method, basic cell structure and a descriptive level discussion of biological molecules in High School or in BISC 100. These topics can be de-emphasized or omitted in the revised BISC 101 and 102 courses. Course outlines of the revised offerings, as well as the present course outlines are attached.

For both courses, all topics can be covered at a more advanced level, and therefore, in greater depth.

BISC 101: The major changes are: reduced discussion of cell structure; description of basic biological molecules is omitted; discussion of DNA and proteins is added (moved from BISC 102); microbiology will be introduced. Other topics will remain the same, except for a general improvement in the level of difficulty.

BISC 102: The major changes are: coverage of cell biology (moved to BISC 100) and DNA and proteins (moved to BISC 101) will be dropped; diversity, evolution, ecology and behaviour will be covered in greater detail.

The basic nature of the courses will remain the same: BISC 101 covers levels of organization up to the organism while BISC 102 focusses on the organismal to population levels of study.

Proposed Schedule of Offerings:

Any proposal of a new, presumably high enrollment, first year course must take into account facilities and equipment. Our current enrollments in BISC 101 and 102 are 250 students in Fall and Spring semesters, and 50 during the Summer semester. We have run informal surveys among students in these courses to determine how many would have enrolled in a putative BISC 100 course, instead of a course targetted for Biology Majors. About a third of the students would have selected the more elementary course. In the following analysis, we assume a third to a half of the students will choose BISC 100.

Current offerings and enrollments:

	Fall	Spring	Summer
BISC 101	250	250	50
BISC 102	250	250	50

Proposed schedule:

	Fall	Spring	Summer
BISC 100	250	-	50
BISC 101	250	250	-
BISC 102	-	250	50

There are several points to note:

1. Under the current schedule we are offering two high enrollment laboratory courses each semester. Under the proposed schedule, we will continue to offer two of the courses each semester.

2. Consider BISC 100 as a prerequisite for the University level courses, BISC 101 and 102. By offering BISC 100 in the summer and fall semesters, a new student lacking High School Biology 12 (a prerequisite for the revised BISC 101 and 102) can get "on track" with his/her cohort in either of two ways: 1. Summer = BISC 100, Fall = BISC 101 and Spring = BISC 102; or 2. Fall = BISC 100, Spring = BISC 101 and Summer = BISC 102.

3. The proposed schedule results in the same throughput of students, 1100 per year, as we currently have. The main question, which we cannot answer at this time, is whether offering BISC 102 only in Spring and Summer semesters, to 300 students, will prove adequate. It is more likely that a section in the Fall semester will have to be offered. If so, an additional laboratory and large lecture theatre will have to be made available. We should emphasize that current enrollment pressures in BISC 101 and 102 may soon force us to find additional laboratory space and equipment for these courses in their present form. We are no longer able to accomodate our present enrollment needs. Both courses are closed by enrollments in both Fall and Spring semesters. If we do open

a Fall offering of BISC 102 under the proposed schedule, the increase in student spaces may be sufficient to meet our present, and perhaps future, needs. Additional laboratory and lecture space should become available when the new buildings are completed.

Equipment: The proposed BISC 100 can be adequately served by equipment presently used by BISC 101 and 102. If all three courses are offered in the Fall semester, additional equipment will be required. We are at present looking to upgrade existing equipment in BISC 101 and 102 laboratories, as part of our capital equipment request next year. If we are able to upgrade, the present equipment is still adequate for an elementary course, BISC 100.

A.T. Beckenbach

c.c. Dr. B.A. McKeown, Chair Department of Biological Sciences

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

Department: Biological Sciences

1. Calendar Information

Abbreviation Code: BISC Course Number: 100 Credit Hours: 4 Vector: 2-1-4

Title of Course: Introduction to Biology

Calendar Description of Course:

An introduction to the basic concepts of biology, emphasizing evolution as a unifying theme. Topics include cell structure, mitosis and meiosis, DNA structure and function, evolution, and population and ecosystem ecology.

Nature of Course : Lecture/Laboratory

Prerequisites (or special instructions):

No prerequisites. Students with credit for BISC 101 or a succeeding Biology course may not take BISC 100 for further credit. Students with credit for BIOLOGY 12 normally will not be permitted to take this course for credit.

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? Twice a year.

Semester in which the course will first be offered? 91-2

Which of your present faculty would be available to make the proposed offering possible? Any of our present faculty should be able to teach BISC 100

3. Objectives of the Course

There are two main objectives:

1. Introduce students to fundamental biological principles
2. Give students an understanding of scientific investigative process.

The course will serve as a laboratory course for non-majors, and as an entry level course for BISC 101 and 102.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	None
Audio Visual	None
Space	None
Equipment	None

5. Approval

Date: Sept 19/90 Nov. 2/90

Department Chairman Dean Chairman, SCUS

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

10

SIMON FRASER UNIVERSITY
MEMORANDUM

File: 671/676

To: Faculty of Science Undergraduate Curriculum Committee

From: B.A. McKeown, Chair, Biological Sciences

Re: BISC 100-4 Offering in 91-2

Date: 90-10-24

The Faculty of Science and Senate recently approved a new course BISC 100-4 (3-1-3), Introduction to Biology.

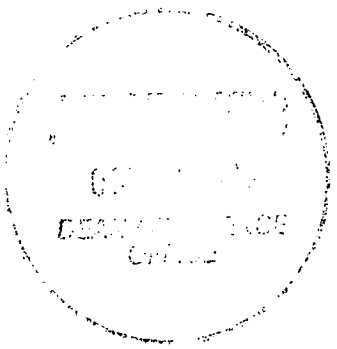
I would appreciate if you would ask the Registrar to approve a waiver so that the course could be offered in Summer 1991. This waiver for early offering is requested to enable students who do not have Grade 12 biology to take the course in the summer and provide the necessary background for these students as an entry level course for BISC 101 and 102. We anticipate a relatively small number of students will enroll in the summer.

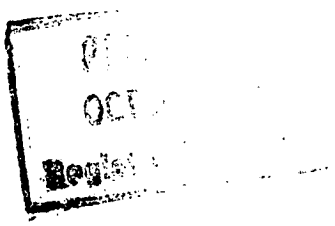
Thank you.

/cac

B. A. McKeown, Chair.

cc: Dr. A.T. Beckenbach, Chair, DUCC.
Dr. C.L. Kemp, Advisor.





BISC 100 - INTRODUCTION

A new non-majors introductory biology laboratory course (Biology 100) is proposed as an addition to the Department of Biological Sciences' present course offerings. This course would serve two major groups of students. It would be a remedial course for students who have not completed Biology 11 and 12 but who plan to do a biology major or minor. These students would take Biology 101 and 102 upon completion of the non-majors course. This allows us to upgrade the curricula of both BISC 101 and 102. BISC 100 would also serve students (with or without a strong biology background) who wish to take an introductory biology laboratory course, but who do not plan to continue in biology

The non-majors course should have two main - and equally important - objectives. First, it must introduce students to fundamental biological concepts and terminology. Students who have completed this course should be prepared to handle the material presented in the enriched Biology 101/102 courses. Second, the course should give students an understanding of the scientific investigative process. The first year biology course may be the only contact non-science majors have with a laboratory science course. From this course, students should develop a realistic appreciation of the strengths (and the limitations) of the scientific investigative approach.

To make this course challenging and exciting and to ensure that students gain an appreciation of the nature of scientific inquiry, students should personally engage in scientific investigation. Within the context of the topics covered in the introductory course, students should be able to identify biological problems, formulate hypotheses and test these hypotheses.

Course design

The non-majors course should consist of three lectures per week, one tutorial and one scheduled 3 hour laboratory for 20 to 25 students.

The course should emphasize evolution as the central unifying theme of biology. Evolution is woefully underemphasized in the high school curriculum and an emphasis on evolution as biology's essential foundation will give students who have taken high school biology a new perspective on the subject.

Tentative Course Outline

Week 1:

Lecture topics	- Origin and evolution of life - Adaptation by natural selection - The unity and diversity of living things
Laboratory	- Introduction to microscopy - Diversity of life - Introduction to the five kingdoms

Week 2:

Lecture topics - Atomic and molecular structure
- Water's importance to the living world
- Classes of organic compounds

Laboratory - Use and care of microscopes
- Cell diversity
- Biological molecules

Week 3:

Lecture topics - Scientific method - strengths & limitations

Laboratory - Scientific measurement
- Experimental design

Students will examine and discuss scientific papers in two exercises. In the first exercise, a classic scientific paper will be read in advance. Students then identify, through discussion, the question being asked, the hypothesis formulated and the experimental tests of the hypothesis. In the second exercise, students work with a flawed scientific paper (prepared for the exercise). They look - again through discussion - for errors in logic and experimental design. In groups the students redesign the experiments, carry them out and collect and analyse the data.

Week 4:

Lecture topics - Cell structure and function
- Cell membranes

Laboratory - Chemical components of cells
- Movement of molecules
- Osmosis, diffusion

Week 5:

Lecture topics - Energy transformation
- Energy acquiring and energy releasing pathways

Laboratory - O_2 consumption in germinating seeds/insect
- O_2 evolution in a living plant

Week 6:

Lecture topics - Cell reproduction

Laboratory - Modelling mitosis and meiosis

Week 7:

Lecture topics
- DNA to protein - gene function

Laboratory
- Simulations of replication, transcription and translation

Week 8:

Lecture topics
- The nature of inheritance
- Patterns of heredity

Laboratory
- Investigation of the genetics of coat color and cats - computer simulation
- Human genetics

Weeks 9 & 10

Lecture topics
- Evolutionary theory
- Natural selection
- Speciation

Laboratory
- Evidence for evolution
- Predator-prey co-evolution
- Human evolution

Week 11:

Lecture topics
- Population ecology
- Community interactions

Laboratory
- Student designed investigative laboratory

In the two to three weeks leading up to this lab, students will be given a number of questions relevant to topics covered in the course. Students choose a question and work in small groups to develop their own hypotheses, design and conduct appropriate experiments and report their findings.

Week 12:

Lecture topics
- Ecosystems
- The biosphere
- Ecology and human concerns

Laboratory
- Population growth curves
- Pollution - Determination of LD50 for various pollutants

Course Revision

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 101 Credit Hours: 4 Vector: 2-1-4

Title of Course: General Biology

Calendar Description of Course:

This course offers an introduction to the biochemical and physiological mechanisms of living organisms. Topics covered include cell structure and function, DNA replication and the flow of genetic information, enzyme function, metabolism and physiology of microorganisms, plants and animals.

Nature of Course

Prerequisites (or special instructions):

High school biology 11 and 12 (or equivalent) or BISC 100.
Note: BISC 101 and 102 may be taken in either order, or concurrently.

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? Twice a year.

Semester in which the course will first be offered? 91-3

Which of your present faculty would be available to make the proposed offering possible? Any of our present faculty.

3. Objectives of the Course

Build on the background developed in high school biology 11 and 12, or in BISC 100, as preparation for 200 level BISC courses.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	None
Audio Visual	None
Space	None
Equipment	None

5. Approval

Date: Sept. 16/90 Nov. 2/90

Department Chairman — Dean — Chairman, SCUS

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

Course revision

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

NEW COURSE PROPOSAL FORM

1. Calendar Information

Department: Biological Sciences

Abbreviation Code: BISC Course Number: 102 Credit Hours: 4 Vector: 2-1-4

Title of Course: General Biology

Calendar Description of Course:

The course begins by surveying the diversity of life, and its evolutionary history on Earth. The student is introduced to the study of genetics, development and evolution, giving an overview of how these processes interact to produce form and function. The principles of behaviour and ecological relationships of organisms to each other and their environment are also studied.

Nature of Course

Prerequisites (or special instructions):

High school biology 11 and 12 (or equivalent) or BISC 100.
Note: BISC 101 and 102 may be taken in either order, or concurrently.

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? Twice a year.

Semester in which the course will first be offered? 92-1

Which of your present faculty would be available to make the proposed offering possible? Any of our present faculty.

3. Objectives of the Course

BISC 102, together with BISC 101, will provide the necessary preparation for 200 level BISC courses.

4. Budgetary and Space Requirements (for information only)

What additional resources will be required in the following areas:

Faculty	None
Staff	None
Library	None
Audio Visual	None
Space	None
Equipment	None

5. Approval

Date: Sept. 11/90 Nov. 2 1990

Department Chairman | Dean | Chairman, SCUS

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

FSC 12-90

Simon Fraser University
Department of Biological Sciences
MEMORANDUM

To: Dr. K. Heinrich, Chair
Faculty of Science UCC

From: A.T. Beckenbach
Biological Sciences

Subject: Chemistry for Biology Majors

Date: 21 Sept. 1990; 10 Oct. 1990

The Department of Chemistry has recently revised its lower levels offerings and prerequisite structures. These changes necessitate revision of the Chemistry requirements in Biological Sciences.

Therefore, the Department of Biological Sciences has approved the following Chemistry requirements for students taking a Major or Honours in Biological Sciences:

CHEM 102-3 General Chemistry I
115-2 General Chemistry Laboratory I

plus a minimum of 10 semester hours selected from:
CHEM 105-3 General Chemistry II for Life Sciences
118-2 General Chemistry Laboratory II
150-3 Organic Chemistry I
155-2 Organic Chemistry Laboratory I
250-3 Organic Chemistry II
255-2 Organic Chemistry Laboratory II

Students taking a Major or Honours in Biological Sciences are encouraged to take a full year of organic chemistry. Students intending to apply for Medical or Veterinary School should include all of the Chemistry courses listed above.

Rationale: Since CHEM 105/118 are no longer prerequisites for entrance into the organic chemistry series, the new offerings provide greater flexibility for our students. There is no change in the number of credit hours of Chemistry required.

A.T. Beckenbach

SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Heath, Secretary to Senate

From: P. Dobud, Administrative Assistant to the Dean of Science

Subject: Calendar Change: Biochemistry Program

Date: March 15, 1990

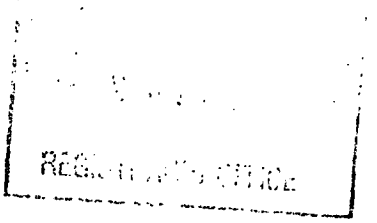
This is to inform you that the Faculty of Science, at its meeting held on Monday March 12, 1990 has approved the following calendar changes for the Biochemistry Program. I would appreciate it very much if you would place these motions in the agenda of the next SCUS meeting for consideration and approval.

"To approve that BISC 402-3 be replaced by BISC 321-3 in the Core and Minor Biochemistry Program"

(Paper FSC 1-90)

Thank you

cc: Dr. L. Srivastava, Chair ,Department of Biological Sciences.
Dr. A. T. Beckenbach, Department of Biological Sciences.
Dr. R. Frindt, Chair, Faculty of Science Undergraduate Curriculum Committee.



FSC 1-90

SIMON FRASER UNIVERSITY

MEMORANDUM

TO: R. F. Frindt, Chair Faculty Undergraduate Curriculum Committee	FROM: Dr. W. R. Richards, Chair Biochemistry Curriculum Committee
SUBJECT: Revisions to Undergraduate Program	DATE: 10 January, 1990 WP: C10674;dc44wp

The Biochemistry Curriculum Committee has approved, and recommends, the following changes to both the core and minor Biochemistry programmes:

BISC 402-3 shall be replaced by BISC 321-3.

SIMON FRASER UNIVERSITY

MEMORANDUM

To. Ron Heath Registrar's Office	From Dr. C.L. Kemp Dept. of Biological Sciences
Subject. CHANGE TO BIOCHEMISTRY CORE	Date. October 25, 1990

Further to our conversation of yesterday, I believe the following represents the intent of the Biochemistry Committee.

In order to accommodate Molecular Biology in the Biochemistry core programme, the Biochemistry Committee recommends dropping BISC 402 (Molecular Genetics) and replacing it with BISC 321 (Introduction to Molecular Biology). This is a reasonable change since BISC 402 has presumed some background in Molecular Biology and students were advised to take BISC 321 at least as a corequisite. Rather than adding BISC 321 to the core program the Committee wished to maintain some flexibility and decided to drop the third course in Genetics from core.

C.L. Kemp

2

SFU SIMON FRASER UNIVERSITY

MEMORANDUM

To: FSUCC	Date Fri, Sep 21, 1990 From: MSSC Steering Committee Department of Mathematics & Statistics
Subject: MSSC Calendar Changes	

1. Old Description

NOTE: BUEC 333 and ECON 331 will not be accepted towards the MSSC degree.

New Description

NOTE: BUEC 232, BUEC 333 and ECON 331 will not be accepted towards the 120 or 132 hours required for the MSSC major or honors degree.

RATIONALE: Since MSSC students are required to take STAT 270 and STAT 330, plus STAT 450 for honors students, BUEC 333 and ECON 331 were excluded to prevent the acquisition of extremely easy credit hours. We assumed students would realize that BUEC 232 is also forbidden since it serves as a prerequisite for BUEC 333. This assumption has proved to be unwise and it is necessary to specifically exclude BUEC 232.

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2. RECOMMENDATION: BUS 337 be dropped from the list of required upper division courses.

RATIONALE: The course has been eliminated by the School of Business Administration. We may introduce a replacement course in the near future.

Dr. Brian Alspach,
Coordinator

S. 90 - 58g

Department of Mathematics and Statistics
Summary of Curriculum Revisions

SCUS Reference: SCUS 90-35

SCAP Reference: SCAP 90-52

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1. Change in requirements
   - Mathematics Minor Program
   - Statistics Major and Honors Options
   - Statistics Minor Option
   - Certificate Program in Actuarial Mathematics

2. Revision to Calendar statement - general course information

3. Change in course description - MATH 100, MATH 180

4. Change of prerequisite - MATH 113, MATH 144, MATH 152, MATH 154, MATH 155, MATH 190, STAT 101, STAT 102, STAT 103

5. Change of course description and prerequisite - MATH 151

6. Change of title, description and prerequisite - MATH 157, MATH 158

SCUS 90-35

SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Heath, Secretary to Senate

From: P. Dobud, Administrative Assistant to the Dean of Science

Subject: Calendar Change: Department of Mathematics and Statistics

Date: October 10, 1990

This is to inform you that the Faculty of Science, at its meeting held on October 9, 1990 has approved the following calendar changes for the Department of Mathematics and Statistics. I would appreciate it very much if you would place these motions in the agenda of the next SCUS meeting for consideration and approval.

1) ***"To approve the calendar changes to the Mathematics Minor Program, Statistics Major and Honors Options, Statistics Minor Option and Certificate in Actuarial Mathematics as stated in Paper FSC 14-90."***

(Paper FSC 14-90)

2) ***"To approve the changes to the Mathematics course and Statistics course entries as stated in Paper FSC 15-90."***

(Paper FSC 15-90)

Thank you

cc: Dr. A. Freedman, Chair ,Department of Mathematics and Statistics
Dr. K. Heinrich, Chair, Faculty of Science Undergraduate Curriculum Committee.

2

FSC 14-90

Department of Mathematics and Statistics, SFU
Undergraduate Studies Committee
Chair: K. Heinrich

MEMO 24th, September, 1990.

To: Faculty of Science Undergraduate Curriculum Committee
Subject: Proposed calendar changes.

All changes are to either (i) improve readability of the calendar, (ii) accommodate the new ACMA courses, (iii) correct previous errors or omissions and (iv) be consistent with the two areas MATH and STAT.

1. Change item (ii) under Mathematics Minor Program
from:

> (ii) To obtain credit in at least 15 semester hours of upper division Mathematics or Statistics or Mathematics/Computing Science (MACM) courses. These courses may not include Job Practicum courses (MATH 336, 337, 436 and 437) or PHYS 413-3.

to:

> (ii) To obtain credit in at least 15 semester hours of upper division Mathematics (MATH) or Statistics (STAT) or Mathematics/Computing Science (MACM) or Actuarial Mathematics (ACMA) courses. These courses may not include PHYS 413.

Change item (6) under Statistics Major and Honors Options
from:

> (6) Upper Division Auxilliary Concentration
> At least 15 upper division credit hours in some specific fields other than probability and statistics, mathematics, or computing science. These courses are to be approved by a departmental advisor.

to:

> (6) Upper Division Auxilliary Concentration
> At least 15 upper division credit hours in some specific fields other than Probability and Statistics, Mathematics, Actuarial Mathematics, or Computing Science. These courses are to be approved by a departmental advisor.

Change item (7) under Statistics Major and Honors Options
from:

> (7) In addition faculty requirements stipulate that at least two other upper division courses be taken in Mathematics, Statistics, or Mathematics/Computing Science. These would normally be

Mathematics/Computing Science. These would normally be selected from the remaining options listed in (5) or the following list.
Other recommended mathematics courses
MATH 243, 308, 309, 313, 320, 322, 343, 408, 419, 426, 438, 439, 443 and STAT 480.

to:

(7) In addition faculty requirements stipulate that at least two other upper division courses be taken in Mathematics, Statistics, Actuarial Mathematics or Mathematics/Computing Science. These would normally be selected from the remaining options listed in (5) or the following list.
Other recommended courses
MATH 243, 308, 309, 313, 320, 322, 343, 408, 419, 426, 438, 439, 443, STAT 480, and ACMA 330.

Change item (8) under Statistics Major and Honors Options
from:

(8) In addition to requirements (1) through (6) for a major, candidates for a honors degree in Mathematics with the statistics option will be required to obtain credit for MATH 320, 322, 426, 438, and STAT 480-3, all of the courses listed under (5) above, and three additional upper division courses labelled MATH, STAT, or MACM.

to:

(8) In addition to requirements (1) through (6) for a major, candidates for an honors degree in Mathematics with the statistics option will be required to obtain credit for MATH 320, 322, 426, 438, and STAT 480, all of the courses listed under (5) above, and three additional upper division courses labelled MATH, STAT, ACMA, or MACM.

Change item (ii) under Statistics Minor Option
from:

(ii) obtain credit for at least 5 of the following courses
STAT 330, 380, 410, 420, 430, 440, 450, 460, and 480 (This will normally include: STAT 330, 430, and 450.)

to:

(ii) obtain credit for at least 5 of the following courses
STAT 330, 380, 410, 420, 430, 440, 450, 460, 480 and ACMA 330. (This will normally include: STAT 330, 430, and 450.)

Change note under Certificate Program in Actuarial Mathematics
from:

> **Note:** students completing the above courses who are also enrolled in either a major or minor program in Mathematics may count these MATH, MACM or STAT courses both toward the certificate program in actuarial mathematics and for their major or minor program in Mathematics. The ACMA courses may not be used to fulfill the upper division requirements for a major in Mathematics.

to:

> **Note:** students completing the above courses who are also enrolled in either a major or minor program in Mathematics may count these MATH, MACM or STAT courses both toward the certificate program in actuarial mathematics and for their major or minor program in Mathematics.

RATIONALE: These changes reflect how the new ACMA courses fit into the major and minor programs in Mathematics. To summarize: ACMA courses can be used by students to satisfy upper division Mathematics or Statistics or Mathematics/Computing Science requirements for a minor in Mathematics (as difficult as the courses are, it was felt that the mathematical content was not extensive enough to be used in the major and honors programs), and to satisfy upper division elective\Mathematics or Statistics or Mathematics/Computing Science requirements for the major, minor and honors Statistics options (actuarial mathematics being generally much closer to statistics). The few editorial changes are merely for consistency.

FSC 15-90

MATHEMATICS AND STATISTICS

2. Changes to undergraduate courses in Mathematics. We have rewritten the calendar description up to the end of the 100 level courses. The new version is attached. We will now summarize the important points. Paragraph numbers refer to the paragraphs in the new description.

Paragraph 1:
Change: Insertion of ACMA.
Rationale: The courses now exist and are of interest to students in the mathematics program.

Paragraph 2:
Change: Title change, deletion of reference to Statistics workshop and deletion of last sentence.
Rationale: All reference to Statistics has been moved to the Statistics calendar entry. The last sentence referred only to the Statistics workshop.

Change: Insertion of "friendly" sentence.
Rationale: Aside from all our efforts (including a well written handout) some students remain wary of the workshops. This sentence is an attempt to encourage the more nervous student to attend.

Paragraph 3:
Change: Change of title.
Rationale: It seems that many students (particularly those entering from colleges) are confused about what "entry" level means. Hopefully "beginning" will be clearer.

Change: Table instead of lengthy descriptions.
Rationale: It is felt that a table sets the prerequisites out more clearly. We particularly wanted to stress the fact that for students wanting to study MATH 157 the prerequisite is MATH 110 (the most appropriate course for them). MATH 100 will also suffice but for most of the students it proves to be too difficult. We are now also requiring a grade of C in BC Math 11. It is essential that students have a very good understanding of this material: the better the understanding the greater the probability that they will pass the courses for which this is a prerequisite. Nevertheless, there are students who do not have this grade but who will be able to cope with the material of the courses. It is important that we speak with them.

Change: Locations at which Math Assessment test can be taken.
Rationale: The test can now be taken at Harbour Centre.

Change: Deletion of sentence which explicitly allowed students to take MATH 100 or 110 concurrently with a calculus course.
Rationale: Currently a student without the prerequisite for calculus can register in both courses, then drop MATH 100 or 110 and remain (illegally) in calculus. This usually puts the students at a disadvantage. The majority of students with C+ (or lower) in BC Math 12 are happy to take either MATH 100 or 110 before taking calculus. Those who insist on taking calculus are asked to write the Math Assessment Test. If they score above a certain level we sign them into calculus. We feel it best for the student to make a committment to one course or the other. Even with the calendar deletion, in certain circumstances a student may still be permitted to take the courses concurrently.
This change affects about 15 students a semester.

Paragraph 4:
Change: Deletion of sentence "Students will not normally be permitted to enrol in any MATH or STAT course for which a grade of D or lower has been obtained in any prerequisite."
Rationale: Since we already say they must have a C- this is unnecessary.

Paragraph 5: Course descriptions
Change: BC Algebra 12 to BC Math 12 throughout.
Rationale: This is the new name.

MATH 100
Change: "Applications" to "applications".
Rationale: Consistency with MATH 110 description.

MATH 113
Change: Deletion of reference to MATH 194 and 195.
Rationale: These courses have not been taught for years.

MATH 144
Change: Deletion of reference to MATH 141. Deletion of sentence referring to concurrent enrollment.
Rationale: MATH 141 has not been taught for years. The concurrent enrollment sentence is not necessary.

MATH 151, 152, 154, 155, 157, 158
Change: Deletion of reference to MATH 150.
Rationale: MATH 150 not been taught for years.

MATH 151
Change: Deletion of reference to real numbers and complex numbers.
Rationale: Knowledge of real numbers is assumed and complex numbers are no longer part of the curriculum.

MATH 155
Change: Semi-colons to commas.
Rationale: Improves readability.

MATH 157 and 158
Change: Title.
Rationale: For consistency with MATH 154 and 155.

MATH 157
Change: Course description.
Rationale: The current description was too general; the proposed description tells the student what is taught in the class.

MATH 158
Change: Reference to linear programming.
Rationale: "Introduction" is more correct than "discussion".

MATH 180
Change: "up to the present time" to "up to the discovery of the calculus".
Rationale: This reflects what is actually taught.

MATH 190
Change: Deletion of lengthy discussion in prerequisites.
Rationale: There is no reason why a student who has taken calculus and then decided to become an elementary school teacher should be precluded from this course. Knowing calculus does not make MATH 190 an easy credit. Students

who decide to become elementary school teachers, whether or not they have taken calculus, benefit greatly from this course and all such students should definitely be encouraged to take it.

3. Changes to undergraduate courses in Statistics. We have rewritten the calendar description up to the end of the 100 level courses. The new version is attached. Up until the course descriptions all changes are consistent with those described under MATH and we will not repeat them here.

STAT 101, 102, 103
Change: Under prerequisites.
Rationale: These corrections reflect the fact that students can take exactly one of the three courses for credit. Previous calendar entries were incorrect.

FROM

Mathematics
Faculty of Science

See also courses listed under *Mathematics and Computing Science (MACM)* and *Statistics (STAT)*.

Open Workshops (see courses marked with † below)

Some introductory and service courses are organized through the department's open workshops. In addition to regularly scheduled lectures, students registered in these courses are encouraged to come to the workshops for assistance with problems and questions any time during posted working hours. Supplementary course materials, computer terminals and calculators are available for student use.

The workshops are:

Workshop	Location	Courses Scheduled in Workshop	Co-ordinator
Basic Mathematics	TLX 9507	100,110,190	Dr. M. Dubiel
Statistics	TLX 9510	101,102,103,302	Mrs. C.E. Dwyer
Calculus and Linear Algebra	TLX 9505	151,152, 232	Mrs. T. Berggren
Applied Calculus	TLX 9503	154,155,157,158	Dr. J.C. Arya

Downtown courses are not scheduled through the workshops but have regularly scheduled tutorials.

Minimum Grade Requirement

Students wishing to register for Mathematics courses must have obtained grades of C- or better in prerequisite courses. Students will not normally be permitted to enrol in any MATH or STAT course for which a D grade or lower was obtained in any prerequisite.

Some experience with a high level programming language is recommended by the beginning of the second year.

Entry Level Requirements in Mathematics

MATH 100, 110, 113 and 190 all have B.C. High School Mathematics 11 (or equivalent) as a prerequisite. Students lacking this background may take the non-credit Basic Math Course offered through Continuing Studies. Students with a grade of P in B.C. High School Mathematics 11 should take the Math Assessment Test.

The prerequisite for MATH 144 is B.C. High School Mathematics 12 (or equivalent) or MATH 100.

MATH 151 and MATH 154 have as prerequisite B.C. High School Mathematics 12 (or equivalent) with a grade of at least B (**) or MATH 100 (not MATH 110).

The MATH 157 prerequisite is B.C. High School Mathematics 12 (or equivaent) with a grade of at least B (**) or MATH 100 or MATH 110.

Students who are unsure of their level of preparation are encouraged to take the free Math Assessment Test at the Basic Math Workshop, TLX 9507 (or the Evening Resource Centre P 9310 if the workshop is closed).

Courses marked with an asterisk (*) are intended to be particularly accessible to students who are not specializing in Mathematics.

** Students with grades C or C+ in B.C. High School Mathematics 12 (or equivalent) have the right to register concurrently in MATH 100 or MATH 110 and either MATH 151, 154 or 157. However, this is usually unwise, and students are advised to consult with the department before undertaking such concurrent registration.

TO

Mathematics
Faculty of Science

See also courses listed under Actuarial Mathematics (ACMA), Mathematics andComputing Science (MACM) and Statistics (STAT).

Open Workshops for MATH Courses

(see courses marked with † below)

Some introductory and service courses are organized through the department's open workshops.
In addition to regularly scheduled lectures, students registered in these courses are encouraged to come to the workshops for assistance with problems and questions any time during posted working hours.
At the workshop students will have the opportunity to meet with the co-ordinator, the teaching assistants and other students, and work together to understand mathematics in a friendly and helpful environment.
The workshops are:

	Location	Courses In Workshop	Co-ordinator
Basic Mathematics	TLX 9507	100, 110, 190	Dr. M. Dubiel
Calculus and Linear Algebra	TLX 9505	151, 152, 232	Mrs. T. Berggren
Applied Calculus	TLX 9503	154, 155, 157, 158	Dr. J.C. Arya

Downtown sections of these courses are not scheduled through the workshops but have regularly scheduled tutorials.

Beginning Level Requirements in Mathematics

Students considering registering in a mathematics course who do not have B.C. Math 11 (or equivalent)with at least a grade of C must see the co-ordinator of the Basic Math Workshop. These students may take the non-credit Basic Math Course, MATH 010, offered through Continuing Studies.

The prerequisites for the first mathematics courses are as follows:

Course	Prerequisite
MATH 100, MATH 110 MATH 113, MATH 190	B.C. Math 11 (or equivalent) with a grade of at least C or permission of the department or MATH 010.
MATH 157	B.C. Math 12 (or equivalent) with a grade of at least B, MATH 110 with a grade of at least C- or, with permission of the department, MATH 100 with a grade of at least C-.
MATH 151, MATH 154	B.C. Math 12 (or equivalent) with a grade of at least B or MATH 100 with a grade of at least C-.
MATH 144	B.C. Math 12 (or equivalent) or MATH 100 with a grade of at least C-.

Students who are unsure of their level of preparation are strongly encouraged to take the free Math Assessment Test at the Basic Math Workshop, TLX 9507, the Evening Resource Centre P9310 (if the Workshop is closed) or SFU at Harbour Centre.

Minimum Grade Requirement in Prerequisites for Later MATH Courses

Students enrolled in courses offered by the Mathematics and Statistics Department must have obtained grades of C- or better in prerequisite courses.

Some experience with a high level programming language is recommended by the beginning of the second year.

Courses marked with the an asterisk (*) are intended to be particularly accessible to students who are not specializing in Mathematics.

FROM

Statistics
Faculty of Science

See also course descriptions for Mathematics (MATH) and Mathematics and Computing Science (MACM).

Open Workshops (see courses marked with † below)

Some introductory and service courses are organized through the department's open workshops. In addition to regularly scheduled lectures, students registered in these courses are encouraged to come to the workshops for assistance with problems and questions any time during posted working hours. Supplementary course materials, computer terminals and calculators are available for student use.

Minimum Grade Requirement

Students wishing to register for Statistics courses must have obtained a grade of C- or better in prerequisite courses. Students will not normally be permitted to enrol in any Statistics course for which a grade of D or lower was obtained.

Entry Level Requirements in Statistics

STAT 101 and 103 have B.C. High School Mathematics 11 (or equivalent) as a prerequisite. Students lacking this background may take the non-credit Basic Math Course offered through Continuing Studies. Students with a grade of P in B.C. High School Mathematics 11 should take the Math Assessment Test.

STAT 102 requires B.C. High School Mathematics 12 (or equivalent) as a prerequisite. Students with a grade of P in B.C. High School Algebra 12 should take the Math Assessment Test.

Students who are unsure of their level of preparation are encouraged to take the free Math Assessment Test at the Basic Math Workshop, TLX 9507 (or the Evening Resource Centre P 9310 if the workshop is closed).

Courses marked with an asterisk (*) are intended to be particularly accessible to students who are not specializing in Mathematics and are part of the Statistics Workshop.

TO

Statistics
Faculty of Science

See also courses listed under Actuarial Mathematics (ACMA), Mathematics and Computing Science (MACM), and Mathematics (MATH).

Open Workshop for STAT Courses (see courses marked with † below)
Some introductory and service courses are organized through the department's openworkshops.In addition to regularly scheduled lectures, students registered in these courses are encouraged to come to the workshops for assistance with problems and questions any time during posted working hours. At the workshop students will have the opportunity to meet with the co-ordinator, the teaching assistants and other students, and work together to understand statistics in a friendly and helpful environment. Supplementary course materials, computer terminals and calculators are available for student use.

Workshop	Location	Courses In Workshop	Co-ordinator
Statistics Workshop	TLX 9510	101, 102, 103, 302	Mrs. B. Dwyer

Downtown sections of these courses are not scheduled through the workshops but have regularly scheduled tutorials.

Beginning Level Requirements in Statistics

Students considering registering in a statistics course who do not have B.C. Math 11 (or equivalent) must see the co-ordinator of the Basic Math Workshop (as described under Mathematics). These students may take the non-credit Basic Math Course, MATH 010, offered through Continuing Studies.

The prerequisites for the first statistics courses are as follows:

Course	Prerequisite
STAT 101, STAT 103	B.C. Math 11 (or equivalent) or MATH 010.
STAT 102	B.C. Math 12 (or equivalent) or MATH 100 with a grade of at least C- or MATH 110 with a grade of at least C-.

Students who are unsure of their level of preparation are strongly encouraged to take the free **Math Assessment Test** at the Basic Math Workshop, TLX 9507, the Evening Resource Centre P9310 (if the Workshop is closed) or SFU at Harbour Centre.

Minimum Grade Requirement in Prerequisites for Later STAT Courses

Students enrolled in courses offered by the Mathematics and Statistics Department must have obtained grades of C- or better in prerequisite courses.
Some experience with a high level programming language is recommended by the beginning of the second year.

Courses marked with the an asterisk (*) are intended to be particularly accessible to students who are not specializing in Statistics

FROM

***MATH 100-3 Precalculus**
Algebraic, exponential, logarithmic and trigonometric functions and their graphs. Conic sections, Applications. (3-0-1†) *Prerequisites: See entry level requirements. This course may not be taken for credit by students who already have credit for any Mathematics course for which this course (or B.C. High School Algebra 12) is a prerequisite. Students may not count more than one of MATH 100 or 110 for credit. MATH 100 may not be counted towards Mathematics minor, major or honors degree requirements.*

***MATH 110-3 Introductory Mathematics for the Social and Management Sciences**
Linear and quadratic functions, sequences and sums, compound interest, exponential and logarithmic functions, counting techniques, probability. (3-0-1†) *Prerequisites: See entry level requirements. This course may not be taken for credit by students who already have credit for any Mathematics course for which this course (or B.C. High School Algebra 12) is a prerequisite. Students may not count more than one of MATH 100 or 110 for credit. MATH 110 may not be counted towards Mathematics minor, major or honors degree requirements.*

***MATH 113-3 Euclidean Geometry**
Plane Euclidean geometry, congruence and similarity. Theory of parallels. Polygonal areas. Pythagorean Theorem. Geometrical constructions. (3-1-0) *Prerequisite: See entry level requirements or permission of the department. Students with credit for MATH 194 and MATH 195 may not take MATH 113 for further credit.*

MATH 144-3 Introduction to Pure Mathematics
The fundamental notions of modern Pure Mathematics (logic, sets, functions, relations, etc.) are presented, and are applied in an investigation of the counting numbers 1, 2, 3 . . . as an abstract axiomatic system. Other applications as time permits. (3-1-0) *Prerequisites: See entry level requirements. Students will not be permitted to register concurrently for MATH 144 and 100 or 110. Students with credit for MATH 141 may not take MATH 144 for further credit.*

MATH 151-3 Calculus I
Real number, functions and graphs, conic sections, limits and continuity, derivatives, techniques and applications of differentiation, trigonometric functions, logarithms and exponentials, extrema, the mean value theorem, polar coordinates and complex numbers. (3-0-1†) *Prerequisites: See entry level requirements. Students with credit for either MATH 154 or 157 (or 150) may not take MATH 151 for further credit.*

MATH 152-3 Calculus II
Integrals, techniques and applications of integration, approximations, sequences and series, area and arc length in polar coordinates. (3-0-1†) *Prerequisite: MATH 151 or 154; or MATH 157 (or 150) with a grade of A or B. Students with credit for MATH 155 or 158 may not take MATH 152 for further credit.*

***MATH 154-3 Calculus I for the Biological Sciences**
This course is designed for students specializing in the biological and medical sciences. Topics include: limits; growth rate and the derivative; logarithmic, exponential and trigonometric functions and their applications in population study; optimization and approximation methods. (3-0-1†) *Prerequisite: See entry level requirements. Students with credit for either MATH 151 or 157 (or 150) may not take MATH 154 for further credit.*

***MATH 155-3 Calculus II for the Biological Sciences**
The integral and its applications; partial derivatives; differential equations and their applications in ecology; mathematical models of biological processes. (3-0-1†) *Prerequisite: MATH 151 or 154; or MATH 157 (or 150) with a grade of A or B. Students with credit for MATH 152 or 158 may not take MATH 155 for further credit.*

TO

***MATH 100-3 Precalculus**
Algebraic, exponential, logarithmic and trigonometric functions and their graphs. Conic sections, applications. (3-0-1†)
Prerequisites: *See above table.* This course may not be taken for credit by students who already have credit for any Mathematics course for which this course (or B.C. Math 12) is a prerequisite. Students may not count more than one of MATH 100 and MATH 110 for credit. MATH 100 may not be counted towards the Mathematics minor, major or honors degree requirements.

***MATH 110-3 Introductory Mathematics for the Social and Management Sciences**
Linear and quadratic functions, sequences and sums, compound interest, exponential and logarithmic functions, counting techniques, probability. (3-0-1†) Prerequisites: *See above table.* This course may not be taken for credit by students who already have credit for any Mathematics course for which this course (or B.C. Math 12) is a prerequisite. Students may not count more than one of MATH 100 and MATH 110 for credit. MATH 110 may not be counted towards the Mathematics minor, major or honors degree requirements.

***MATH 113-3 Euclidean Geometry**
Plane Euclidean geometry, congruence and similarity. Theory of parallels. Polygonal areas. Pythagorean Theorem. Geometrical constructions. (3-1-0)
Prerequisite: *See above table.*

MATH 144-3 Introduction to Pure Mathematics
The fundamental notions of modern Pure Mathematics (logic, sets, functions, relations, etc.) are presented, and are applied in an investigation of the counting numbers 1, 2, 3 . . . as an abstract axiomatic system. Other applications as time permits. (3-1-0)
Prerequisite: *See above table.*

MATH 151-3 Calculus I
Functions and graphs, conic sections, limits and continuity, derivatives, techniques and applications of differentiation, trigonometric functions, logarithms and exponentials, extrema, the mean value theorem, and polar coordinates. (3-0-1†)
Prerequisites: *See above table.* Students with credit for either MATH 154 or MATH 157 may not take MATH 151 for further credit.

MATH 152-3 Calculus II
Integrals, techniques and applications of integration, approximations, sequences and series, area and arc length in polar coordinates. (3-0-1†)
Prerequisite: MATH 151 or MATH 154; or MATH 157 with a grade of A or B. Students with credit for MATH 155 or MATH 158 may not take MATH 152 for further credit.

***MATH 154-3 Calculus I for the Biological Sciences**
This course is designed for students specializing in the biological and medical sciences. Topics include: limits; growth rate and the derivative; logarithmic, exponential and trigonometric functions and their applications in population study; optimization and approximation methods. (3-0-1†)
Prerequisite: *See above table.* Students with credit for either MATH 151 or MATH 157 may not take MATH 154 for further credit.

***MATH 155-3 Calculus II for the Biological Sciences**
The integral and its applications, partial derivatives, differential equations and their applications in ecology, mathematical models of biological processes. (3-0-1†)
Prerequisite: MATH 151 or MATH 154; or MATH 157 with a grade of A or B. Students with credit for MATH 152 or MATH 158 may not take MATH 155 for further credit.

FROM

***MATH 157-3 Calculus for Social Sciences I**
Introduction to those concepts of differential calculus that are of value in the social sciences. (3-0-1†) *Prerequisite: See entry level requirements. Students with credit for either MATH 151 or 154 or 150 may not take MATH 157 for further credit.*

***MATH 158-3 Calculus for Social Science II**
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. (3-0-1†) *Prerequisite: MATH 151 or 154 or 157 (or 150). Students with credit for MATH 152 or 155 may not take MATH 158 for further credit.*

MATH 161-0 Honors Supplement for Calculus I
The class meets one hour each week. Students will spend most of the time working on challenging problems relating to the material of MATH 151, Calculus I. (0-1-0) *Prerequisites: Concurrent registration for MATH 151 and a grade of A on Algebra 12. This course will be graded on a Pass/No Entry basis.*

MATH 162-0 Honors Supplement for Calculus II
The class meets one hour each week. Students will spend most of the time working on challenging problems relating to the material of MATH 152 Calculus II. (0-1-0) *Prerequisites: Concurrent registration for MATH 152 and a grade of A or better in MATH 151. This course will be graded on a Pass/No Entry basis.*

***MATH 180-3 The History of Mathematics**
A survey of the historical development of mathematics from its beginnings in Babylonia up to the present time. Special emphasis will be given to the interaction between mathematics and other aspects of the cultures being considered. (3-1-0)

***MATH 190-4 Principles of Mathematics for Teachers**
Mathematical ideas involved in number systems and geometry in the elementary school curriculum. Whole number, fractional number, and rational number systems. Plane geometry, solid geometry, metric geometry, and motion geometry. (4-0-1†) *Prerequisite: See entry level requirements. Those students who are currently taking or have received credit for MATH 151 or 154 or 157 (or 150) may not take this course for further credit. This course may not be counted toward Mathematics minor, major or honors degree requirements. Candidates for degrees in the Faculty of Science may not use this course along with any of MATH 151, 154, 157 (or 150) for the satisfaction of degree requirements.*

MATH 198-3 Selected Topics in Mathematics
Topics in areas of mathematics and statistics not covered in the regular undergraduate curriculum of the department. (3-1-0) *Prerequisites: Dependent on the topic covered.*

TO

***MATH 157-3 Calculus for the Social Sciences I**
This course is designed for students specializing in business or the social sciences. Topics include: limits, growth rate and the derivative; logarithmic and exponential functions and their application to business, economics, optimization and approximation methods; functions of several variables. (3-0-1†)
Prerequisite: *See above table.* Students with credit for either MATH 151 or MATH 154 may not take MATH 157 for further credit.

***MATH 158-3 Calculus for the Social Sciences II**
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, introduction to linear programming. (3-0-1†)
Prerequisite: MATH 151 or MATH 154 or MATH 157. Students with credit for MATH 152 or MATH 155 may not take MATH 158 for further credit.

MATH 161-0 Honors Supplement for Calculus I
The class meets one hour each week. Students will spend most of the time working on challenging problems relating to the material of MATH 151, Calculus I. (0-1-0)
Prerequisites: Concurrent registration for MATH 151 and a grade of A on Algebra 12. This course will be graded on a Pass/No Entry basis.

MATH 162-0 Honors Supplement for Calculus II
The class meets one hour each week. Students will spend most of the time working on challenging problems relating to the material of MATH 152 Calculus II. (0-1-0)
Prerequisites: Concurrent registration for MATH 152 and a grade of A or better in MATH 151. This course will be graded on a Pass/No Entry basis.

***MATH 180-3 The History of Mathematics**
A survey of the historical development of mathematics from its beginnings in Babylonia up to the discovery of the calculus. Special emphasis will be given to the interaction between mathematics and other aspects of the cultures being considered. (3-1-0)

***MATH 190-4 Principles of Mathematics for Teachers**
Mathematical ideas involved in number systems and geometry in the elementary school curriculum. Whole number, fractional number, and rational number systems. Plane geometry, solid geometry, metric geometry, and motion geometry. (4-0-1†)
Prerequisite: *See above table.* This course may not be counted toward the Mathematics minor, major or honors degree requirements. Candidates for degrees in the Faculty of Science may not use this course for the satisfaction of degree requirements.

MATH 198-3 Selected Topics in Mathematics
Topics in areas of mathematics and statistics not covered in the regular undergraduate curriculum of the department. (3-1-0)
Prerequisites: Dependent on the topic covered.

FROM

***STAT 101-3 Introduction to Statistics, Option A**
An introductory course in random variables and their distributions, estimating and hypothesis testing. (3-0-1†) *Prerequisites: See entry level requirements. Students with credit for ARCH 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and 371) may not subsequently receive credit for STAT 101-3. Students with credit for MATH 101 may not take STAT 101 for further credit.*

***STAT 102-3 Introduction to Statistics, Option B**
A course similar to STAT 101-3 but with more emphasis on simple statistical formulas. (3-0-1†) *Prerequisites: See entry level requirements. Students with credit for ARC 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and 371) may not subsequently receive credit for STAT 102. Students with credit for STAT 101 or MATH 102 may not take STAT 102 for further credit.*

***STAT 103-3 Introduction to Statistics for Social Sciences**
A course similar to STAT 101 (formerly MATH 101) but directed to students in the social sciences. (3-0-1†) *Prerequisites: See entry level requirements. Students with credit for ARCH 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and 371) may not subsequently receive credit for STAT 103. Students with credit for STAT 101, 102, MATH 101 or 102 may not take STAT 103 for further credit.*

TO

***STAT 101-3 Introduction to Statistics, Option A**
An introductory course in random variables and their distributions, estimation and hypothesis testing. (3-0-1†)
Prerequisites: See above table. Students with credit for ARCH 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and MATH 371) may not subsequently receive credit for STAT 101. Students with credit for STAT 102, STAT 103, MATH 101 or MATH 102 may not take STAT 101 for further credit.

***STAT 102-3 Introduction to Statistics, Option B**
A course similar to STAT 101 but with more emphasis on simple statistical formulas(3-0-1†)
Prerequisites: See above table. Students with credit for ARCH 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and MATH 371) may not subsequently receive credit for STAT 102. Students with credit for STAT 101, STAT 103, MATH 101 or MATH 102 may not takeSTAT 102 for further credit.

***STAT 103-3 Introduction to Statistics for Social Sciences**
A course similar to STAT 101 but directed to students in the social sciences. (3-0-1†)
Prerequisites: See above table. Students with credit for ARCH 376, BUEC 232 (formerly 332) or STAT 270 (formerly MATH 272 and MATH 371) may not subsequently receive credit for STAT 103. Students with credit for STAT 101, STAT 102, MATH 101 or MATH 102 may not take STAT 103 for further credit.

S. 90 - 58h

Department of Physics
Summary of Curriculum Revisions

SCUS Reference: SCUS 90-6, SCUS 90-36

SCAP Reference: SCAP 90-53, SCAP 90-54

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1. Prerequisite change - PHYS 365-3
2. Change to course description - PHYS 344

SCUS 90-1-

SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Heath, Secretary to Senate

From: P. Dobud, Administrative Assistant to the Dean of Science

Subject: Calendar Changes Department of Physics

Date: March 15, 1990

This is to inform you that the Faculty of Science, at its meeting held on Monday March 12, 1990 has approved the following change for the Departmen of Physics calendar entry. I would appreciate it very much if you would place this motion in the agenda of the next SCUS meeting for consideration and approval.

"To approve the change in prerequisites for PHYS 365 as follows:

From: PHYS 385

To: PHYS 221-3 "

(Paper FSC 2-90)

Thank you

cc: Dr.M. Plischke, Chair ,Department of Physics
Dr. R. Frindt, Chair, Faculty of Science Undergraduate Curriculum Committee.

2

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

~~NEW COURSE PROPOSAL FORM~~ PREREQUISITE CHANGE

1. Calendar Information

Department: PHYSICS

Abbreviation Code: PHYS Course Number: 365 Credit Hours: 3 Vector: (3-1-0)

Title of Course: Semiconductor Device Physics

Calendar Description of Course:

No Change

Nature of Course

Prerequisites (or special instructions): Phys 221

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

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

The prerequisite change will accommodate Engineering Science students who do not in general take PHYS 385, our current prerequisite. No change in course description is required.

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: 1/31/90 March 19 1990. Nov. 2/90

Department Chairman

Dean

Chairman, SCUS

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

SIMON FRASER UNIVERSITY

FSC 2-90

MEMORANDUM

Dr. P. Dobud Administrative Assistant to the Dean of Science	From Michael Plischke, Chairman Department of Physics
Subject PHYS 365: PREREQUISITE CHANGE	Date January 31, 1990

The Physics Department recommends a change in the prerequisite for PHYS 365, Semiconductor Device Physics from PHYS 385 to PHYS 221. This change will accommodate Engineering Science students interested in microelectronics. Engineering Science students do not, in general, take PHYS 385. The presentation of course material will be somewhat modified; however, no change in calendar description is required.

Michael Plischke

MICHAEL PLISCHKE

MP/ML

Enclosure: Form - Prerequisite Change

4

FSC 16-90

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Dr. P. Dobud Administrative Assistant to the Dean of Science	From: Michael Plischke, Chairman Department of Physics
Subject: CALENDAR CHANGE	Date: September 17, 1990

Please find attached, documentation related to a calendar change for PHYS 344. Curriculum changes to PHYS 344 was approved at a Departmental Meeting on September 13, 1990.

Michael Plischke

MICHAEL PLISCHKE

MP/ML

Enclosure: Form SCUS 73-34b
Memo J. Jones/B. Frindt d. 31 May 1990

PHYS 344 Calendar Description

Change: to add the words "heat transfer" to the course description.

Rationale: Topics in heat transfer are currently offered in PHYS 344, although the words "heat transfer" are not mentioned in the calendar description. Currently, students from Engineering Science take PHYS 344 for credit under the assumption that heat transfer is taught in the course. The proposed calendar change makes the course content more explicit.

SENATE COMMITTEE ON UNDERGRADUATE STUDIES

CHANGE IN CALENDAR DESCRIPTION — Description Only

1. Calendar Information — Department: PHYSICS

Abbreviation Code: PHYS Course Number: 344 Credit Hours: 3 Vector: 3-1-0

Title of Course: Thermal Physics

Calendar Description of Course:

Temperature, heat, heat transfer, kinetic theory, laws of thermodynamics, entropy, heat engines, applications of thermodynamics to special systems, phase transitions.

Nature of Course: Same

Prerequisites (or special instructions):

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

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

A more extensive discussion of heat transfer will be included in the course, as requested by Engineering Science. The topic "heat transfer" is thus included in the new course description.

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: 10/9/90 — 10/10/90 — Nov. 2/90

Department Chairman — Dean — Chairman, SCUS

6

SCUS 73-34b:-When completing this form, for instructions see Memorandum SCUS 73-34a.