

SIMON FRASER UNIVERSITY

MEMORANDUM

To: Senate

From: J. Munro, Chair
Senate Committee on
Academic Planning

Subject: Undergraduate Curriculum
Changes - Faculty of Science

Date: November 20, 1992

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.92- 70 the undergraduate curriculum revisions for the Faculty of Science as follows

- | | | |
|------|----------|--|
| i) | S.92-70a | Department of Biological Sciences |
| ii) | S.92-70b | Department of Chemistry |
| iii) | S.92-70c | Chemical Physics Program |
| iv) | S.92-70d | Department of Mathematics and Statistics |
| v) | S.92-70e | Quaternary Studies Program" |



**Department of Biological Sciences
Summary of
Undergraduate Curriculum Revisions**

SCUS Reference: SCUS 92-32
SCAP Reference: SCAP 92-42a

1. Proposed Post Baccalaureate Diploma in Aquaculture
2. Changes to the Major Program
3. Changes to the Lower Division Core
4. Changes to Upper Division Requirements and Electives
5. Changes to Honors Program
6. Changes to Cooperative Education Program
7. Changes to Environmental Toxicology Minor Program
8. Changes to Post Baccalaureate Diploma in Environmental Toxicology
9. Changes to Marine Science Program

SIMON FRASER UNIVERSITY

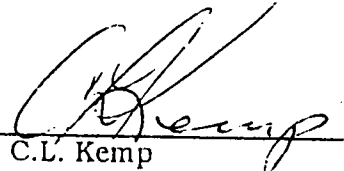
FSC 8-92

MEMORANDUM

To..... R.C. Brooke, Chair Fac. Undergraduate Curriculum Committee Dept. of Biological Sciences	From..... Lin Kemp Dept. of Biological Sciences
Subject..... CALENDAR REVISION, BIOLOGY	Date..... August 11, 1992.

The revisions to the Calendar entry for Biological Sciences received Departmental approval on Nov. 7, 1991 and the addition of a structured PBD in Aquaculture on Feb. 6, 1992. The revised Calendar entry clearly outlines the basic core involving both Lower Division and Upper Division courses plus a more flexible pattern of BISC courses required to complete the 40 hours of Bisc and related courses.

Consequently the only substantial changes is the elimination of the 3 streams and their replacement by the information that the Department has 8 areas of teaching strength. Students may choose to emphasize one of those areas or may choose a general Biology program. The changes will also reduce or eliminate waivers necessitated by the streams requirements and the Departmental course offering pattern.


C.L. Kemp

cc. B.A. McKeown, Chair
Biological Sciences

LK/fmr

AI
B
14 Aug 1992

K.R. Delaney BSc (Br Col), MA, PhD (Prin)
 N.H. Haunerland Dipl Biochem, PhD (Mün)
 J.R. Kermode BSc, PhD (Calg)
 L.F.W. Lesack BSc (Man), PhD (Calif), joint appointment with Geography
 G.R. Lister BSc (Liv), PhD (S Fraser)
 M.M. Moore BSc, PhD (Br Col)
 J.V. Price BA (San Diego), PhD (Colorado)

Adjunct Professors

N.P.D. Angerilli BSc, PhD (S. Fraser)
 R.W. Baron BSc, MSc (Manit), PhD (McG)
 W.D. Binder BSc, MSc (Vic, BC), PhD (Oregon State)
 J.R. Byers BSA, MSc, PhD (Sask)
 H.L. Ching BA, MSc (Oregon State), PhD (Neb)
 K.C. Eastwell BSc, PhD (Alta)
 T.P.T. Evelyn BSA, MSA (Tor), PhD (Br Col)
 W.G. Friend BSc (McG), PhD (C'nell)
 M.S. Graham BSc (Guelph), PhD (Nfld)
 G.J.R. Judd BSc, MPM, PhD (S Fraser)
 Z. Kabata BSc, MSc, PhD (Aberdeen)
 E. Kafer Dip, DPhil (Zur)
 K.K. Klein DipAg, BSA, MSc (Sask), PhD (Purdue)
 V.P. Lipovsky BS (Finlay, Ohio), MSc, PhD (Wash)
 H.R. MacCarthy BA (Br Col), PhD (Calif)
 L. Margolis BSc, MSc, PhD (McG)
 D.L. Struble BA, MA, PhD (Sask)
 R.S. Uikhede BSc, MSc (Nag), PhD (IARI)
 R.S. Vernon BSc, MPM, PhD (S Fraser)
 T.C. Vrain DUES, MSc (Univ de Caen), PhD (N Carolina State)

Associated Faculty

C.B. Crawford Psychology
 B.M.F. Galdikas Archaeology
 M. McClaren Education
 R.M. Peterman Resource and Environmental Management
 R.D. Routledge Mathematics
 H. Weinberg Psychology

Laboratory Instructors

Fernando BSc (Sri Lanka), MSc (Br Col)
 McGregor BSc (Ou), MSc (Calg)
 T. McMullan BSc, MPM (S Fraser)
 J. Sharp BA, BSc (McG), MSc (Br Col)
 C. Thong BSc (Singapore), PhD (S Fraser)
 D.R. Wilson BSc, MSc (S Fraser)

Advisor: Dr. C.L. Kemp
 B8276 Shrum Science Centre
 291-4161

Programs are offered in Biological Sciences, major, honors, minor; Environmental Toxicology, minor, Post Baccalaureate Diploma; Co-operative Education is available to students in the major and honors programs.

Academic Advising

Each student majoring in Biological Sciences should contact an advisor in the department before registration.

Students in a pre-profession school program (e.g., pre-medicine, pre-veterinary medicine, pre-dentistry, etc.) should so advise the department. They will be assigned to advisors who are familiar with the requirements of the proposed professional program.

Streams in Cellular and Molecular Biology and Ecology are identified, and an appropriate General stream. Students would normally be expected to complete the requirements of one of these streams, but deviation approved in advance, will be possible.

Major Program

The basic credit hour requirements underlying all streams are as follows:

BISC (lower division)	20 semester hours
Non-BISC Science (lower division)	30 semester hours
BISC (upper division)	40-47 semester hours (to be selected from General, Cellular and Molecular and Ecology streams, see below)
Electives	30 semester hours
	120 semester hours

*Electives must include a minimum of 6 semester hours in subjects taken in Applied Sciences, Arts, Education (excluding EDUC 401, 402, 405, 406). A minimum of 44 upper division semester hours must be included in the program.

ACADEMIC ADVISING

-DELETE LAST PARAGRAPH-

(Explanatory Note: see note under Upper Division Requirements and Electives)

MAJOR PROGRAM

-DELETE SECTION AND REPLACE WITH-

The basic credit hour requirements underlying all areas of emphasis are as follows:

BISC (lower division)	20 hrs
Non-BISC Science (lower division)	30 hrs
BISC (upper division)	40 hrs
(To be selected as noted below)	
*Electives	30 hrs

TOTAL (minimum)	120 hrs
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* Electives must include a minimum of 12 semester hrs in subjects taken outside the Faculty of Science (excluding EDUC 401, 402, 405 and 406). A minimum of 6 of these semester hours must be from the Faculty of Arts. A minimum of 44 semester hours of upper division must be included in the program.

It is highly recommended that 6 semester hours of English be completed by all major/honor students in Biological Sciences.

(Explanatory Note: The requirement for courses outside the Faculty of Science is a Faculty requirement.

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LOWER DIVISION CORE

ADD 'normally' TO STATEMENT REGARDING COMPLETION OF LOWER DIVISION CORE WITHIN 60 HOURS.

ADD TO STATEMENT REGARDING PROFESSIONAL SCHOOLS -

(see "Requirements for students wishing to transfer into professional schools, page...")

UPPER DIVISION REQUIREMENTS AND ELECTIVES

DELETE ALL REFERENCE TO STREAMS.

(Explanatory Note: Rationale: - they did not provide students with the real thrust and dynamics of the program. The streams became 'engraved in stone' and the disclaimer under 'Academic Advising' was not working. Significant numbers of students were seeking waivers that in most cases were rational and appropriate. Therefore, replace the outline of the 3 streams with:)

All Biological Sciences majors will complete a minimum of 13 upper division (courses numbered 300 and above) BISC courses. The following six courses form an upper division core required of all BISC major / honors students.

Bisc 301, (or Bich 301 and 302)
Bisc 329,
Bisc 400,
Bisc 306 or 316,
Bisc 326 or 337, and
Bisc 305 or 366.

(Explanatory Note: i) The entry requirements for some professional programs (Medicine, etc.) list Bich 301 and 302 as requirements.)
ii) These courses are currently common to all 'streams'. The entry would continue as -).

The remaining minimum seven* upper division BISC courses may be chosen to form an area of concentration consistent with student interests and career goals. The Department offers course concentration in:

It is highly recommended that 6 semester hours of English be completed by major/honor students in Biological Sciences.

Lower Division Core

All students majoring in Biological Sciences are expected to complete the following courses, or their equivalents, within the first 60 hours (4 semesters) of their programs.

Courses in Biological Sciences

BISC 101-4 Introduction to Biology
102-4 Introduction to Biology
201-3 Cell Biology
202-3 Genetics
203-3 Developmental Biology
204-3 Introduction to Ecology

20 semester hours

Courses in Faculty of Science (excluding 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 (or 103)
118-2 General Chemistry Laboratory II for Life Sciences (or 119)
150-3 Organic Chemistry I
155-2 Organic Chemistry Laboratory I
250-3 Organic Chemistry II
255-2 Organic Chemistry Laboratory II

plus

MATH 154-3 Calculus I for the Biological Sciences (or 151)
155-3 Calculus II for the Biological Sciences (or 152)
STAT 102-3 Introduction to Statistics, Option B
PHYS 101-3 General Physics I (or 120)
102-3 General Physics II (or 121)
30 semester hours

50 Lower Division Total

Students are encouraged to take a full year of organic chemistry. Those students intending to apply for medical, dental or veterinary school require all of the Chemistry courses listed above.

Upper Division Requirements and Electives

All Biological Sciences majors will be expected to complete a minimum of 40 semester hours of credit in the upper division (courses numbered 300 and above) in one of the following three streams or program approved by the department:

General Stream
Cellular and Molecular Stream
Ecology Stream

General Biology Stream

Lower Division Core 50

Upper Division Requirements

BISC 301-3 Biochemistry - Intermediary Metabolism
302-3 Genetic Analysis (or 305-3 Cell Physiology or 455-3 Endocrinology)
303-3 Microbiology
304-3 Animal Ecology (or 304-3 Plant Ecology)
305-3 Animal Physiology (or 366-3 Plant Ecology)
306-3 Invertebrate Biology (or 316-3 Vertebrate Biology)
317-3 Insect Biology (or 315-3 Ornithology)
326-3 Biology of Non-Vascular Plants (or 337-3 Comparative Morphology, Distribution and Evolution of Vascular Plants)
329-4 Introduction to Experimental Techniques
400-3 Evolution
429-3 Experimental Techniques I: Separation Methods (or 429-3 Experimental Techniques II: Histochemistry)
6 Electives: BISC or related courses - may be any of the upper division courses offered by the Department of Biological Sciences or courses chosen from among BICH 301, 302, 311, 312, KIN 305, 306, 326, 336, GEOG 315, and 425.

40 Upper Division Total

6 semester hours of electives in subjects taken in Applied Sciences, Arts, Education (excluding EDUC 401, 402, 405, 406).

24 semester hours of electives in subjects offered by any department or program in the University (excluding EDUC

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401, 402, 405, 406) of which at least 6 semester hours must be in courses numbered 300 or above. English or a foreign language is recommended. STAT 302 is highly recommended.

30 Electives Total

120 Total Semester Hours

Cellular and Molecular Biology Stream

Lower Division Core 50

Upper Division Requirements

- BISC 301-3 Biochemistry - Intermediary Metabolism
 302-3 Genetic Analysis
 303-3 Microbiology
 305-3 Animal Physiology (or 366-3 Plant Ecophysiology)
 306-3 Invertebrate Biology (or 316-3 Vertebrate Biology)
 321-3 Introduction to Molecular Biology
 326-3 Biology of Non-Vascular Plants (or 337-3 Comparative Morphology, Distribution and Evolution of Vascular Plants)
 329-4 Introduction to Experimental Techniques
 400-3 Evolution
 401-3 Biochemistry - Regulatory Mechanisms
 402-3 Molecular Genetics
 405-3 Cell Physiology
 423-4 Biotechnology - Industrial Applications (or 431-4 Molecular Biotechnology)
 429-3 Experimental Techniques I: Separation Methods
 455-3 Endocrinology

7 Upper Division Total

23 Elective courses in subjects offered by any department or program in the University. A minimum of 6 semester hours must be taken in Applied Sciences, Arts, Education (excluding EDUC 401, 402, 405, 406). English or a foreign language is recommended. STAT 302 is highly recommended.

120 Total Semester Hours

Ecology Stream

Lower Division Core 50

Upper Division Requirements

- BISC 301-3 Biochemistry - Intermediary Metabolism
 304-3 Animal Ecology
 305-3 Animal Physiology (or 366-3 Plant Ecophysiology)
 329-4 Introduction to Experimental Techniques
 400-3 Evolution
 404-3 Plant Ecology
 407-3 Population Dynamics
 422-3 Population Genetics
 15 courses chosen from among: BISC 303-3, 306-3, 316-3, 317-3, 326-3, 337-3

40 Upper Division Total

3 Electives

120 Total Semester Hours

Botany
 Ecology
 Genetics, Cell and
 Molecular Biology
 Environmental Toxicology
 Marine Science
 Pest Biology & Management
 Physiology
 Zoology

Students should consult the Departmental Advisor and/or the advising lists available in the Biological Sciences Department.

* Students may substitute a maximum of two courses from among GEOG 315, 415, and 419, KIN 305, 306, 326, 336, and 431 to satisfy this requirement.

(Explanatory Note: The option was previously available in the 'General Stream'. The addition of GEOG 419 and KIN 431 is consistent with their inclusion in the ENTX program)

Typical Lower Division Core Program

Although there are many variations, the following is a typical program for the first four semesters.

Level 1

- BISC 102-4 Introduction to Biology
 CHEM 102-3 General Chemistry I
 115-2 General Chemistry Laboratory I
 MATH 154-3 Calculus I for the Biological Sciences
 Elective

Level 2

- BISC 101-4 Introduction to Biology
 CHEM 105-3 General Chemistry II for Life Sciences
 118-2 General Chemistry Laboratory II for Life Sciences
 MATH 155-3 Calculus II for the Biological Sciences
 PHYS 101-3 General Physics I

Note: BISC 101-4 and 102-4 need not be taken in any particular sequence and also may be taken concurrently.

Level 3

- CHEM 150-3 Organic Chemistry I
 155-2 Organic Chemistry Laboratory I
 PHYS 102-3 General Physics II

and two of

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- BISC 201-3 Cell Biology
202-3 Genetics
203-3 Developmental Biology
204-3 Introduction to Ecology

Level 4

The other two of BISC 201-3, 202-3, 203-3 and 204-3

- STAT 102-3 Introduction to Statistics, Option B
Electives

Note: Students majoring in the Biological Sciences are normally required to complete the Chemistry, Mathematics and Physics requirements as well as the lower division Biological Sciences courses within the first 60 semester hours (4 semesters).

Honors Program

The honors program is designed for Biology students who wish to pursue an advanced degree in Biological Sciences. This program requires a minimum of 30 semester hours of upper division Biological Sciences courses, or related subjects, which will be selected for each student, in consultation with appropriate advisors, in relation to his/her career goals.

Departmental approval is required for entry into the honors program. All students applying for entry must have completed 30 semester hours at Simon Fraser University in a major program in Biological Sciences. Applications received after more than 90 semester hours have been completed will not normally be considered.

The BSc honors degree in Biological Sciences requires

- maintenance of a minimum of 3.00 CGPA
- completion of the same lower division core of studies as for the major program
- an additional 60 hours of upper division Biological Sciences or related subjects which will include BISC 490-5, 491-5 and 492-5 (Individual Study Semester) these latter to constitute the honors thesis, and
- completion of appropriate electives to achieve a final total of at least 132 semester hours, including at least 6 semester hours from courses outside the Faculty of Science (excluding EDUC 401, 402, 405, 406)

or Program

Students taking a minor in Biological Sciences will be required to obtain the following credits or standing in the subjects shown to fulfill the requirements for the B.Sc. degree.

Courses in Biological Sciences

- BISC 101-4 Introduction to Biology
102-4 Introduction to Biology

At least two of

- BISC 201-3 Cell Biology
202-3 Genetics
203-3 Developmental Biology
204-3 Introduction to Ecology

Plus any 15 hours of upper division credit in Biological Sciences, or closely related subject areas (including Marine Sciences courses), as approved by the department.

Co-operative Education Program

Co-operative Education is a system which combines work experiences with academic studies. The student normally spends alternate semesters on campus and in paid, study-related jobs.

Arrangements for the work experiences are made through the department's Co-op Co-ordinator and the University's Office of Co-op Education. For further details, students should refer to the *Co-operative Education* section.

Interested students should contact the Biological Sciences Co-op Co-ordinator for further information (AQ 5003, telephone 291-5934).

Environmental Toxicology Minor Program

This program is designed to give undergraduates, who are working towards a degree in the sciences, an opportunity to obtain a thorough overview of the field of environmental toxicology. As a result, students will be better qualified and consequently, eligible for employment with various industrial and government agencies engaged in environmental monitoring and research.

Lower Division Requirements

The following lower division courses are required in the Environmental Toxicology minor program. Most students, pursuing degree programs in science, will already have credit for most of the courses.

REPLACE LAST REQUIREMENT WITH -

-completion of appropriate electives to achieve a final total of at least 132 semester hours, including at least 12 semester hours from courses outside the Faculty of Science (including a minimum of 6 semester hours from the Faculty of Arts and excluding EDUC 401, 402, 405, 406).

COOPERATIVE EDUCATION PROGRAM

REPLACE ENTRY WITH:

Majors and Honors students in Biological Sciences may apply for admission into the Co-Operative Education Program. The program includes four work semesters during the normal academic program. Interested students should contact the Science Co-Op Coordinators for further information.

AQ 5003, telephone 291-4716

For additional information refer to the Co-Op Education section of this calendar.

ENVIRONMENTAL TOXICOLOGY MINOR PROGRAM

Lower Division Requirements

REPLACE 'PREREQUISITES' WITH 'REQUIRED'

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152 Science - Chemical Physics

BISC 101-4 Introduction to Biology
102-4 Introduction to Biology
201-3 Cell Biology
CHEM 102-3 General Chemistry I
105-3 General Chemistry II for Life Sciences
115-2 General Chemistry Laboratory I
118-2 General Chemistry Laboratory II for Life Sciences
150-3 Organic Chemistry I
155-2 Organic Chemistry Laboratory I
250-3 Organic Chemistry II
~~255-2 Organic Chemistry Laboratory II~~
STAT 102-3 Introduction to Statistics, Option B
MATH 154-3 Calculus I for the Biological Sciences (or MATH 151-3)
155-3 Calculus II for the Biological Sciences (or MATH 152-3)
PHYS 101-3 General Physics I (or PHYS 120-3)
102-3 General Physics II (or PHYS 121-3)

Upper Division Requirements

BISC 301-3 Biochemistry — Intermediary Metabolism
312-3 Environmental Toxicology I
313-3 Environmental Toxicology II
432-3 Chemical Pesticides and the Environment
plus two of
BISC 445-3 Environmental Physiology of Animals
(prerequisite is BISC 305-3)
CHEM 371-3 Chemistry of the Aqueous Environment
(prerequisites are CHEM 150 (or 251-3) and 261-3)
GEOG 419-4 Mass Transfer in the Biosphere

If credit for any of the above courses is already being used towards another degree or diploma, additional credits will have to be obtained from the courses listed below in order to satisfy the minimum credit requirements of 15 semester hours in upper division courses for a minor in Environmental Toxicology. None of the upper division courses listed below may be counted towards the requirements for more than one program.

BICH 301-3, 412-3, 440-3
BISC 301-3, 305-3, 366-3, 401-3, 405-3
KIN 305-3, 306-3

It is advised that students wishing to pursue a minor in Environmental Toxicology contact the Department of Biological Sciences as soon as possible.

A grade point average of 2.00 or higher, is required for the courses in the minor program.

DELETE Chem 255 Organic Chemistry
Laboratory II

Reason: The course was not required when the program was originally approved

Upper Division Requirements

DELETE BISC 301 Biochemistry-
Intermediary Metabolism

Reason: This course is a prerequisite for several courses in the program and is not part of the program.

ADD: UNDER 'PLUS TWO OF'

KIN 431-3 Environmental
Carcinogenesis

AND their prerequisites as noted in the Departmental course entries

REPLACE 'IF CREDIT ... KIN 305-3, 306-3' WITH -

Since Upper Division credit may not be counted to fulfil credit hours for more than one program some substitutions may be required. Appropriate course selection for substitutions would be:

BICH 301-3, 412-3, 440-3
BISC 366-3, 401-3, 405-3
KIN 305-3, 306-3

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Post Baccalaureate Diploma in Environmental Toxicology

The Post Baccalaureate Diploma program in Environmental Toxicology is available for students who have already completed a degree in science and who are presently engaged in environmental work, to update their training. Practical experience in recent laboratory assay techniques will enable students to critically evaluate the data generated by these techniques.

For information about the Post Baccalaureate Diploma program general regulations, refer to *Continuing Studies*.

Program Requirements

Completion of BISC 301 or BISC 302 or equivalent; CHEM 250 or equivalent.

BISC 312-3 Environmental Toxicology I
313-3 Environmental Toxicology II
432-3 Chemical Pesticides and the Environment

Plus two of

BISC 445-3 Environmental Physiology of Animals
(prerequisite is BISC 305-3)
CHEM 371-3 Chemistry of the Aqueous Environment
(prerequisites are CHEM 150 (or 251-3) and 261-3)
GEOG 411-4 Mass Transfer in the Biosphere

One technical course chosen from among

BISC 429, BISC 449, CHEM 357, CHEM 311 and KIN 336

Plus

BISC 650-3 Industrial Toxicology
651-3 Food and Drug Toxicology
652-3 Problem Analysis in Environmental Toxicology
846-3 Insecticide Chemistry and Toxicology

If any of the above courses has already been used towards the requirements of another degree, additional electives in the area of specialization will be required.

Note: This program, like other diploma programs of the University, is classified as an undergraduate program. However, certain of the courses listed above are available for credit to graduate students in Biological Sciences. The course descriptions for BISC 650-3, 651-3, 652-3 and 846-3 are given in the *Graduate Studies* section.

-REPLACE PBD ENTRY-

POST BACCALAUREATE PROGRAMS

BIOLOGICAL SCIENCES

Post Baccalaureate diploma Programs are available in various areas of Biological Sciences for student who have already completed a degree (usually) in science and who are presently seeking to upgrade their academic credentials.

For information about Post Baccalaureate Diploma programs in Biology contact the Department of Biological Sciences.

NOTE: Course descriptions for the 600 and 800 level courses are given in the Graduate Studies section of this Calendar.

(Explanatory Note: Post Baccalaureate programs have consistently been available in Biological Sciences. Since they are considered to be "undergraduate" programs this note advertises the diversity of possible programs.)

ENVIRONMENTAL TOXICOLOGY

This Post Baccalaureate program has been specifically designed to meet the needs of students with Science degrees who are presently engaged in environmental work and seek to upgrade their training. Practical experience in recent laboratory assay techniques will enable students to critically evaluate the data generated by these techniques.

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Program Requirements

Bisc 312-3 Environmental Toxicology I
Bisc 313-3 Environmental Toxicology II
Bisc 432-3 Chemical Pesticides and the
Environment

Plus two of:

Bisc 445-3 Environmental Physiology of
Animals
Chem 371-3 Chemistry of the Environment I
Geog 419-4 Mass Transfer in the Biosphere
Kin 431-3 Environmental Carcinogenesis

Plus

One course chosen from among
Bisc 329-4, Bisc 429-3, Bisc 449-3,
Chem 316-3, Chem 357-3 and Kin 336-3

Plus

Bisc 650-3 Industrial Toxicology
Bisc 651-3 Food and Drug Toxicology
Bisc 652-3 Problem Analysis in
Environmental Toxicology
Bisc 846-3 Insecticide Chemistry
and Toxicology

AND their prerequisites as noted in the
Departmental course entries
If any of the above requirements
(except prerequisites) have been
used to fulfill requirements for
another degree, additional
electives in the area of
specialization will be required.
Please consult the Department
of Biological Sciences.

AQUACULTURE

This program is for those students
with Science degrees who wish to
obtain specialized training in
Aquaculture. Specific prerequisites
for entry into the PBD in Aquaculture
are:

Bisc 303-3 Microbiology;
Bisc 326-3 Non-Vascular Plants;
Bisc 306-3 Invertebrate Biology; and
Bisc 416-3 Fish Biology, or their equivalent.

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The required courses for the PBD in Aquaculture are:

- Bisc 630-5 Management of Aquaculture Resources
- Bisc 631-5 Growth, Reproduction and Nutrition in Aquaculture Systems
- Bisc 632-5 Salmonid and Shellfish Diseases and Their Control
- Bisc 633-1 Current Topics in Aquaculture
- Bus 543-4 Introductory Graduate Marketing
- Econ 663-4 The Economics and Management of Aquaculture
- MRM 615-3 Management of Aquaculture Resources
- Elective-3

Note: These programs, like other diploma programs of the University, are classified as undergraduate programs. Certain of the courses listed above are available for credit to both graduate and undergraduate students in Biological Sciences. Course descriptions of the 600 level courses are given in the Graduate Studies section.

MARINE SCIENCE

CHANGE PARAGRAPH 1 TO:

Programs in Marine Science may include both BISC and MASC courses to fulfil the upper division requirements in Biological Sciences. MASC courses are offered at the Bamfield Marine Station, Bamfield, B.C. in conjunction with certain other universities from May to August inclusive in 3 or 6 week blocks. Consult the Department of Biological Sciences in January for the course offerings scheduled for the summer and for their use as substitutes for Upper Division BISC courses in major, minor, or honors programs.

Marine Science

Marine science courses, which may be included in a Biology honors or major program, are offered at the Bamfield Marine Station, BC in conjunction with other universities in the summer period. They are offered over a six week period. Three periods of offerings are anticipated during May-August. Not all courses are necessarily offered in any one summer.

Acceptance for entry to the courses requires special application through the Department of Biological Sciences, well in advance of commencement of the courses, as selection of candidates will be across several universities and placements are limited.

For information concerning application for entry, fees, and related matters, consult the Department of Biological Sciences Office. For entry as a student in Simon Fraser University, applicants must be eligible for admission to Simon Fraser University and apply for admission in the normal manner. See the *Admission and Readmission* section.

MASC courses offered at the Bamfield Marine Station are listed in the *Course Description Index*.

From time to time graduate level courses will be offered. For details see the Graduate section of Biological Sciences.

Students from other Departments

Certain courses may be taken by students who are not enrolled in Biological Sciences programs. These courses are:

BISC 003-3, 004-3, 100-4, 101-4, 102-4, 105-3. Admission to certain other courses may be gained by permission of the department.

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**Department of Chemistry
Summary of
Undergraduate Curriculum Revisions**

SCUS Reference: SCUS 92-33

SCAP Reference: SCAP 92-42b

1. Deletion of:
 CHEM 105 - 3 General Chemistry II for Life Sciences
 CHEM 119 - 2 General Chemistry II for Physical Sciences
2. Changes to Programs as detailed on page B-3
3. Changes to courses as detailed on page B-4

For Information:

Acting under delegated authority of Senate, SCUS approved the following revision as detailed in SCUS 92 - 33

Prerequisite change for CHEM 115

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SIMON FRASER UNIVERSITY
MEMORANDUM

To: R. Brooke, Chair, FSUCC

From: Dr. E. Kiehlmann, Faculty Advisor
Chemistry Department

Subject: Prerequisite for CHEM 115;
Deletion of CHEM 105 and 119

Date: 30-Mar-92

Please place the following two items on the agenda of the next FSUCC meeting.

A. Prerequisite for CHEM 115

At its meeting of 16 January 1992 the Chemistry Department decided to add BC High School Chemistry 12 or CHEM 106 as prerequisite for CHEM 115.

Current Calendar Description:

CHEM 115-2 *General Chemistry Laboratory I*

Experiments on the preparation, separation and analysis of chemical compounds, and measurements of their chemical and physical properties. Corequisite: CHEM 102.

Motion:

Add: "Prerequisite: BC High School Chemistry 12 or CHEM 106."

Rationale:

In the past, students without CHEM 12 were allowed into CHEM 102 and CHEM 115 after completion of CHEM 101. While most of them also took CHEM 106, those who skipped the lab course were inadequately prepared for CHEM 115. The addition of CHEM 106 as prerequisite for CHEM 115 is expected to rectify this problem.

B. Deletion of CHEM 105 and CHEM 119

At its meeting of 20 February 1992 the Chemistry Department decided to delete CHEM 105 and CHEM 119.

Motion:

To delete CHEM 105 *General Chemistry II for Life Sciences* and CHEM 119 *General Chemistry II for Physical Sciences* from the Calendar, replace the current title of CHEM 103 *General Chemistry II for Physical Sciences* by the new title *General Chemistry II*, and replace the current title of CHEM 118 *General Chemistry Laboratory II for Life Sciences* by the new title *General Chemistry Laboratory II*.

B1
31 Mar 92

Rationale:

After the deletion of CHEM 104 in 1991, streaming of the second semester of General Chemistry makes little sense as CHEM 103 and 105 are also very similar in content. In CHEM 119 only three experiments differ significantly from the corresponding CHEM 118 experiments.

The proposed deletion of CHEM 105 and CHEM 119 ends the streaming experiment started in 1987. The Chemistry Department found it difficult to develop and teach two distinctly different general chemistry courses to physical and life science students such as to justify restricted access to certain higher-level chemistry courses on the basis of the course taken and grade received in first year. The combined courses will be called *General Chemistry I and II*, numbered CHEM 102/103/115/118 and taught at the (less mathematical) level of the former CHEM 104/105 (*General Chemistry for the Life Sciences*).

Science and Applied Science Departments (especially Bioscience and Kinesiology) requiring first-year chemistry of their students are advised to replace CHEM 105 by CHEM 103 in the Calendar descriptions of their programs. However, CHEM 105 should be retained as an alternate for students who have already completed this course.

B2

CHEMISTRY CALENDAR REVISIONS (1992):

20-Jul-92

A. PROGRAMS

Page	Program	Current text:	Change to:
78	Kinesiology Major Program, Lower Level Requirements	CHEM 105-3 General Chemistry II for Life Sciences CHEM 118-2 General Chemistry Laboratory II for Life Sciences	CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
148	Biochemistry Major Program Core Program	CHEM 103-3 General Chemistry II for Physical Sciences (or 105-3 General Chemistry II for Life Sciences)	CHEM 103-3 General Chemistry II
		CHEM 119-2 General Chemistry Laboratory II for Physical Sciences (or 118-2 General Chemistry Laboratory II for Life Sciences)	CHEM 118-2 General Chemistry Laboratory II
149	(typical program)	Levels 3 and 4 BISC 202-3, CHEM 103-3, 119-2,.....	Levels 3 and 4 BISC 202-3, CHEM 103-3, 118-2,.....
150	Bioscience Major Program Lower Division Core	CHEM 105-3 General Chemistry II for Life Sciences (or 103)	CHEM 103-3 General Chemistry II
		CHEM 118-2 General Chemistry Laboratory II for Life Sciences (or 119)	CHEM 118-2 General Chemistry Laboratory II
152 (top)	Env. Toxicology Minor Program, Lower Division Requirements	CHEM 105-3 General Chemistry II for Life Sciences CHEM 118-2 General Chemistry Laboratory II for Life Sciences	CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
154	Chemistry Major Program, Required Courses	CHEM 103-3 General Chemistry II for Physical Sciences CHEM 119-2 General Chemistry Laboratory II for Physical Sciences	CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
	Chemistry Honors Program, Required Courses	CHEM 103-3 General Chemistry II for Physical Sciences CHEM 119-2 General Chemistry Laboratory II for Physical Sciences	CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
155	Chem. Minor Progr.: Organic Chemistry Inorg./Radiochem. Physical Chemistry	CHEM 102-3, 103-3, 115-2, 119-2, CHEM 102-3, 103-3, 115-2, 119-2, CHEM 102-3, 103-3, 115-2, 119-2,	CHEM 102-3, 103-3, 115-2, 118-2, CHEM 102-3, 103-3, 115-2, 118-2, CHEM 102-3, 103-3, 115-2, 118-2,
	Environmental Chemistry Minor Program	CHEM 103-3 General Chemistry II for Physical Sciences CHEM 119-2 General Chemistry Laboratory II for Physical Sciences	CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
156	General Science Program, Lower Div. Requirements	and CHEM 103-3 General Chemistry II for Physical Sciences CHEM 119-2 General Chemistry Laboratory II for Physical Sciences	and CHEM 103-3 General Chemistry II CHEM 118-2 General Chemistry Laboratory II
		or CHEM 102-3 General Chemistry I CHEM 105-3 General Chemistry II for Life Sciences CHEM 115-2 General Chemistry Laboratory I CHEM 118-2 General Chemistry Laboratory II for Life Sciences	(delete these four courses)

In addition, replace

CHEM 103-3 General Chemistry II for Physical Sciences
by CHEM 103-3 General Chemistry II

DEPT. OF CHEMISTRY

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B 3

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in the following program descriptions:

Engineering Science Common Core, Semester Two (p. 75),
 Transfer to the Engineering Program at UBC (p.146),
 Chemical Physics Major Program, Lower Division Requirements (p. 152, bottom right),
 Geography Major Program, Required Faculty of Science Courses (p. 156, bottom right),
 Physics Major Program, Lower Division Requirements (p. 163, top left),
 Applied Physics Major Program, Lower Division Requirements (p. 163, bottom left), and
 Recommended Program for First Four semesters (p. 164, top left).

B. COURSES

Page	Course	Current text	Change to:
179	CHEM 103-3	General Chemistry II for Physical Sciences Prerequisites: CHEM 102 (or 104 with a minimum grade of B).	General Chemistry II Prerequisite: CHEM 102 (or 104).
		...CHEM 119...should be taken concurrently....	...CHEM 118...should be taken concurrently
		This course is intended for students who are planning to proceed to CHEM 218, 232 and/or 261.	(delete this sentence)
	CHEM 105-3		(delete this course)
	CHEM 115-2	Corequisite: CHEM 102.	(add:) Prerequisite: B.C. High School Chemistry 12, or CHEM 106.
	CHEM 118-2	General Chemistry Laboratory II for Life Sciences Corequisite: CHEM 103 or 105.	General Chemistry Laboratory II Corequisite: CHEM 103.
	CHEM 119-2		(delete this course)
	CHEM 150-3	Prerequisite: CHEM 102. CHEM 155 should...	Prerequisite: CHEM 102 (or 104). CHEM...
	CHEM 155-2	(add to current text:)	Students may not count both CHEM 155 and CHEM 256 for credit.
	CHEM 218-3	Prerequisite: CHEM 103 (or 105 with a grade of B or better) and 119 (or 118).	Prerequisite: CHEM 103 (or 105) and 118 (or 119).
	CHEM 232-3	Prerequisite: CHEM 102 (or 104 with a grade of B or better).	Prerequisite: CHEM 102 (or 104).
	CHEM 255-2	(add to current text:)	Students may not count both CHEM 255 and CHEM 356 for credit.
	CHEM 261-3	Prerequisites: CHEM 103 (or 105 with a grade of B or better),....	Prerequisites: CHEM 103 (or 105),....
180	CHEM 316-3	Principles and applications of basic analytical instrumentation based on spectroscopy, chromatography and electrochemistry, in analytical chemistry.	Principles and applications of basic analytical instrumentation based on spectroscopy, chromatography and electrochemistry.
	CHEM 407-0	Prerequisites: CHEM 406.	Prerequisite: CHEM 406.
	CHEM 439-3	CHEM 439-3 Special Topics...	CHEM439-3 Special Topics...
172	BICH 491-5	Prerequisites: permission of....	Prerequisite: Permission of....

Most of the above Calendar revisions are prompted by the decision of the Chemistry Department to discontinue streaming its first-year courses into a Physical Science and a Life Science stream, i.e., to drop CHEM 105 and CHEM 119 from its program (CHEM 104 was dropped a year ago).

The Calendar changes were approved

by the Department Curriculum Committee on 9 July 1992,
 by the Chemistry Department on 20 July 1992,
 by the Faculty of Science Curriculum Committee on 23 July 1992, and
 by the Faculty of Science on

B 4

**Chemical Physics Program
Summary of
Undergraduate Curriculum Revisions**

SCUS Reference: SCUS 92-34
SCAP Reference: SCAP 92-42c

1. Change of requirements for major and honours programs in Chemical Physics.

FSC 96-92

SIMON FRASER UNIVERSITY
MEMORANDUM

TO: Prof. R.C. Brooke,
Dept. Biological Sciences
Chair, Faculty of Science Under-
graduate Curriculum Committee

FROM: E.D. Crozier
Chair, Chemical Physics Comm.

SUBJECT: Calendar Change for
Chemical Physics Program

DATE: Sept. 24/92

I wish to draw to your attention the following item.

Both the major and honours programs in Chemical Physics in the current calendar (1993) list CHEM 416-3 as a required course. However, the Chemistry Department has revised its course offerings and 416-3 is no longer offered. CHEM 316-3 is approximately equivalent to the old CHEM 416-3.

It is the opinion of the Chemical Physics Committee that the new CHEM 316-3 is a suitable course for both the major and honours programs. The 1994 calendar should be modified to reflect this change:

delete CHEM 416-3

add CHEM 316-3 as a required course for the major and honours programs.

Daryl Crozier

EDC:aer

Dr. C. Jones, Dean

*Please add this to the agenda
of the Faculty of Science meeting.*

D.

29 Sept/92

C1

**Department of Mathematics and Statistics
Summary of
Undergraduate Curriculum Revisions**

SCUS Reference: SCUS 92-35
SCAP Reference: SCAP 92-42d

1. Change of note in calendar description for MATH 190-4.
2. MACM 216-3 dropped as requirement for the Management and Systems Science Program.

SIMON FRASER UNIVERSITY

MEMORANDUM

Date: July 20, 1992	From: Harvey Gerber
To: Dr. R. Brooke, Chair Faculty of Science UGCC	Department of Mathematics & Statistics
Subject: MATH 190-4 Calendar change	

On May 19, 1992 the Undergraduate Studies Committee of the Mathematics and Statistics Department passed the following motion:

The following should be added to the calendar description for MATH 190-4:
Students who have taken, or are currently taking MATH 151, 154 or 157 may not take MATH 190 for credit without permission from the Mathematics and Statistics Department.

This motion was passed by the Mathematics and Statistics Department at a meeting on June 8, 1992.

The rule was recently changed so that students from Business Administration who wanted to go into the PDP program could take MATH 190-4 for credit. It is now clear that students who want to enter the Faculty of Business Administration are taking MATH 190, in large numbers, in order to take an "easy" course after they have taken MATH 157. We therefore decided to return to the former regulations.

Harvey Gerber

SIMON FRASER UNIVERSITY

FSC 7-92

MEMORANDUM

To.....Faculty of Science Undergraduate.....
Curriculum Committee

Subject.....MACM 216-3.....

From.....Brian Alspach, Coordinator.....
Management and Systems Science Program

Date.....11 September 1992.....

At the 92-2 meeting of the Management and Systems Science Steering Committee, the following motion was passed unanimously.

MOTION. It is moved that MACM 216-3 be dropped as a requirement for the Management and Systems Science Program effective immediately.

Rationale. The course MACM 216-3 was included as a requirement for the MSSC Program from the beginning. However, as the Program has evolved, it has become apparent that this particular course is not particularly useful to the students in the Program. The main emphasis in mathematics is statistics and optimization. That is not what this course deals with and there has been a growing feeling that the course is not really working. There is no plan to replace the course with another one, although this may be done sometime in the future.

D2

**Quaternary Studies Program
Summary of
Undergraduate Curriculum Revisions**

SCUS Reference: SCUS 92-36
SCAP Reference: SCAP 92-42e

1. New course:
 QUAT 403 - 4 Directed Readings
2. Changes to Upper Division Requirements for Quaternary Studies Minor

SENATE COMMITTEE ON UNDERGRADUATE STUDIES
NEW COURSE PROPOSAL FORM

1. Calendar Information Department Institute for Quaternary Research

Abbreviation Code: QUAT Course Number: 403 Credit Hours: 4 Vector:

Title of Course: Directed Readings in Quaternary Studies

Calendar Description of Course:

Designed for students in the Quaternary Studies Minor program who wish to pursue in detail a topic not covered in existing courses.

Nature of Course:

Prerequisites (or special instructions):

Permission to enter Directed Readings Courses requires written consent of both a faculty member associated with the Institute for Quaternary Research (IQR) who is willing to supervise the research, and the Director of IQR.

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? Every semester

Semester in which the course will first be offered? Autumn 1993

Which of your present faculty would be available to make the proposed offering possible? All faculty associated with IQR, although it would be the student's responsibility to find a faculty member willing to supervise the directed reading.

3. Objectives of the Course

To allow students the opportunity to pursue a topic of specific interest in Quaternary Studies which is not addressed in existing 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:

David E. Jones

Sept 16 1992

David C. Brooks
16 September 1992

CHW Jones

Dean

JAC

Chairman, SCUS

September 16, 1992

To: R.C. Brooke, Chair, FSUCC
From: Lionel Jackson, Acting Director,
Institute for Quaternary Research

SUBJECT: PROPOSAL FOR A NEW COURSE - QUAT 403

Many departments offer directed readings courses which allow upper-level students the opportunity to study a topic of special interest which is not covered in detail in existing courses. The Institute for Quaternary Research would like to offer a directed readings course to students in the Quaternary Studies Minor program. The introduction of the directed readings course, with the proposed change to the calendar entry (see below), would also allow Quaternary Studies Minor students with majors in Geography and Biology more flexibility in scheduling their programs.

COURSE DESCRIPTION

QUAT 403 Directed Readings

Designed for students in the Quaternary Studies Minor program who wish to pursue in detail a topic not covered in existing courses. Prerequisite: permission to enter Directed Readings courses requires written consent of both a faculty member associated with the Institute for Quaternary Research (IQR) who is willing to supervise the research, and the Director of IQR.

CHANGES TO CALENDAR ENTRY FOR QUATERNARY STUDIES MINOR.

Add at end of list of Upper Division Requirements:

"Students who wish to count one of the Upper Division Requirements for credit towards their majors may substitute QUAT 403 as one of the requirements for the minor."

R. D. Moore

R.D. Moore, for Lionel Jackson