SIMON FRASER UNIVERSITY

OFFICE OF THE VICE-PRESIDENT, ACADEMIC

MEMORANDUM

To: Senate

From: D. Gagan, Chair
Senate Committee on Academic Planning

Subject: Faculty of Science -
Curriculum revisions

Date: November 12, 1996

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

Motion:

"that Senate approve and recommend approval to the Board of Governors the curriculum revisions for the Faculty of Science as set forth in S.96-77 as follows:

S.96-77a Department of Biological Sciences
Introduction of Streams in Biological Science Curriculum"

For Information:
Acting under delegated authority of Senate, SCUS approved revisions as set forth in S.96-77

a) Department of Biological Sciences
b) Department of Chemistry
c) Earth Sciences Program
d) Environmental Science Program
e) Department of Geography
f) Department of Mathematics and Statistics
g) Department of Physics

In all cases agreement has been reached between the Faculty and the Library in the assessment of library costs associated with new courses.

Any Senator wishing to consult the full report of curriculum revisions within the Faculty of Science should contact Bobbie Grant, Senate Assistant at 291-3168 or e-mail bgrant@sfu.ca

SCUS Reference: SCUS 96-39
SCUS Reference: SCUS 96-40
SCUS Reference: SCUS 96-41
SCAP Reference: SCAP 96-54 a)

S.96-77a

a) Department of Biological Sciences

FOR APPROVAL

i) Introduction of Streams in Biological Sciences Curriculum

FOR INFORMATION

Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

ii) Grades for prerequisites in the Department of Biological Sciences

iii) New courses:
MASC 401 - 3 Directed Studies in Marine Sciences
MASC 415 - 3 Structure and Function in Animals
MASC 425 - 3 Ecological Adaptations of Seaweeds
MASC 437 - 3 Marine Population Ecology and Dynamics
MASC 480 - 3 Seminars and Papers in Marine Science
Proposed Program at Bamfield Marine Station

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Proposal for the Reintroduction of 'Streams' into the Department of Biological Sciences Undergraduate Curriculum.

Introduction

While the biology department had offered streams for many years, these were abandoned 4 years ago because the existing selection of streams (Ecology and Evolution, Genetics/Cell and Mo. Biol, General Biology) no longer reflected all major areas of Biology. Instead, the undergraduate advisor (Dr. Kemp) came up with 11 different areas of emphasis. By not offering defined streams, the department felt no longer obligated to offer courses required for a sub-set of our students at regular intervals, and hence a focused curriculum planning was very difficult to achieve. Many students selected courses rather randomly, and hence did not achieve excellence in any area of biology.

Reasons for Streams

The impetus for reintroducing streams stems from the desire of many students to 'specialize' in an area of biology and our strong belief that academic excellence may require rather specialized knowledge. Presently, our department has only one stream, the general stream, which offers no guidance for students on where or how to focus their degrees. Streams would encourage students to decide what areas they wish to concentrate their studies on, and remove some general requirements to make room for a more in-depth study in one area. However, students will still be able to remain in a general stream and gain biological knowledge in a broader sense.

Many students do not take advantage of our advisors and the large number of students presently enrolled and projected increases in enrollment will not allow the present system to function as intended. It is the general consensus of our department that a larger number of students can be adequately advised in terms of specialization if the calendar held the appropriate information in terms of a stream outline.

Another important feature of streaming is that it allows students to focus on their particular areas of interest without having to take courses of peripheral interest to them which is the case at the present time. Our department has decided that the present system requires students to take courses which may not be of extreme value if they decide to focus in one particular area. The department has decided on a base level of required courses which should give every biology graduate the 'breadth' needed to be well rounded biologists and give them the freedom to specialize.

With increased enrollments, the present system tends to 'bottleneck' students and may delay progress and the eventual graduation of students. The proposed model allows students to take other courses instead alleviating the enrollment stress on courses which may not be relevant to them. The load of increased enrollments would be spread more evenly, and students would benefit by having the opportunity to take upper division courses with relatively small enrollments and a more personal contact with their professors.

The model.

Students are required to complete all 1st and 2nd year courses as well as STAT 301 as required at present. Mandatory upper level courses for all biology majors would be: BISC 329 Experimental techniques; BISC 333 Developmental Biology; BISC 400 Evolution; and either BISC 305 Animal Physiology or BISC 366 Plant Physiology. The department felt

that a gap in the curriculum will still exist in terms of the breadth of knowledge that graduates will have. Therefore, it is under consideration that all students also take a required organismal course or biodiversity course which will encompass all five kingdoms. It is unclear at the present what the course content would be, at what level the course would be taught, or who would teach such a course.

Students in the 3rd year of studies will then begin the streaming process (see layout). There are six streams: Cell and molecular biology, animal physiology, plant biology, ecology, marine sciences and a general stream. In each stream there are mandatory lecture courses, mandatory lab courses and a suite of electives from the particular area of emphasis. There is still room in a students program for elective courses in other areas, although the choices may be limited due to prerequisite requirements. The general stream is similar to the present system although it allows more freedom in terms of a students choices in courses. In this model, students will take at least the same and possibly one more required lab course than the present system operating, therefore, there is no diluting of lab experience for the graduates. In contrast, the lab experience will be enriched because the student load is spread more equally over a larger number of lab courses.

Ramifications.

There are several ramifications were this proposal to be accepted. First, biology graduates in this scenario may not have the breadth of biological knowledge that previous graduates have had. What is accomplished, however, is a student with a much more focused knowledge base in a particular area of a biological science. This may be of benefit to some students and allows them to make that important decision based on their individual needs. If students do not wish to specialize, the option of the general stream still exists.

The areas of streams were chosen based on the anticipated student interest, the existing course offerings, and the perceptions of areas of strength of the biology faculty. The streams as outlined are not meant to and will not dictate any future hirings. It is anticipated that these streams will evolve with time as new faculty are hired. Modifications to streams will also occur over time as courses are added or dropped from our curriculum with changing faculty.

MOTION

That the reintroduction of streams into the Department of Biological undergraduate curriculum be approved.

The reintroduction of streams into the undergraduate curriculum in the Department of Biological Sciences incurs changes to the upper division requirements for a B.Sc. in biology. These changes are:

From: (p. 151 in calendar)	To:
all of	
BISC 333-3 Developmental Biology	No change
BISC 329-4 Intro. Experimental Techn.	No change
BISC 400-3 Evolution	No change
one of	
BICH 322-3 Molecular Physiology	Students begin streaming as on next page.
BICH 321-3 Intermediary Metabolism	
one of	
BISC 305-3 Animal Physiology	Students begin streaming as on next page.
BISC 366-3 Plant Ecophysiology	
one of	
BISC 306-3 Invertebrate Physiology	Students begin streaming as on next page.
BISC 316-3 Vertebrate Physiology	
one of	
BISC 326-3 Nonvascular Plants	Students begin streaming as on next page
BISC 337-3 Comparative Morphology Distribution and Evolution of Vascular Plants	

The overall layout for the calendar description for the streaming process outlined on the next page is currently in discussion and modification in the Biological Sciences Undergraduate Curriculum Committee.

Upper Division Requirements and Electives

All biological sciences majors will complete a minimum of 12 upper division (36 credit hours in courses numbered 300 or above) BISC courses. The following three courses form an upper division core required of all BISC major/honors students.

BISC 329-3 Experimental Techniques
BISC 333-3 Developmental Biology
BISC 400-3 Evolution

Students are encouraged to choose their remaining curriculum requirements in an area of specialization. Currently, six different streams of biology are offered which include cell and molecular biology, animal physiology, plant biology, ecology, marine biology and general biology. Courses in the general stream may be chosen to gain broad training in the biological sciences, or used to specialize in an areas not offered in the other five streams. The course requirements for each stream are as follows.

Cell & Molecular Biology

one physiology course from
BISC 305-3 Animal Physiology
BISC 366-3 Plant Physiology

one organismal lab course from
BISC 303-3 Microbiology
BISC 306-3 Invertebrate Biology
BISC 316-3 Vertebrate Biology
BISC 326-3 Non-vascular Plants
BISC 337-3 Comparative Morphology, Distribution and Evolution of Vascular Plants

one lab course
BISC 302-3 Genetic Analysis

two mandatory courses:
BISC 331-3 Molecular Biology
BICH 322-3 Molecular Physiology

two additional lab courses from
BISC 405-3 Cell Physiology
BISC 429-3 Experimental Techniques I:Separation Methods
BISC 431-3 Molecular Biotechnology
BISC 457-3 Plant Molecular Biology and Biotechnology
or appropriate special topics lab courses

two additional courses from
BISC 402-3 Molecular Genetics
BISC 453-3 Advanced Developmental Biology
BICH 412-3 Enzymology
BICH 421-3 Nucleic Acids
BICH 422-3 Biomembranes
BICH 423-3 Protein Structure and Function
BISC 498-3 Undergraduate Research
or special topics courses appropriate for the selected stream or alternative courses as approved by the program advisor

two other upper division electives

Animal Physiology

one physiology course
BISC 305-3 Animal Physiology

one organismal lab course from
BISC 306-3 Invertebrate Biology
BISC 316-3 Vertebrate Biology

one lab course
BISC 307-3 Animal Physiology Lab

two mandatory courses:
BICH 321-3 Intermediary Metabolism
BICH 322-3 Molecular Physiology

two additional lab courses from
BISC 405-3 Cell Physiology
BISC 429-3 Experimental Techniques I: Separation Methods
BISC 449-3 Experimental Techniques III: Histochemistry
BISC 416-3 Fish Biology
or appropriate special topics lab courses

two additional courses from
BISC 313-3 Environmental Toxicology II
BISC 445-3 Environmental Physiology of Animals
BISC 455-3 Endocrinology
BISC 498-3 Undergraduate Research
or special topics courses appropriate for the selected stream or alternative courses as approved by the program advisor

two other upper division electives

Plant Biology

one physiology course
BISC 366-3 Plant Physiology

one organismal lab course
BISC 337-3 Comparative Morphology, Distribution and Evolution of Vascular Plants

one lab course
BISC 367-3 Plant Physiology Lab

two mandatory courses:
BISC 356-3 Hormonal Regulation of Plant Growth
BISC 404-3 Plant Ecology

two additional lab courses from
BISC 429-3 Experimental Techniques I:Separation Methods
BISC 449-3 Experimental Techniques III: Histochemistry
BISC 430-3 Plant Pathology
BISC 457-3 Plant Molecular Biology and Biotechnology
or appropriate special topics lab courses

two additional courses from
BISC 310-3 The Plants and Animals of British Columbia
BISC 326-3 Nonvascular Plants
BISC 434-3 Paleoecology and Palynology
BISC 498-3 Undergraduate Research
or special topics courses appropriate for the selected stream

r alternative courses as approved by the program advisor

two other upper division electives

Ecology

one physiology course from
BISC 305-3 Animal Physiology
BISC 366-3 Plant Physiology

one organismal lab course from
BISC 303-3 Microbiology
BISC 306-3 Invertebrate Biology
BISC 316-3 Vertebrate Biology
BISC 326-3 Non-vascular Plants
BISC 337-3 Comparative Morphology, Distribution and Evolution ofVascular Plants

one lab course from
BISC 302-3 Genetic Analysis
BISC 307-3 Animal Physiology Lab
BISC 367-3 Plant Physiology Lab
MASC 445-3 Biology of Marine Mammals

two mandatory courses
BISC 304-3 Animal Ecology
BISC 407-3 Population Dynamics

two additional lab courses from
BISC 317-3 Insect Biology
ISC 404-3 Plant Ecology
BISC 414-3 Limnology
BISC 415-3 Ornithology
BISC 416-3 Fish Biology
BISC 417-3 Entomology
BISC 419-3 Wildlife Biology
BISC 430-3 Plant Pathology
or appropriate special topics lab courses

two additional courses from
BISC 310-3 The Plants and Animals of British Columbia
BISC 312-3 Environmental Toxicology I
BISC 404-3 Plant Ecology
BISC 410-3 Ethology
BISC 417-3 Entomology
BISC 430-3 Plant Pathology
BISC 432-3 Chemical Pesticides and the Environment
BISC 434-3 Paleoecology and Palynology
BISC 435-3 Introduction to Pest Management
BISC 498-3 Undergraduate Research
or special topics courses appropriate for the selected stream
or alternative courses as approved by the program advisor

two other upper division electives

Marine Biology

one physiology course from
BISC 305-3 Animal Physiology
ISC 366-3 Plant Physiology

one organismal lab course from
BISC 306-3 Invertebrate Biology
BISC 316-3 Vertebrate Biology
MASC 410-3 Marine Invertebrate Zoology

one lab course from

BISC 307-3 Animal Physiology Lab
BISC 367-3 Plant Physiology Lab
MASC 445-3 Biology of Marine Mammals

two mandatory courses:
BISC 406-3 Marine Biology and Oceanography
BISC 326-3 Nonvascular Plants

two additional lab courses from
BISC 414-3 Limnology
BISC 415-3 Ornithology
BISC 416-3 Fish Biology
MASC 412-3 Biology of Fishes
MASC 413-3 Biology of Marine Molluscs
MASC 440-3 Biology of Marine Birds
or appropriate special topics lab courses

two additional courses from
BISC 304-3 Animal Ecology
BISC 303-3 Microbiology
BISC 498-3 Undergraduate Research
MASC 411-3 Comparative Embryology of Marine Invertebrates
MASC 445-3 Biology of Marine Mammals
MASC 446-3 Compartive Ethology
or special topics courses appropriate for the selected stream
or alternative courses as approved by the program advisor

two other upper division electives

General Stream

one physiology course from
BISC 305-3 Animal Physiology
BISC 366-3 Plant Physiology

one organismal lab course from
BISC 303-3 Microbiology
BISC 306-3 Invertebrate Biology
BISC 316-3 Vertebrate Biology
BISC 326-3 Non-vascular Plants
BISC 337-3 Comparative Morphology, Distribution and Evolution ofVascular Plants

one lab course from
BISC 302-3 Genetic Analysis
BISC 307-3 Animal Physiology Lab
BISC 367-3 Plant Physiology Lab
MASC 445-3 Biology of Marine Mammals

two additional lab courses from
any upper division BISC or MASC lab course
or appropriate special topics lab courses

four additional courses from
any upper division BISC or MASC course
or special topics courses appropriate for the selected stream
or alternative courses as approved by the program advisor

two other upper division electives

SCUS Reference: SCUS 96-42
SCAP Reference: SCAP 96-54 b)

FOR INFORMATION

b) Department of Chemistry

Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Change of description: CHEM 372
ii) Change of course requirement:
delete MATH 310 as prerequisite for CHEM 361
delete MATH 310 as a required course for Chemistry major and honors programs; increase from 4-7 hours the elective UD credit in CHEM, BICH or NUSC in major program
iii) Restriction of entry to CHEM 101

SCUS Reference: SCUS 96-43
SCAP Reference: SCAP 96-54 c)

FOR INFORMATION

c) Earth Sciences Program

Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Delete EASC 304 - 3 Structural Geology II
ii) Change title and course description: EASC 407 - 3
iii) Change number and prerequisite: EASC 408 - 3
iv) New course: EASC 410 - 3 Groundwater Geochemistry
v) Change of prerequisites: EASC 202, 207, 306
vi) Change of requirements for graduation in Major Program
vii) New course outlines: EASC 407 - 3 Tectonics
EASC 408 - 3 Hydrogeology

SCUS Reference: SCUS 96-44
SCAP Reference: SCAP 96-54 d)

S.96-77d

FOR INFORMATION

d) Environmental Science Program

Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Change of title, credit and vector: ENPL 200
ii) New course: EVSC 401 - 1 Current Topics in Environmental Science

SCUS Reference: SCUS 96-45
SCAP Reference: SCAP 96-54 e)

FOR INFORMATION

e) Department of Geography
Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Change in prerequisite: GEOG 311 - 4
ii) Change in program requirements for B.Sc. in Geography

SCUS Reference: SCUS 96-46
SCAP Reference: SCAP 96-54 f)

S.96-77f

FOR INFORMATION

f) Department of Mathematics and Statistics
Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Change of title, credit and vector: MATH 262

SCUS Reference: SCUS 96-47
SCAP Reference: SCAP 96-54 g)

FOR INFORMATION

g) Department of Physics

Acting under delegated authority, SCUS approved curriculum revisions of a minor nature as follows:

i) Change in prerequisite: PHYS 190
ii) Changes in requirements for Applied Physics Major