## MEETING OF THE FACULTY COUNCIL OF THE FACULTY OF SCIENCE

A regular meeting of the Faculty Council of the Faculty of Science will be held on Wednesday, December 6, 2017 at 1 p.m. in C-2045.

## AGENDA

## 1. Regrets

2. Adoption of the Minutes of November 15, 2017
3. Business Arising from the Minutes: None
4. Correspondence: None
5. Reports of Standing Committees:

## A. Undergraduate Studies Committee:

a. Department of Biochemistry, paper 5.A.a (76 pages)
i. New dedicated Biochemistry lab courses (BIOC 2901, 3906, 3907); new non-lab courses (BIOC 2200, 2201, 3206, 3207) to replace existing lab courses (BIOC 2100, 2101, 3106, 3107); and related changes to the Biochemistry Major, Honours, and Minor programs; the Major and Honours in Biochemistry (Nutrition); and the Joint Honours programs in Applied Mathematics and Chemistry, Biochemistry and Cell Biology, Biochemistry and Chemistry, Biochemistry and Physics, Biochemistry and Psychology (Behavioural Neuroscience), and Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience).
b. Department of Chemistry, paper 5.A.b (8 pages)
i. Course Change: CHEM 2210 - Prerequisite change
c. Department of Mathematics and Statistics, paper 5A.c (27 pages)
i. Course change: MATH 2130 - Prerequisite change (pagesl-3)
ii. Course change: MATH 4300 - Change to description and prerequisite change (pages 4-6)
iii. Course change: STAT 1510 - Prerequisite change and related program changes (pages 7-11)
iv. Course change: STAT 3410 - Renumber as STAT 2410 (pages 12-18)
v. Course change: STAT 2560 - Prerequisites (pages 19-21)
vi. Program Change: Applied Mathematics and Computer Science Joint Major (pages 22-24)
vii. Program Change: Pure Mathematics Honours - Incorporating STAT $3410 / 2410$ change (pages 25-27)
d. Department of Ocean Sciences, paper 5.A.d (85pages)
i. Program Change: Ocean Sciences Major (pages 1-12)
ii. Program Change: Ocean Sciences Minor (pages 13-26)
iii. New Course: OCSC 499A/B (pages 27-39)
iv. New Program: Ocean Sciences Honours (pages 40-61)
v. New Courses: OCSC 4200, 4300 (pages 62-85)
e. Department of Psychology, paper 5.A.e (47 pages)
i. Course Change: PSYC 2100 (pages 1-6)
ii. Program Change: Psychology (Co-operative) and Behavioural Neuroscience (Co-operative) (pages 7-31)
iii. Program Change: Behavioural Neuroscience (pages 32-47)
f. Faculty of Science - General, paper 5.A.f (159 pages)
i. Deletion of Courses SC 1000, 1001, 1150, and 1151 (pages 1-15)
ii. Revision of Faculty of Science General Regulations (pages 16-159)
B. Graduate Studies Committee:
a. Department of Physics and Physical Oceanography, proposed calendar changes for M.Sc. degree, paper 5.B.a (7 pages)
C. Nominating Committee: None
D. Library Committee: None
6. Report of Teaching Consultant
7. Reports of Delegates from Other Councils
8. Report of the Dean
9. Question Period
10. Adjournment


Mary L. Courage, Ph.D. Interim Dean of Science

## FACULTY OF SCIENCE <br> FACULTY COUNCIL OF SCIENCE MINUTES OF MEETING OF NOVEMBER 15, 2017

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, November 15th, at 1:00 p.m. in room C-2045.

FSC 2546 Present
Biochemistry
Berry, M.

## Biology

Staveley, B. Purchase, C.
Chemistry
Bottaro, C. Fridgen, T.
Computer Science
Bungay, S.

## Earth Sciences

Welford, K.

Mathematics \& Statistics
Booth, I. Loredo-Osti, J. Mantyka, S. Sullivan, S.
Ocean Sciences
Fletcher, G.

Physics \& Physical Oceanography
Curnoe, S. Lagowski, J. Saika-Voivod, I.

## Psychology

Neath, I.
Dean of Science Office
Foss, K. Foster, A. Harding, S. Jackson, G. Zedel, L.

CITL
Todd, A.

Library
Gamsby, M.

## Engineering

Bazan, C.

## Registrar's Office

Murray, M.

FSC 2547

FSC 2548

FSC 2549

FSC 2550
FSC 2551

Regrets
Cook, N. Edinger, E. Jones, I. Poduska, K.

## Adoption of Minutes

Moved: Minutes of October 18, 2017, meeting be adopted (Sullivan/Berry).
1 Abstention. Carried.
Business Arising: None
Correspondence: None
Reports of Standing Committees:

## A. Undergraduate Studies Committee: <br> Report presented by Shannon Sullivan, Chair, Undergraduate Studies Committee

a) i) Moved: Department of Ocean Sciences, calendar change, proposal for a new course, OCSC 3600, Marine Microbiology. (Sullivan/ Fletcher). Carried.
ii) Moved: Department of Ocean Sciences, calendar change, changes to the Major and Honours regulations for the Environmental Physics program. (Sullivan/Fletcher). Carried.

The December Faculty of Science Council meeting is the last meeting to approve changes for the 2018/19 calendar. FoSCUGS last meeting is Monday, November $27^{\text {th }}$, so all agenda items for this meeting must be submitted by Monday, November $20^{\text {th }}$.

## B. Graduate Studies Committee:

J.C. Loredo-Osti, Chair, Graduate Studies Committee, presented the special topics course for Earth Sciences, EASC 6953, Principles of Mineral Exploration Geochemistry, for information purposes only.
C. Nominating Committee: None

## D. Library Committee: None

FSC 2552 Report of Teaching Consultant
Amy Todd reminded council that after the Christmas break there will be calls for awards nominations so it is good to start thinking about who you want to nominate now. Also, Amy is in the final stages of preparing syllabi guidelines for the faculty. She hopes to have it available in early December. On December $4^{\text {th }}$ CITL will hold a pan-university session to discuss how we teach for critical thinking in the disciplines, and it would be great to see Faculty of Science representatives at the table. The Office of the Provost and Vice-President (Academic) is moving towards a more learner focus for the University and will be supporting the teaching and learning framework through various programs including: Graduate Student Supervision, Semester in Dialogue, and student success by working with EAB. We are anticipating more information at the end of the semester when the official report is released.

FSC 2553 Reports of Delegates from Other Councils:
Carlos Bazan introduced himself as the Faculty of Engineering and Applied Science representative to the Faculty of Science Council.

FSC 2554 Report of the Dean:
Mary Courage provided an update on the Canada Research Chairs; unofficially, Amanda Bates has been approved as a Tier II CRC in the Department of Ocean Sciences and Sue Ziegler as a Tier I CRC in the Earth Sciences department. The Chemistry chair position and the Canada 150 are still in progress.

FSC 2555 Question Period
FSC 2556 Adjournment
The meeting adjourned at 1:11 p.m.

MEMORIAL
UNIVERSITY
Office of the Registrar

St. John's, NL Canada A1C 5S7
Tel: 7098648260 Fax: 7098642337
www.mun.ca
November 29, 2017

TO: $\quad$ All Members of Faculty Council, Faculty of Science
FROM: Maria Murray, Secretary, Committee onUndergraduate Studies
Faculty of Science
SUBJECT: Proposals for Calendar Changes

At meetings held on November 6, 15, and 27, 2017, the Faculty of Science Undergraduate Studies Committee agreed that the following items should be forwarded to Faculty Council for approval:

## 1. Department of Biochemistry

a. New dedicated Biochemistry lab courses (Biochemistry 2901, 3906, 3907); new non-lab courses (Biochemistry 2200, 2201, 3206, 3207) to replace existing lab courses (Biochemistry 2100; 2101, 3106, 3107); and related changes to the Biochemistry Major, Honours, and Minor programs; the Major and Honours in Biochemistry (Nutrition); and the Joint Honour programs in Applied Mathematics and Chemistry, Biochemistry and Cell Biology, Biochemistry and Chemistry, Biochemistry and Physics, Biochemistry and Psychology (Behavioural Neuroscience), and Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience).

## 2. Department of Chemistry

a. Course Change: Chemistry 2210 - Prerequisite change

## 3. Department of Mathematics and Statistics

a. Course Change: Mathematics 2130 - Prerequisite change
b. Course Change: Mathematics 4300 - Change to description and prerequisite
c. Course Change: Statistics 1510- Prerequisite change and related program changes.
d. Course Change: Statistics 3410 - Renumber as Statistics 2410
e. Course Change: Statistics 2560 - Pre-requisites
f. Program Change: Applied Mathematics and Computer Science Joint Major
g. Program Change: Pure Mathematics Honours - Incorporating Statistics 3410/241O change

## 4. Department of Ocean Sciences

a. Program Change: Ocean Sciences Major
b. Program Change: Ocean Sciences Minor
c. New Course: Ocean Sciences 499A/B
d. New Program: Ocean Sciences Honours
e. New Courses: Ocean Sciences 4200, 4300
5. Department of Psychology
a. Course Change - Psychology 2100
b. Program Change - Psychology (Co-operative) and Behavioural Neuroscience (Co-operative)
c. Program Change-Behavioural Neuroscience
6. Faculty of Science - General
a. Deletion of Courses Science 1000, 1001, 1150, and 1151
b. Revision of Faculty of Science General Regulations

Inaruafmurray.

# Proposal <br> Calendar Changes to Existing Biochemistry Programs in Relation to New, Dedicated Lab Courses 

Major in Biochemistry Honours in Biochemistry Minor in Biochemistry Major in Biochemistry (Nutrition) Honours in Biochemistry (Nutrition)

***Note that these proposed changes are in addition to the calendar changes approved by Faculty of Science Undergraduate Studies Committee on October 6, 2017 and Faculty of Science Council on October 18, 2017, as well as additions to the Ocean Sciences programs discussed at November, 2017 meetings of Faculty of Science Undergraduate Studies Committee ***

## Executive Summary

This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.

This package is structured in 4 parts:
1: Proposed Biochemistry program changes related to new, dedicated lab courses
2: Proposal for new, dedicated lab courses (Bioc 2901, 3906, 3907)
3. Proposed modifications to existing courses (Bioc 2100, 2101, 3106, 3107) to remove the lab components of the existing courses and renumber them (Bioc 2200, 2201, 3206, 3207).
4. Proposed modifications to joint programs

## Resource Implications: Instructional Costs

The lab instructor, teaching assistant, lab support staff and consumable costs for the three new lab courses will be balanced by removal of the lab components from four current lecture + lab courses, namely Bioc 2101, Bioc 2100, Bioc 3106 and 3107. We have done a careful cost analysis for the new labs in consultation with our student laboratory supervisor and are able to say that the changes will be cost neutral. We have been anticipating the switch over to dedicated lab courses over the last several years and have taken advantages of opportunities to upgrade student lab equipment with the new labs in mind. Thus, we have most of the new equipment in place and can accommodate the few small equipment purchases still needed within our current funding envelope. The teaching contributions from faculty will be accommodated with current faculty as part of our teaching load.

## Consultations

The University Library, Grenfell Campus, the Marine Institute, Faculty of Engineering, Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Medicine, School of Pharmacy and Departments within the Faculty of Science. The consultation email dialogues are appended to the end of this document (Appendix 2, page 51).

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):


Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Calendar Changes

## Under Section 10.1.2, Biochemistry:

### 10.1.2.1 Major in Biochemistry

Required courses to complete the major:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000, 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry 2100, 2101, 2200 (or 2100), 2201, 2901, 3105, 3106, 3107, 3206, 3207, 3108, and 3906 or 3907.
c. At least 129 credit hours in courses from Biochemistry 2600, 3203, 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
d. Six additional credit hours chosen from: Medicine 310A/B, Biochemistry 2600, Biology 2060, Biology 3050, Chemistry 4201, 4701 or Biochemistry courses at the 3000 or 4000 level.
e. Chemistry 2301 or Physics 2053; Chemistry 2400, 2401.
f. One of Chemistry 2100, Environmental Sciences 3210.
g. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the degree total up to 120 credit hours.

### 10.1.2.2 Honours Degree in Biochemistry

1. Required courses:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry $2100,2101,2200$ (or 2100), 2201, 2901, 3105, 3106, 3107, 3206, 3207, 3108, 3906, 3907, 4102, 499A, 499B, Medicine 310A/B, and either Biochemistry 4210 or 4211.
c. Twelve Nine credit hours in courses from Biochemistry 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
d. Six additional credit hours chosen from Biochemistry 2600, Biology 3050, Chemistry 4201, 4701, or Biochemistry courses at the 3000 or 4000 level.
e. Chemistry 2301 or Physics 2053, Chemistry 2400, 2401. one of Chemistry 3411 of 4410.
f. One of Chemistry 2100, Environmental Sciences 3210.

## g. Statistics 2550 or equivalent

h. A sufficient number of elective courses to bring the total for the degree up to 120 credit hours.
2. Those courses in which a grade "B" or an average of $75 \%$ or higher are required, as specified under 7.5.6.1 of the Regulations for the Honours Degree of Bachelor of Science, are those listed in clauses 1 (b), (c), and (d) above and Chemistry 2400 and 2401.Those courses in which a grade "B" or an average of 75\% or higher are required, as specified under 7.5.6.1 of the Regulations for the Honours Degree of Bachelor of Science, are 48 credit hours from those listed in clauses 1 (b) and (c).

### 10.1.2.3 Minor in Biochemistry

Students who take a minor in Biochemistry will complete:

1. Biochemistry $2101,3106 \underline{2201, ~ 2901, ~} 3206$.
2. One of Biochemistry 2100 2200, 2600, Biology 2250.
3. Nine Six credit hours in Biochemistry at the 3000 or 4000 level; or 6 credit hours in Biochemistry at the 3000 or 4000 level and Biology 3050 .
4. Either Chemistry 2400 and either Chemistry 2401,-or Chemistry 2400 and or one additional Biochemistry course at the 3000 or 4000 level.

Course prerequisites stipulated in the course descriptions shall apply to a minor in Biochemistry.

### 10.1.2.4 Major in Nutrition

1. Required courses to complete the major:
a. English 1090 or the former 1080 (or 1000), and 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000; Physics 1020 and 1021 (or Physics 1050 and 1051); Chemistry 1050, 1051 (or Chemistry 1200 and 1001).
b. Biochemistry 2005, 2100, 2101, 2200 (or 2100), 2201, 2600, 2901, 3106, 3203, 3206, 3402 , 3906, 4300, 4301, Medicine 310A/B.
c. Six credit hours in courses from Biochemistry 3052, 3107, 3108, 3202, 3402, 3600, 3907, 4002 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239, 4240, 4241-4249, Biology 3050.
d. Chemistry 2400
e. Statistics 2550 or equivalent
f. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the degree up to a total of 120 credit hours.

### 10.1.2.5 Honours Degree in Nutrition

1. Required courses:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry 2005, 2100, 2101, 2200 (or 2100), 2201, 2600, 2901, 3106, 3107, 3203, 3206, 3207, 3402, 3600, 4002, 3906, 4300, 4301, 4502, 499A, 499B, Medicine 310A/B.
c. Twelve Nine additional credit hours chosen from Biochemistry 3052, 3105, 3108, 3202, $3402,3600,3906,4002,4101,4103,4104,4105,4200,4201,4210,4211,4230,4231-$ 4239, 4240, 4241-4249, Biology 3050,-Chemistry 4701.
d. Chemistry 2400
e. Statistics 2550 or equivalent
f. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.
2. Those courses in which the grades specified under 6.5.6.1 of the Regulationsfor the Honours Degree of Bachelor of Science are 60 credit hours chosen from Biochemistry courses, Med 310A/B, and Biology 3050 . . Those courses in which a grade "B" or an average of $75 \%$ or higher are required, as specified under 7.5.6.1 of the Regulations for the Honours Degree of Bachelor of Science, are 51 credit hours from those listed in clauses 1 (b) and (c).

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

## Under Section 10.1.2, Biochemistry:

### 10.1.2.1 Major in Biochemistry

Required courses to complete the major:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000, 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry 2200 (or 2100), 2201, 2901, 3105, 3206, 3207, 3108, and 3906 or 3907.
c. At least 9 credit hours in courses from Biochemistry 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
d. Six additional credit hours chosen from: Medicine 310A/B, Biochemistry 2600, 3203, Biology 2060, Biology 3050, Chemistry 4201, 4701 or Biochemistry courses at the 3000 or 4000 level.
e. Chemistry 2301 or Physics 2053; Chemistry 2400, 2401.
f. One of Chemistry 2100, Environmental Sciences 3210.
g. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the degree total up to 120 credit hours.

### 10.1.2.2 Honours Degree in Biochemistry

1. Required courses:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry 2200 (or 2100), 2201, 2901, 3105, 3206, 3207, 3108, 3906, 3907, 4102, 499A, 499B, Medicine 310A/B, and either Biochemistry 4210 or 4211.
c. Nine credit hours in courses from Biochemistry 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
d. Six additional credit hours chosen from Biochemistry 2600, Biology 3050, Chemistry 4201, 4701, or Biochemistry courses at the 3000 or 4000 level.
e. Chemistry 2301 or Physics 2053, Chemistry 2400, 2401.
f. One of Chemistry 2100, Environmental Sciences 3210.
g. Statistics 2550 or equivalent
h. A sufficient number of elective courses to bring the total for the degree up to 120 credit hours.
2. Those courses in which a grade "B" or an average of $75 \%$ or higher are required, as specified under 7.5.6.1 of the Regulations for the Honours Degree of Bachelor of Science, are 48 credit hours from those listed in clauses 1 (b) and (c).

### 10.1.2.3 Minor in Biochemistry

Students who take a minor in Biochemistry will complete:

1. Biochemistry 2201, 2901, 3206.
2. One of Biochemistry 2200, 2600, Biology 2250.
3. Six credit hours in Biochemistry at the 3000 or 4000 level.
4. Chemistry 2400 and either Chemistry 2401 or one additional Biochemistry course at the 3000 or 4000 level.

Course prerequisites stipulated in the course descriptions shall apply to a minor in Biochemistry.

### 10.1.2.4 Major in Nutrition

1. Required courses to complete the major:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000; Physics 1020 and 1021 (or Physics 1050 and 1051); Chemistry 1050, 1051 (or Chemistry 1200 and 1001).
d. Biochemistry 2005, 2200 (or 2100), 2201, 2600, 2901, 3203, 3206, 3906, 4300, 4301, Medicine 310A/B.
e. Six credit hours in courses from Biochemistry 3052, 3108, 3402, 3600, 3907, 4002, 4105, 4200, 4230, 4240, 4241-4249, Biology 3050.
d. Chemistry 2400
e. Statistics 2550 or equivalent
f. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the degree up to a total of 120 credit hours.

### 10.1.2.6 Honours Degree in Nutrition

1. Required courses:
a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1050, 1051 (or Chemistry 1200,1001).
b. Biochemistry 2005, 2200 (or 2100), 2201, 2600, 2901, 3203, 3206, 3207, 3906, 4300, 4301, 4502, 499A, 499B, Medicine 310A/B.
c. Nine additional credit hours chosen from Biochemistry 3052, 3108, 3402, 3600, 4002, 4105, 4200, 4201, 4230, 4240, 4241-4249, Biology 3050.
d. Chemistry 2400
e. Statistics 2550 or equivalent
f. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.
2. Those courses in which a grade " B " or an average of $75 \%$ or higher are required, as specified under 7.5.6.1 of the Regulations for the Honours Degree of Bachelor of Science, are 51 credit hours from those listed in clauses 1 (b) and (c).

## Rationale

In the current laboratory components of most of the individual Biochemistry lab+lecture courses (Bioc 2100, 2101, 3106, 3107), students only do $\sim 4$ hands-on labs per course and often there is little logical connection from one lab to the next. Our proposed new lab courses (Bioc 2901, 3906, 3907) will be more "project-based"; students will follow one or two specific projects through most of the course. The new lab courses will also promote a much more intensive experience - so that students really improve and master their laboratory skills as opposed to merely having been exposed to particular techniques. Each course will consist of a lecture hour, a three-hour laboratory, and a follow-up tutorial session. The lecture hour will provide contextual overview of the major techniques or approaches that will be used in each lab, so that students are ready to hit the ground running and make the best use of their 3 hours in the lab. The tutorial hour will provide additional face-to-face time for students to practice calculations, write quizzes, and/or carry out supplementary analyses, etc., with help from lab instructors and teaching assistants.

In order to accommodate the three new courses, we have revised the lists of required courses in each of our programs; and we have revised and rationalized the lists of elective courses especially in the Biochemistry (Nutrition) programs. Overall, the program changes that accompany the introduction of these new lab courses will result in students in Major in Biochemistry and Major in Biochemistry (Nutrition) programs being required to take one additional course in Biochemistry. We feel this change is reasonable. Biochemistry Honours students will take 2 additional Biochemistry courses, but one Chemistry course requirement will be removed. Students in Biochemistry
(Nutrition) Honours will be required to take 2 fewer Biochemistry courses than they presently do. This change will bring the Biochemistry (Nutrition) Honours program more into line with the Biochemistry Honours program and other similar honours degrees.

As a consequence of the addition of these proposed lab courses, we also propose to remove the lab component of courses Bioc 2100, 2101, 3106, 3107, and renumber these to 2200, 2201, 3206, 3207, to denote the new "lab free" versions of the courses. We have modified current Biochemistry course calendar entries to include these new courses as appropriate, in pre-requisite and creditrestriction entries.

We anticipate continuing to use the course number Bioc 2100, a course that was recently crosslisted with Biol 2250, to allow Biology students to take a version of the course with the labs. The labs for Bioc 2100/Biol 2250 will continue to be offered by the Biology Department.

Our intention is to offer Bioc 2101 for the last time in Winter 2018. Bioc 2201 and 2901 would be offered for the first time in September 2018. Bioc 3106 would be offered for the last time in Winter 2019 and Bioc 3206 would be offered for the first time in Fall 2019. Bioc 3107 would be offered for the last time in Fall 2018 and Bioc 3207 would be offered for the first time in Fall 2019. Bioc 3907 would be offered for the first time in Fall 2018 and Bioc 3906 would be offered for the first time in Winter 2019. Thus, the changes will track through with the cohort of Biochemistry students who start their $2^{\text {nd }}$ year in Fall 2018. There will inevitably be some special cases of students who are out of sequence and will wind up with a hybrid of the courses required for the old version of the degree and the new version of the degree; these will be dealt with on a case-by-case basis and care will be taken not to disadvantage the students caught up in the crossover years.

Finally, we propose updates to Joint Biochemistry and Joint Biochemistry (Nutrition) Honours programs to include the new laboratory courses and revised course numbers. These updates don't lead to any increase in the number of courses required to complete the joint programs.

## Consultations Sought From

Biology
Chemistry
Computer Science
Earth Sciences
Education
Engineering
Geography
Grenfell
Humanities and Social Sciences
Marine Institute
Mathematics and Statistics
Medicine
Ocean Sciences
Pharmacy
Physics and Physical Oceanography
Psychology

Comments Received
yes
yes
no
yes
no
yes
no
no
no
yes
no
no
yes yes yes yes

Signature: Dean, Associate Vice-President (Academic) or Vice-President Name

## FOR OFFICE USE ONLY

## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary: $\qquad$

Date:

# Proposal <br> Three New Dedicated Lab Courses in Biochemistry Bioc 2901 <br> Bioc 3906 Bioc 3907 

## Executive Summary

This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.

This package is structured in 4 parts:
1: Proposed Biochemistry program changes related to new, dedicated lab courses
2: Proposal for new, dedicated lab courses (Bioc 2901, 3906, 3907)
3. Proposed modifications to existing courses (Bioc 2100, 2101, 3106, 3107) to remove the lab components of the existing courses and renumber them (Bioc 2200, 2201, 3206, 3207).
4. Proposed modifications to joint programs

## Resource Implications: Instructional Costs

Please see accompanying program change form.

## Consultations

The University Library, Grenfell Campus, the Marine Institute, Faculty of Engineering, Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Medicine, School of Pharmacy and Departments within the Faculty of Science. The consultation email dialogues are appended to the end of this document (Appendix 2, page 51).

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):


Date:

Date:

## Sample Course Outlines and Methods of Evaluation:

## 2901 Biochemistry Laboratory

Sample assessment scheme (at least $20 \%$ of the grade will be provided to students before the final drop day):

Quizzes 25\%,
Lab Book 20\%,
Reports: 25\%,
Final presentation or exam: 25\%,
Lab performance (e.g. accurately determine the concentration of a mystery solution): 5\%

Sample Schedule:

| Week | Lecture | In Tutorial Quiz and Practice for Lab and Next Week's Quiz | Lab |
| :---: | :---: | :---: | :---: |
| 1 | 1) Outline of recombinant protein expression and purification <br> 2) Buffer Calculations - e.g. how much to weigh out? <br> Volume of stock solution to take. Will include a reminder of WHMIS labeling. <br> 3) Spectrophotometry, standard curves. | Practice Buffer calculations and spectrophotometry calculations. | - Safety <br> - Ethics (how NOT to cook your data, etc) <br> -Pipetting (1 ul -> 5 ml) <br> - Using an analytical balance <br> - Keeping a lab book (Part <br> 1) <br> -Glass care |
| 2 | $\cdot \mathrm{pH}$ <br> -buffers <br> -amino acids, polypeptides, and charge | Buffer calculations, spectrophotometry. | - Spectophotometry <br> - Make a standard curve plot on paper <br> -Ascertain the concentration of a solution of unknown concentration. -hand your lab book in |
| 3 | - methods for protein enrichment (nickel affinity, size exclusion, anionic exchange, cationic exchange) | pH, buffers, HendersonHasselbalch | -make stock solutions for nickel purification <br> -use a pH meter to help adjust pH <br> -computer data analysis (using excel, etc) could just replot from last week - Keeping a lab book (Part 2) |
| 4 | -protein basics | -nickel affinity chromatography | -run a nickel column and collect fractions (elute with imidazole or pH ) |
| 5 | - electrophoresis <br> -how to measure apparent |  | $\cdot$-absorbance of 1.8 ml fractions from the nickel |


|  | molecular weight |  | column (disposable cuvettes) <br> -PLOT - on computer <br> -Keeping a lab book (3) <br> -hand in your lab book day |
| :---: | :---: | :---: | :---: |
| Midterm Break |  |  |  |
| 6 | -other methods of protein enrichment | -electrophoresis | -run an SDS PAGE gel with nickel fractions <br> -clean/regenerate column |
| 7 | $\bullet$ •protein assays | $\bullet$ other methods of protein enrichment | -dialyze half their protein (next week will compare protein assays with and without dialysis) plus "demonstration" lab - e.g. sizing column, field trip to HPLC, ion exchange, -Round 1 lab report |
| 8 | $\bullet$-protein bioinformatics | -quiz on protein assay why might two different proteins work out differently? | - protein assay (e.g. Biorad and 280) to determine protein concentration their protein + BSA or gelatin |
| 9 | $\bullet$ •enzymes and enzyme kinetics |  | -bioinformatics lab (computers) <br> -Round 2 lab report for peer critiquing |
| 10 | -enzyme inhibition |  | -enzyme kinetics 1 (activity) -note current enzyme labs use not very pure enzyme |
| 11 | -how to present |  | -enzyme kinetics 2 <br> (inhibition) <br> -Round 3 lab report |
| 12 |  |  | Presentation day - e.g. posters, etc, FOR MARKS |

## 3906 Nutritional Biochemistry and Metabolism Laboratory

Sample grading scheme: scheme (at least $20 \%$ of the grade will be provided to students before the final drop day):
Lab performance (assessed by lab book and in lab skills demonstrated): 20\%
Lab reports (6 x 5\%): 30\%
Lab quizzes: ( $4 \times 5 \%$ ): 20\%
Lab exam: 15\%
Presentation or Assignment: 15\%
Sample schedule (details will depend on the course instructor):

- Week 1: oxygen electrode assays with mitochondria
- Week 2: oxygen electrode assays with mitochondria (continued)
- Week 3: Level 1 tissue culture (e.g. $\mathrm{CHO}, \mathrm{NIH} / 3 T 3$, or MDAMB231) techniques (e.g. half in glucose and half in galactose, or effects of a hormone)
- Week 4: count cells and plate cells (plan for a large fraction of students to have contaminated their cells)
- Week 5: assay 1 (e.g. for metabolism with MTT assay) + statistical analysis
- Week 6: assay 2 (e.g. LDH activity assay) + statistical analysis
- Week 7: lyse cells, protein assay (e.g. DC assay)
- Week 8: SDS PAGE
- Week 9: Immunoblot + visualization
- Week 10: quantification of gels (gel doc) + Statistical analysis of gel doc data
- Week 11: bioinformatics lab - e.g. glycosylation
- Weeks 12: presentation day


## Bioc 3907

A least $20 \%$ of the grade will be provided to students before the final drop day. Two sample schemes are provided to give some indication as to how different instructors might choose to assess the students in the course.

Sample assessment scheme \#1: 60\% (5\% x 12) weekly assessment;
20\% lab exam;
20\% final exam

Sample assessment scheme \#2: 25\% (5\% X 5) lab reports;
10\% tutorial participation/performance;
15\% lab skill assessment;
20\% lab exam;
30\% final exam

## Sample schedule:

| A | - Lecture on molecular biology of DNA restriction <br> - Lab on DNA restriction enzymes and effects of DNA methylation on targeting by restriction enzymes (based on current 3107 lab) <br> - Tutorial on Restriction Enzyme databases |
| :---: | :---: |
| B | - Lecture on the polymerase chain reaction <br> - Lab on basic PCR - with variations to illustrate problems that can arise;(possibly also start reactions for Lab C) <br> - Tutorial on PCR, choosing primers and annealing conditions |
| C | - Lecture on (a) electrophoresis and purification of DNA/RNA; and (b) cloning individual DNA fragments (including DNA ligases) <br> - Lab on purification and analysis of DNA fragment for cloning OR PCR amplification and purification of specific fragment of interest; start preparation of vector DNA <br> - Tutorial TBD |
| D | - Lecture on DNA Libraries - how to construct and analyse <br> - Lab on ligation of DNA samples, and preparation of competent cells <br> - Tutorial TBD |
| E | - Lecture: (possibly omit this week; or site-directed mutagenesis strategies) <br> - Lab Exam: Determine identity of plasmid based on restriction analysis (students will be given one of 3 or 4 plasmids and a choice of 3 or 4 restriction enzymes; they must design an unambiguous strategy for identification and then execute it.) <br> - Tutorial (possibly omit this week) |
| F | - Lecture on competence in bacteria and methods for DNA uptake in bacteria and eukaryotes <br> - Lab on transformation of competent bacteria with recombinant DNA plasmid (backup plan - have Prep room prepare competent cells in advance) <br> - Tutorial on bacterial growth and selection methods |


| G | - Lecture on gene expression systems (both eukaryotic and prokaryotic) <br> - Lab on purification and identification of DNA (minipreps and restriction analysis) - long lab but done now in 3107 <br> - Tutorial on gene expression systems (opportunity for presentations on assigned systems by different groups?) |
| :---: | :---: |
| H | - Lecture on DNA sequencing techniques, whole genome sequencing <br> - Lab on bioinformatics and statistics (e.g. analyze a provided set of microarray data OR web-based portals to analyze data or explore gene expression/transcriptomics) - done outside of lab (i.e. no wet labs this week) <br> - Local DNA sequencers in CREAIT could be used to complement this section <br> - Tutorial on bioinformatics (opportunity for presentations on assigned topics by different groups?) |
| I | - Lecture on Omics techniques and high-throughput approaches <br> - Lab on expression of a gene product in bacterial cells (provide O/N culture, induce cells, collect and save for analysis <br> - Tutorial on local DNA sequencing technology |
| J | - Lecture on genome manipulation, knockout mutations, transposons as well as various ways to assess gene products <br> - Lab on expression of a gene product in bacterial cells (analysis of saved samples) <br> - Tutorial on Western blotting, modern quantification techniques |
| K | - Lecture on imaging techniques, nano-scale, and single-molecule approaches <br> - Lab time in reserve should it be needed to make up time <br> - Tutorial TBD |
| L | - Lecture on Advanced PCR strategies such as 3' and 5' RACE for cloning and for expression analysis <br> - Lab time reserved for possible presentations <br> - Tutorial (exam review) |

## Texts

We are not planning to use textbooks for the new dedicated lab courses Bioc 2901, 3906, 3907. It is anticipated that course instructors and laboratory teaching staff will prepare laboratory manuals and that these will be made available either through the University Bookstore or through Brightspace.

## Instructors

Bioc 2901: Possible instructors include Biochemistry faculty members Valerie Booth and Rob Brown. Bioc 3906: Possible instructors include Biochemistry faculty members Rob Brown, Sherri Christian, Ryan Mailloux, Rob Bertolo and Janet Brunton
Bioc 3907: Possible instructors include Biochemistry faculty members Martin Mulligan and Sherri Christian.

## SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title Biochemistry 2901 Biochemistry Laboratory
Abbreviated Course Titles Biochemistry Lab.

## Calendar Changes - Additions to Section 11.1 Biochemistry

2901 Biochemistry Laboratory develops robust basic biochemistry lab skills in the context of a biotechnology project; students purify and characterize a recombinantly expressed enzyme. Students learn skills including safety, pipetting, buffer calculations, making solutions, protein bioinformatics, techniques for protein enrichment, enzyme kinetics measurements and calculations, graphing data, keeping a lab book, teamwork, critical analysis and presentation of their work in several formats. Students may co-author a scientific publication based on their results.

AR: attendance is required in the laboratory component of this course
PR: Chemistry 1051, Science 1807
CO: Chemistry 2400
LC: 1 hour
OR: 1 hour tutorial per week
LH: 3 hours
Course Number and Title Biochemistry 3906 Nutritional Biochemistry and Metabolism Laboratory
Abbreviated Course Title Nutr. Biochem. Metabolism Lab.

## Calendar Change(s) - Additions to Section 11.1 Biochemistry

3906 Nutritional Biochemistry and Metabolism Laboratory teaches advanced biochemical lab and critical thinking skills with a focus on metabolism and nutrition-related biochemistry. Topics may include animal diet formulation, tissue culture, immunoblots, metabolic flux assays, metabolic regulation, nutrient metabolism, metabolomics and metabolic energetics. Students develop their quantitative reasoning, teamwork and communication skills (written and oral). Students may have opportunities to tour lab facilities and to co-author a scientific publication based on their results.

AR: attendance is required in the laboratory component of this course
PR: BIOC 2901, Science 1807
PR/CO: BIOC 3106 or 3206
LC: 1 hour
OR: 1 hour tutorial per week
LH: 3 hours

Course Number and Title: Biochemistry 3907 Molecular Biology Laboratory
Abbreviated Course Title: Molecular Biology Lab.

## Calendar Change(s) - Additions to Section 11.1 Biochemistry

3907 Molecular Biology Laboratory develops biochemical lab and critical thinking skills through a molecular biology focused project. Topics may include restriction digestion, PCR amplification-based techniques, recombinant DNA and plasmid construction, gene expression systems, nucleic acid bioinformatics, and application of high through-put methods in molecular biology. Students develop their quantitative reasoning, teamwork and communication skills (written and oral). Students may have the opportunity to co-author a peer-reviewed scientific publication based on their results.

AR: attendance is required in the laboratory component of this course
PR: BIOC 2901, Science 1807, and one of BIOC 2100, 2200, Biology 2250
LC: 1 hour
OR: 1 hour tutorial per week
LH: 3 hours

## Secondary Calendar Changes

These are listed in Section 3 of this document (starting on page 24)

## Rationale

See rationale on page 7-8.

## Consultations

The University Library, Grenfell Campus, the Marine Institute, Faculty of Engineering, Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Medicine, School of Pharmacy and Departments within the Faculty of Science. The consultation email dialogues are appended to the end of this document.

## Consultations Sought From

Biology
Chemistry
Computer Science
Earth Sciences
Education
Engineering
Geography
Grenfell
Humanities and Social Sciences
Marine Institute
Mathematics and Statistics
Medicine
Ocean Sciences
Pharmacy
Physics and Physical Oceanography
Psychology

## Comments Received

## yes

yes
no
yes
no
yes
no
no
no
yes
no
no
yes
yes
yes yes

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name

## FOR OFFICE USE ONLY

 APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIESChair:
Secretary:
Date:

# Proposal <br> Remove Labs and Renumber Existing Courses Bioc $2100 \rightarrow$ Bioc 2200 Bioc 2101 $\boldsymbol{\rightarrow}$ Bioc 2201 Bioc $3106 \rightarrow$ Bioc 3206 Bioc $3107 \rightarrow$ Bioc 3207 

## Executive Summary

This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.

This package is structured in 4 parts:
1: Proposed Biochemistry program changes related to new, dedicated lab courses
2: Proposal for new, dedicated lab courses (Bioc 2901, 3906, 3907)
3. Proposed modifications to existing courses (Bioc 2100, 2101, 3106, 3107) to remove the lab components of the existing courses and renumber them (Bioc 2200, 2201, 3206, 3207).
4. Proposed modifications to joint programs

Resource Implications: Instructional Costs
None.

## Library Holdings and/or Other Resources Required

There are no added library costs associated with these course modifications.

Signature of Unit Head (if appropriate): $\qquad$
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SUMMARY PAGE FOR SENATE

## Approval Form

Course Number and Title: Biochemistry 2200 Introduction to Molecular Biology and Genetics
Abbreviated Course Title : Intro Molecular Biol\&Gen
Calendar Changes: Addition Under Section 11.1 Biochemistry:
2200 Introduction to Molecular Biology and Genetics-will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of heredity; the structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: BIOC 2100, Biology 2250
UL: Biology students should normally take Biology 2250 in the Fall semester, and
Biochemistry and Biochemistry (Nutrition) students should normally take BIOC 2200 in Winter semester.

Course Number and Title: Biochemistry 2201 Introduction to Biochemistry

Abbreviated Course Title: Intro to Biochemistry
Calendar Changes: Changes Under Section 11.1 Biochemistry
21012201 Introduction to Biochemistry is an introduction to the major organic substances of living organisms, proteins, carbohydrates and lipids: their structure, analysis and biochemical function. Other topics include: enzymes; the biochemistry of membranes, including the plasma membrane and specialized intracellular membranes; and the biochemistry of selected differentiated cells.

CR: BIOC 2101, Pharmacy 2004, or the former Pharmacy 3110
LH: one three-hour laboratory period on alternate weeks
PR: Chemistry 2400; and Physics 1020 or 1050, and 1021 (or 1051); and Science 1807. Physics 1021 or 1051 can be done concurrently.

Course Number and Title: Biochemistry 3206 Metabolism

## Abbreviated Course Title: Metabolism

Calendar Changes: Changes Under Section 11.1 Biochemistry
3106-3206-Metabolism examines the catabolism of carbohydrates, lipids and amino acids. Other topics will be: mitochondria, chloroplasts and ATP synthesis; biosynthesis of carbohydrates and lipids; metabolic specialization of differentiated cells and tissues; and, integration of metabolism.

CR: BIOC 3106, the former BIOC 3102 or Pharmacy 3111
LH: one three-hour laboratory or one-hour tutorial per week
OR: one-hour tutorial or one three-hour laboratory per week
PR: BIOC 2101 or 2201, and Science 1807

Course Number and Title: Biochemistry 3207 Nucleic Acid Biochemistry and Molecular Biology
Abbreviated Course Title: Nucleic Acid Bioch \& Mol Bi

## Calendar Changes: Changes Under Section 11.1 Biochemistry

31073207 Nucleic Acid Biochemistry and Molecular Biology examines the structure, function and biochemistry of DNA and RNA and the biochemical processes in the flow of information from the gene to protein. These will include: DNA replication, recombination and repair processes; transcription of RNA and RNA splicing; and protein synthesis. The regulation of gene expression will also be covered at an introductory level. The course will also include an introduction to cloning methodology.

LH: up to four hours per week which will normally consist of one three hour laboratory period plus oneadditional hour on the following day.

PR: BIOC 2101 OR 2201; and one of BIOC 2100, 2200, or Biology 2250, and Science-1807 CR: BIOC 3107

Calendar Changes to Biochemistry course descriptions under Section 11.1 Biochemistry
3105 Physical Biochemistry examines topics such as: types of intermolecular forces in biomolecules; the folding of biomolecules and the role of water; pH , buffers, and ionisation of biomolecules; thermodynamics: equilibria, coupled reactions, transport across membranes and redox reactions; and ligand binding. Other topics will include: size and shape of biomolecules; isotopes in biochemistry; and, spectroscopy of biomolecules.

OR: a two hour problem-solving class
PR: BIOC 2101 or 2201; and the former Chemistry 2300 or 2301 or Physics 2053
3108 Molecular Biochemistry of the Cell focuses on the molecular biochemistry of intracellular regulation, including advances in topics such as signal transduction, apoptosis and cancer. Other topics will include protein processing and sorting, cyclins, G-protein structure, function and regulation,
cell adhesion molecules and the structure of the extracellular matrix.
PR: BIOC 2100 or 2200, or Biology 2250; and BIOC 2101 or 2201
3203 Fundamentals of Human Nutrition is the cornerstone course for the study of nutrition. The sources, uptake and physiologic roles of essential nutrients will be discussed in the context of growth, maintenance, reproduction and overall health in humans.

CO: BIOC 3106 or 3206
CR: the former BIOC 3201
PR: BIOC 2101 or 2201, 2600
3402 Food Chemistry examines the following topics: water structure and the role of water in chemical reactions and mechanical properties of foods; chemistry and physical properties of carbohydrates, proteins and lipids; food dispersions; pigments and natural colorants; food flavour; enzyme properties and applications; vitamins and minerals; chemistry of enzymic and non- enzymic browning; characteristics of: muscle tissue, milk, eggs, bread and edible plant tissue; food additives; and, chemical changes in foods during processing.

LH: one period per week
PR: BIOC 2005; BIOC 2101 or 2201; Chemistry 2400, and Science 1807

4002 Biochemical Regulation examines metabolic regulation at the cellular and multicellular level. Topics will include: control theory; hormones: their biosynthesis and mechanism of action; signal transduction; and, endocrine coordination of metabolic processes. Principles will be illustrated by the use of case studies from the medical and veterinary literature.

LC: two to three hours per week, together with assigned reading and case studies
PR: BIOC 2100 or 2200, or Biology 2250; BIOC 3106 or 3206
4103 Prokaryotic Gene Regulation is a detailed and up-to-date treatment of the mechanisms of genetic regulation found in bacterial cells. The course will develop topics based on the evidence of bacterial genetics and modern molecular biological experiments. Topics may include: theory of mutations, RNA transcription, positive and negative regulation of transcription; regulation of protein synthesis; control of DNA replication; bacterial operons and regulons; developmental molecular biology in bacterial systems; and evolution and molecular biology of organelles.

PR: BIOC 3107 or 3207
4104 Eukaryotic Gene Regulation and Developmental Biology details the cellular and molecular aspects of eukaryotic gene regulation and development. Topics to be covered will include the DNA content and organization of eukaryotes, mechanisms controlling the expression of eukaryotic genetic information at the transcriptional and post-transcriptional levels, and the methodologies used to define these mechanisms. Detailed consideration will be given to the cell-surface events which regulate nuclear gene expression and cell lineage specification. Developmental mechanisms operating in a number of model systems will be discussed.

PR: One of BIOC 3107,_or 3108, or 3207
4211 Biochemical Research Techniques II introduces students to the primary literature of
metabolism. It teaches them to critique, both orally and in writing, current research papers. By means of guest lecturers and field trips it introduces students to biochemical activities outside of the home department.

AR: attendance is required
PR: BIOC 3106 or 3206

## Secondary Calendar Changes

Under Section 4 Bachelor of Science in Nutrition (Dietetics Option), Memorandum of Understanding (MOU) between Memorial University of Newfoundland and Acadia University:
4.3.1.6.1 Pharmacy 2002, 2003, and one of Pharmacy 2004 of Biochemistry 2101, or 2201 (only students who are selected for this program will be permitted to register for these Pharmacy courses)
4.3.4 Program Tables (two places): replace (or Biochemistry 2101) with (Biochemistry 2101 or 2201)

Under Faculty of Medicine 11 Course Descriptions
310A and 310B Human Physiology covers the properties of nerve and muscle cells, the special senses, blood and body fluids, and the nervous, cardiovascular, digestive, immune, respiratory, urinary, endocrine and reproductive systems. Integration of the body's systems in maintaining homeostasis is emphasized. Priority for entry into this course is given to Biochemistry, Nutrition, Dietetics, and other students who are interested in experimental science.
CH: 6
CO: Biochemistry 2101 or 2201
CR: Biochemistry 311A/B
LH: to be specified
PR: Biochemistry 2101 or 2201

## Under School of Pharmacy 12 Course Descriptions

2004 Introduction to Biochemistry is an introduction to the major organic substances of living organisms, proteins, carbohydrates and lipids: their structure, analysis and biochemical function. Other topics include: enzymes; the biochemistry of membranes, including the plasma membrane and specialized intracellular membranes; and the biochemistry of selected differentiated cells.
CR: Biochemistry 2101, 2201
OR: tutorials as required
PR: Chemistry 2400 and Physics 1020 (or 1050), and 1021 (or 1051)
3111 General Biochemistry covers the catabolism of carbohydrates, lipids and amino acids. Mitochondria, chloroplasts and ATP synthesis. Biosynthesis of carbohydrates and lipids. Metabolic specialization of differentiated cells and tissues. Integration of metabolism.
CR: Biochemistry 3106, 3206
OR: tutorials as required
PR: One of PHAR 2004, of Biochemistry 2101, or 2201

## Under Section 6.1 Joint Honours:

Under Section 6.1.1 Applied Mathematics and Chemistry Joint Honours (B.Sc. Only)

The following courses are required:

1. English 1090 or the former English 1080 and English 1110 (or equivalent).
2. A computing course. Computer Science 1510 is recommended.
3. Biochemistry 21012201 or 2901.
4. Physics 1050 (or 1020) and 1051 (or 1021).
5. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3001, 3132, 3161, 3202, 3210, 4160.
6. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.
7. Six additional credit hours chosen from courses numbered 3000 or higher that are offered by the Department of Chemistry.
8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
9. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.

## Under 6.1.13 Chemistry and Physics Joint Honours:

The following courses are prescribed:

1. Mathematics 1000, 1001, 2000, 2050, 3202, and 2260.
2. Physics 1050 (or 1020) and 1051, 2055, 2750 or $2056,2820,3220,3500,3750,3820,3900$, 4820, 3 additional credit hours in a Physics course numbered 3000 or higher and 6 additional credit hours in Physics courses numbered 4000 or higher.
3. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, and 6 additional credit hours in Chemistry courses numbered 3000 or higher.
4. Biochemistry 2101 Biochemistry 2201 or 2901.
5. An Honours Dissertation (Chemistry 490A/B or Physics 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
6. A sufficient number of elective courses to bring the degree total to 120 credit hours.
7. English 1090 or the former English 1080 and English 1110 (or equivalent).

## Under 6.2 Joint Majors 6.2.13 Marine Biology

## 2. Program of Study

Students pursuing a Joint Major in Marine Biology are required to complete a minimum of 33 credit hours in Biology and 33 credit hours in Ocean Sciences as follows:
a. English 1090 and 1110 (or equivalent);
b. Mathematics 1000;
c. Earth Sciences 1000;
d. Statistics 2550 (or equivalent);
e. Physics 1020 and 1021 (or equivalent);
f. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001), and 2440 (or 2400 and 2401);
g. Biochemistry 2201 (or the former 2101) and 3206 (or 3106);

Under 10.2.3.1 Major in Biology
6. Biochemistry 21012201 or the former 2101 and 3106

Under 10.2.3.2 Major in Biology (Cell and Molecular)
6. Biochemistry 21012201 or the former 2101 and 3106

Under 10.2.3.3 Major in Biology (Ecology and Conservation)
6. Biochemistry 21012201 or the former 2101 and 3106

Under 10.2.5 Honours in Biology
Under 10.2.5.2 Core Course Requirements
6. Biochemistry 21012201 or the former 2101 and 3106

## Under 10.2.6 Honours in Cell and Molecular Biology

Under 10.2.6.2 Core Course Requirements
6. Biochemistry $2101 \underline{2201}$ or the former 2101 and 3106

Under 10.2.7 Honours in Ecology and Conservation Biology
Under 10.2.7.2 Core Course Requirements
6. Biochemistry 21012201 or the former 2101 and 3106

Under 10.2.8 Honours in Marine Biology

## Under 10.2.8.2 Core Course Requirements

6. Biochemistry $2101 \underline{2201}$ or the former 2101 and 3106

## Under 10.3.4 General Degree - Major in Chemistry

The courses required for a Major in Chemistry are:

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, and 3411.
2. Physics 1050 (or 1020) and 1051 (or 1021).
3. Mathematics 1000, 1001, 2000, and 2050.
4. Biochemistry 2101, 2201 and 2901.

Under 10.3.5 Honours Degree in Chemistry
Students wishing to take Honours should consult those sections of the Calendar dealing Regulations for the Honours Degree of Bachelor of Science. 10.3.5.1 Required Courses

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031)(or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, 3411, and 490A/B.
2. 12 credit hours selected from the 4000 level Chemistry courses chosen in consultation with the 490A/B supervisor for chemistry.
3. Physics 1050 (or 1020) and 1051 (or 1021).
4. Mathematics 1000, 1001, 2000, and 2050.
5. Biochemistry 21012201 and 2901.

## Under 10.3.8 General Degree in Chemistry (Biological)

Students wishing to pursue a General Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible.

### 10.3.8.1 Required Courses

1. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, and 4410.
2. At least 6 credit hours from Chemistry $3210,3303,3411$ or any 4000 -level Chemistry course.
3. Biology 1001, 1002, 2250, 2060, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
4. Biochemistry 2101 2201, 2901 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
5. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
6. Physics 1050 (or 1020) and Physics 1051 (or 1021).
7. Six credit hours in English.

## Under 10.3.9 Honours Degree in Chemistry (Biological)

Students wishing to take Honours should consult those sections of the Calendar dealing with Regulations for the Honours Degree Bachelor of Science. Students wishing to pursue an Honours Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible.

### 10.3.9.1 Required Courses

1. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410 and 490A/B.
2. At least 3 credit hours from Chemistry 3210, 3303, 3411 or any 4000 -level Chemistry course not used to fulfill clause 3. below.
3. At least 3 credit hours from Chemistry 4151, 4201, 4206, 4305, or 4701.
4. Biology 1001, 1002, 2060, 2250, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
5. Biochemistry 2101 2201, 2901 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
6. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
7. Physics 1050 (or 1020) and Physics 1051 (or 1021).
8. Six credit hours in English.

## Under 10.9 Ocean Sciences

Under 10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology
3. Three credit hours selected among:
a. Biology 2122, 3401, 3640, 3715, 4251, 4605, 4750;
b. Biochemistry 3207 (or 3107), 3402, 4002, 4101, 4104, 4105, 4200, 4201;
c. Geography 4300.

## Under 10.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences

5. a minimum of 12 credit hours among:
a. Biology 2060, 2122, 2250, 2600, 2900;
b. Biochemistry 2100, 2201 (or the former 2101), 3206 (or 3106), 3207 (or 3107), 3108;

## Under 11 Course Descriptions

## Under 11.1 Biochemistry

2100 Introduction to Molecular Biology and Genetics (same as Biology 2250) will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of heredity; the structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: BIOC 2100, Biology 2250
LH: up to four hours on alternate weeks which will normally consist of one three hour laboratory period plus one additional hour on the following day

PR: Science 1807

UL: Biology students should normally take Biology 2250 in the Fall semester, and
Biochemistry and Biochemistry (Nutrition) students should normally take BIOC $2100 \underline{2200}$ in Winter semester.

## Under 11.2 Biology

## 2060 Principles of Cell Biology

is a modern view of the biology of eukaryotic cells, organelles and molecules and their interactions in the functioning of living organisms.
CO: Physics 1021 or 1051; Biochemistry 21012201 or the former 2101
CR: the former BIOL 3060
LH: 3
PR: Physics 1021 or 1051; Biochemistry 21012201 or the former 2101
PR: Science 1807; BIOL 1001, 1002 and 2250; Chemistry 2400

Biology 2250 Principles of Genetics (same as Biochemistry 2100) will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of heredity; the
structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: Biochemistry 2100, 2200
LH: up to four hours on alternate weeks which will normally consist of one three hour laboratory period plus one additional hour on the following day

PR: Science 1807
UL: Biology students should normally take BIOL 2250 in the Fall semester, and Biochemistry and Biochemistry (Nutrition) students should normally take Biochemistry 21002200 in Winter semester.

## 3050 Introduction to Microbiology

is a course in which the basic principles underlying microbial life are studied. Aspects include structure, function, bioenergetics and growth with an emphasis on prokaryotes. Also studied are viruses, microbial diseases, introductory principles of immunology and the control of microorganisms. The laboratory sessions provide training in culture and determinative techniques using microorganisms.
LH: 3
PR: Science 1807; BIOL 1001 and 1002; Biochemistry $2101 \underline{2201}$ or the former 2101

## 3951 Introduction to Bioinformatics

(same as Computer Science 3550) deals with the development and application of computational methods to address biological problems. The course will focus on the fundamental concepts, ideas and related biological applications of existing bioinformatics tools. This course will provide hands-on experience in applying bioinformatics software tools and online databases to analyze experimental biological data, and it will also introduce scripting language tools typically used to automate some biological data analysis tasks.
CR: Computer Science 3550
LH: 3
PR: BIOL 2060 or Biochemistry 21012201 or the former 2101, and one Computer Science course at the 1000 -level or above excluding Computer Science 1400, or Computer Science 1600 and Computer Science 2000; or Computer Science 2500 or Computer Science 2001, and one Biology course at the 1000-level or above excluding BIOL 2040 and BIOL 2041; or permission of the course instructor

## 4241 Advanced Genetics

has advanced topics in modern genetic analysis, including regulation of gene expression, developmental genetics, molecular basis of inherited disease, genomics, immunogenetics, behavioural genetics, and molecular evolution.
LH: 3
PR: Science 1807; BIOL 2250 and Biochemistry 21012201 or the former 2101

## 4245 Biophysics

is an examination of the physical properties involved in defining diffusion, membrane properties, electrochemical potentials and the processes of bioenergetics within cells and organelles. Selected
topics in biomechanics and the functioning of whole organisms with respect to size, shape, support, orientation, transport and motility.
LH: 3
PR: Science 1807; BIOL 2060 and Biochemistry 21012201 or the former 2101

## Under 11.9 Ocean Sciences

3640 Environmental Physiology of Animals (same as Biology 3640) covers physiological adaptations of animals facilitating their survival in natural environments with emphasis on physiological and biochemical responses of animals to extreme environments. Starting with the fundamental basis of physiological mechanisms, the course explores various aspects and the integration of major physiological processes (metabolism, respiration, osmoregulation) and how these relate to ecological niche.
CR: the former Biology 3403 or the former Biology 4455, Biology 3640
PR: Biology 2060; Biochemistry 3206 (or 3106)
UL: may not be used to fulfill the physiology course requirement for a Biology major, honours or joint honours program

## Calendar Entry After Changes

## Under Section 4 Bachelor of Science in Nutrition (Dietetics Option), Memorandum of Understanding (MOU) between Memorial University of Newfoundland and Acadia University:

4.3.1.6.1 Pharmacy 2002, 2003, and one of Pharmacy 2004, or Biochemistry 2101, or 2201 (only students who are selected for this program will be permitted to register for these Pharmacy courses)
4.3.4 Program Tables (two places): replace (or Biochemistry 2101) with (Biochemistry 2101 or 2201)

Under Section 6.1.1 Applied Mathematics and Chemistry Joint Honours (B.Sc. Only)
The following courses are required:

1. English 1090 or the former English 1080 and English 1110 (or equivalent).
2. A computing course. Computer Science 1510 is recommended.
3. Biochemistry 2201 or 2901.
4. Physics 1050 (or 1020) and 1051 (or 1021).
5. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3001, 3132, 3161, 3202, 3210, 4160.
6. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.
7. Six additional credit hours chosen from courses numbered 3000 or higher that are offered by the Department of Chemistry.
8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
9. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.

## Under 6.1.13 Chemistry and Physics Joint Honours:

The following courses are prescribed:

1. Mathematics 1000, 1001, 2000, 2050, 3202, and 2260.
2. Physics 1050 (or 1020) and $1051,2055,2750$ or $2056,2820,3220,3500,3750,3820,3900$, 4820, 3 additional credit hours in a Physics course numbered 3000 or higher and 6 additional credit hours in Physics courses numbered 4000 or higher.
3. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, and 6 additional credit hours in Chemistry courses numbered 3000 or higher.
4. Biochemistry 2201 or 2901.
5. An Honours Dissertation (Chemistry 490A/B or Physics 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
6. A sufficient number of elective courses to bring the degree total to 120 credit hours.

English 1090 or the former English 1080 and English 1110 (or equivalent).
Under 6.2 Joint Majors 6.2.13 Marine Biology

## 2. Program of Study

Students pursuing a Joint Major in Marine Biology are required to complete a minimum of 33 credit hours in Biology and 33 credit hours in Ocean Sciences as follows:
a. English 1090 and 1110 (or equivalent);
b. Mathematics 1000;
c. Earth Sciences 1000 ;
d. Statistics 2550 (or equivalent);
e. Physics 1020 and 1021 (or equivalent);
f. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001), and 2440 (or 2400 and 2401);
g. Biochemistry 2201 (or the former 2101) and 3206 (or 3106);

## Under 10.2.3.1 Major in Biology

6. Biochemistry 2201 or the former 2101 and 3106

Under 10.2.3.2 Major in Biology (Cell and Molecular)
6. Biochemistry 2201 or the former 2101 and 3106

Under 10.2.3.3 Major in Biology (Ecology and Conservation)
6. Biochemistry 2201 or the former 2101 and 3106

## Under 10.2.5 Honours in Biology

Under 10.2.5.2 Core Course Requirements
6. Biochemistry 2201 or the former 2101 and 3106

Under 10.2.6 Honours in Cell and Molecular Biology
Under 10.2.6.2 Core Course Requirements
6. Biochemistry 2201 or the former 2101 and 3106

Under 10.2.7 Honours in Ecology and Conservation Biology Under 10.2.7.2 Core Course Requirements
6. Biochemistry 2201 or the former 2101 and 3106

Under 10.2.8 Honours in Marine Biology

## Under 10.2.8.2 Core Course Requirements

6. Biochemistry 2201 or the former 2101 and 3106

## Under 10.3.4 General Degree - Major in Chemistry

The courses required for a Major in Chemistry are:

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, and 3411.
2. Physics 1050 (or 1020) and 1051 (or 1021).
3. Mathematics 1000, 1001, 2000, and 2050.
4. Biochemistry 2201 and 2901.

Under 10.3.5 Honours Degree in Chemistry
Students wishing to take Honours should consult those sections of the Calendar dealing Regulations for the Honours Degree of Bachelor of Science. 10.3.5.1 Required Courses

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, 3411, and 490A/B.
2. 12 credit hours selected from the 4000 level Chemistry courses chosen in consultation with the 490A/B supervisor for chemistry.
3. Physics 1050 (or 1020) and 1051 (or 1021).
4. Mathematics 1000, 1001, 2000, and 2050.
5. Biochemistry 2201 and 2901.

## Under 10.3.8 General Degree in Chemistry (Biological)

Students wishing to pursue a General Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible.

### 10.3.9.2 Required Courses

1. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, and 4410.
2. At least 6 credit hours from Chemistry $3210,3303,3411$ or any 4000 -level Chemistry course.
3. Biology 1001, 1002, 2250, 2060, and 3050 and at least 6 credit hours chosen from Biology

3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
4. Biochemistry 2201, 2901 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
5. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
6. Physics 1050 (or 1020) and Physics 1051 (or 1021).
7. Six credit hours in English.

Under 10.3.9 Honours Degree in Chemistry (Biological)
Students wishing to take Honours should consult those sections of the Calendar dealing with Regulations for the Honours Degree Bachelor of Science. Students wishing to pursue an Honours Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible.

### 10.3.9.3 Required Courses

1. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410 and 490A/B.
2. At least 3 credit hours from Chemistry 3210, 3303,3411 or any 4000 -level Chemistry course not used to fulfill clause 3 . below.
3. At least 3 credit hours from Chemistry 4151, 4201, 4206, 4305, or 4701.
4. Biology 1001, 1002, 2060, 2250, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
5. Biochemistry 2201, 2901 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
6. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
7. Physics 1050 (or 1020) and Physics 1051 (or 1021).
8. Six credit hours in English.

## Under 10.9 Ocean Sciences

Under 10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology
3. Three credit hours selected among:
a. Biology 2122, 3401, 3640, 3715, 4251, 4605, 4750;
b. Biochemistry 3207 (or 3107), 3402, 4002, 4101, 4104, 4105, 4200, 4201;
c. Geography 4300.

## Under 10.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences

5. a minimum of 12 credit hours among:
a. Biology 2060, 2122, 2250, 2600, 2900;
b. Biochemistry 2100, 2201 (or the former 2101), 3206 (or 3106), 3207 (or 3107), 3108;

## Under Section 11.1 Biochemistry:

2100 Introduction to Molecular Biology and Genetics (same as Biology 2250) will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of
heredity; the structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: BIOC 2100, Biology 2250
LH: up to four hours on alternate weeks which will normally consist of one
three hour laboratory period plus one additional hour on the following day
PR: Science 1807
UL: Biology students should normally take Biology 2250 in the Fall semester, and
Biochemistry and Biochemistry (Nutrition) students should normally take BIOC 2200 in Winter semester.

2200 Introduction to Molecular Biology and Genetics will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of heredity; the structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: BIOC 2100, Biology 2250
UL: Biology students should normally take Biology 2250 in the Fall semester, and Biochemistry and Biochemistry (Nutrition) students should normally take BIOC 2200 in Winter semester.

2201 Introduction to Biochemistry is an introduction to the major organic substances of living organisms, proteins, carbohydrates and lipids: their structure, analysis and biochemical function. Other topics include: enzymes; the biochemistry of membranes, including the plasma membrane and specialized intracellular membranes; and the biochemistry of selected differentiated cells.

CR: BIOC 2101, Pharmacy 2004, or the former Pharmacy 3110
PR: Chemistry 2400; and Physics 1020 or 1050, and 1021 (or 1051). Physics 1021 or 1051 can be done concurrently.

3105 Physical Biochemistry examines topics such as: types of intermolecular forces in biomolecules; the folding of biomolecules and the role of water; pH , buffers, and ionisation of biomolecules; thermodynamics: equilibria, coupled reactions, transport across membranes and redox reactions; and ligand binding. Other topics will include: size and shape of biomolecules; isotopes in biochemistry; and, spectroscopy of biomolecules.

OR: a two hour problem-solving class
PR: BIOC 2101 or 2201; and the former Chemistry 2300 or 2301 or Physics 2053
3108 Molecular Biochemistry of the Cell focuses on the molecular biochemistry of intracellular regulation, including advances in topics such as signal transduction, apoptosis and cancer. Other topics will include protein processing and sorting, cyclins, G-protein structure, function and regulation, cell adhesion molecules and the structure of the extracellular matrix.

PR: BIOC 2100 or 2200, or Biology 2250; and BIOC 2101 or 2201
3203 Fundamentals of Human Nutrition is the cornerstone course for the study of nutrition. The
sources, uptake and physiologic roles of essential nutrients will be discussed in the context of growth, maintenance, reproduction and overall health in humans.

CO: BIOC 3106 or 3206
CR: the former BIOC 3201
PR: BIOC 2101 or 2201, 2600
3206 Metabolism examines the catabolism of carbohydrates, lipids and amino acids. Other topics will be: mitochondria, chloroplasts and ATP synthesis; biosynthesis of carbohydrates and lipids; metabolic specialization of differentiated cells and tissues; and, integration of metabolism.

CR: BIOC 3106, the former BIOC 3102 or Pharmacy 3111
PR: BIOC 2101 or 2201.
3207 Nucleic Acid Biochemistry and Molecular Biology examines the structure, function and biochemistry of DNA and RNA and the biochemical processes in the flow of information from the gene to protein. These will include: DNA replication, recombination and repair processes; transcription of RNA and RNA splicing; and protein synthesis. The regulation of gene expression will also be covered at an introductory level. The course will also include an introduction to cloning methodology.

PR: BIOC 2101 OR 2201; and BIOC 2100, 2200, or Biology 2250.
CR: BIOC 3107
3402 Food Chemistry examines the following topics: water structure and the role of water in chemical reactions and mechanical properties of foods; chemistry and physical properties of carbohydrates, proteins and lipids; food dispersions; pigments and natural colorants; food flavour; enzyme properties and applications; vitamins and minerals; chemistry of enzymic and non- enzymic browning; characteristics of: muscle tissue, milk, eggs, bread and edible plant tissue; food additives; and, chemical changes in foods during processing.

LH: one period per week
PR: BIOC 2005; BIOC 2101 or 2201; Chemistry 2400, and Science 1807

4002 Biochemical Regulation examines metabolic regulation at the cellular and multicellular level. Topics will include: control theory; hormones: their biosynthesis and mechanism of action; signal transduction; and, endocrine coordination of metabolic processes. Principles will be illustrated by the use of case studies from the medical and veterinary literature.

LC: two to three hours per week, together with assigned reading and case studies
PR: BIOC 2100 or 2200, or Biology 2250; BIOC 3106 or 3206
4103 Prokaryotic Gene Regulation is a detailed and up-to-date treatment of the mechanisms of genetic regulation found in bacterial cells. The course will develop topics based on the evidence of bacterial genetics and modern molecular biological experiments. Topics may include: theory of mutations, RNA transcription, positive and negative regulation of transcription; regulation of protein synthesis; control of DNA replication; bacterial operons and regulons; developmental molecular biology in bacterial systems; and evolution and molecular biology of organelles.

PR: BIOC 3107 or 3207

4104 Eukaryotic Gene Regulation and Developmental Biology details the cellular and molecular aspects of eukaryotic gene regulation and development. Topics to be covered will include the DNA content and organization of eukaryotes, mechanisms controlling the expression of eukaryotic genetic information at the transcriptional and post-transcriptional levels, and the methodologies used to define these mechanisms. Detailed consideration will be given to the cell-surface events which regulate nuclear gene expression and cell lineage specification. Developmental mechanisms operating in a number of model systems will be discussed.

PR: One of BIOC 3107, 3108, or 3207
4211 Biochemical Research Techniques II introduces students to the primary literature of metabolism. It teaches them to critique, both orally and in writing, current research papers. By means of guest lecturers and field trips it introduces students to biochemical activities outside of the home department.

AR: attendance is required
PR: BIOC 3106 or 3206

## Under Faculty of Medicine 11 Course Descriptions

310A and 310B Human Physiology covers the properties of nerve and muscle cells, the special senses, blood and body fluids, and the nervous, cardiovascular, digestive, immune, respiratory, urinary, endocrine and reproductive systems. Integration of the body's systems in maintaining homeostasis is emphasized. Priority for entry into this course is given to Biochemistry, Nutrition, Dietetics, and other students who are interested in experimental science.
CH: 6
CO: Biochemistry 2101 or 2201
CR: Biochemistry 311A/B
LH: to be specified
PR: Biochemistry 2101 or 2201

## Under School of Pharmacy 12 Course Descriptions

2004 Introduction to Biochemistry is an introduction to the major organic substances of living organisms, proteins, carbohydrates and lipids: their structure, analysis and biochemical function. Other topics include: enzymes; the biochemistry of membranes, including the plasma membrane and specialized intracellular membranes; and the biochemistry of selected differentiated cells.
CR: Biochemistry 2101, 2201
PR: Chemistry 2400 and Physics 1020 (or 1050), and 1021 (or 1051)
3111 General Biochemistry covers the catabolism of carbohydrates, lipids and amino acids. Mitochondria, chloroplasts and ATP synthesis. Biosynthesis of carbohydrates and lipids. Metabolic specialization of differentiated cells and tissues. Integration of metabolism.
CR: Biochemistry 3106, 3206
PR: One of PHAR 2004, Biochemistry 2101, or 2201
Under 11.2 Biology

## 2060 Principles of Cell Biology

is a modern view of the biology of eukaryotic cells, organelles and molecules and their interactions in the functioning of living organisms.
CO: Physics 1021 or 1051; Biochemistry 2201 or the former 2101

CR: the former BIOL 3060
LH: 3
PR: Physics 1021 or 1051; Biochemistry 2201 or the former 2101
PR: Science 1807; BIOL 1001, 1002 and 2250; Chemistry 2400

Biology 2250 Principles of Genetics (same as Biochemistry 2100) will cover the heritability of simple traits from phenotype to genotype; the discovery of DNA as the molecule of heredity; the structure and function of DNA; the manipulation of DNA for recombinant DNA technology and biotechnology; and briefly, pharmacogenetics.

CO: Chemistry 2400
CR: Biochemistry 2100, 2200

LH: up to four hours on alternate weeks which will normally consist of one three hour laboratory period plus one additional hour on the following day

PR: Science 1807
UL: Biology students should normally take BIOL 2250 in the Fall semester, and Biochemistry and Biochemistry (Nutrition) students should normally take Biochemistry 2200 in Winter semester.

## 3050 Introduction to Microbiology

is a course in which the basic principles underlying microbial life are studied. Aspects include structure, function, bioenergetics and growth with an emphasis on prokaryotes. Also studied are viruses, microbial diseases, introductory principles of immunology and the control of microorganisms. The laboratory sessions provide training in culture and determinative techniques using microorganisms.
LH: 3
PR: Science 1807; BIOL 1001 and 1002; Biochemistry 2201 or the former 2101

## 3951 Introduction to Bioinformatics

(same as Computer Science 3550) deals with the development and application of computational methods to address biological problems. The course will focus on the fundamental concepts, ideas and related biological applications of existing bioinformatics tools. This course will provide hands-on experience in applying bioinformatics software tools and online databases to analyze experimental biological data, and it will also introduce scripting language tools typically used to automate some biological data analysis tasks.
CR: Computer Science 3550
LH: 3
PR: BIOL 2060 or Biochemistry 2201 or the former 2101, and one Computer Science course at the 1000-level or above excluding Computer Science 1400, or Computer Science 1600 and Computer Science 2000; or Computer Science 2500 or Computer Science 2001, and one Biology course at the 1000-level or above excluding BIOL 2040 and BIOL 2041; or permission of the course instructor

## 4241 Advanced Genetics

has advanced topics in modern genetic analysis, including regulation of gene expression,
developmental genetics, molecular basis of inherited disease, genomics, immunogenetics, behavioural genetics, and molecular evolution.
LH: 3
PR: Science 1807; BIOL 2250 and Biochemistry 2201 or the former 2101

## 4245 Biophysics

is an examination of the physical properties involved in defining diffusion, membrane properties, electrochemical potentials and the processes of bioenergetics within cells and organelles. Selected topics in biomechanics and the functioning of whole organisms with respect to size, shape, support, orientation, transport and motility.
LH: 3
PR: Science 1807; BIOL 2060 and Biochemistry 2201 or the former 2101

## Under 11.9 Ocean Sciences

3640 Environmental Physiology of Animals (same as Biology 3640) covers physiological adaptations of animals facilitating their survival in natural environments with emphasis on physiological and biochemical responses of animals to extreme environments. Starting with the fundamental basis of physiological mechanisms, the course explores various aspects and the integration of major physiological processes (metabolism, respiration, osmoregulation) and how these relate to ecological niche.
CR: the former Biology 3403 or the former Biology 4455, Biology 3640
PR: Biology 2060; Biochemistry 3206 (or 3106)
UL: may not be used to fulfill the physiology course requirement for a Biology major, honours or joint honours program

## Rationale

See rationale on page 7-8.

## Consultations

Acadia University, the University Library, Grenfell Campus, the Marine Institute, Faculty of Engineering, Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Medicine, School of Pharmacy and Departments within the Faculty of Science. The consultation email dialogues are appended to the end of this document.

## Consultations Sought From

Acadia
Biology
Chemistry
Computer Science
Earth Sciences
Education
Engineering
Geography
Grenfell
Humanities and Social Sciences
Marine Institute

## Comments Received

no
yes
yes
no
yes
no
yes
no
no
no
yes
Mathematics and Statistics no
Medicine no
Ocean Sciences yes
Pharmacy yes
Physics and Physical Oceanography yes
Psychology yes
Library Report Received no

## Signature: Dean, Associate Vice-President (Academic) or Vice-President

Name

## FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary: $\qquad$
Date: $\qquad$

# Proposal <br> Calendar Changes to Existing Joint Honours Programs to Accommodate New Dedicated Lab Courses in Biochemistry 

## Executive Summary

This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.

This package is structured in 4 parts:
1: Proposed Biochemistry program changes related to new, dedicated lab courses
2: Proposal for new, dedicated lab courses (Bioc 2901, 3906, 3907)
3. Proposed modifications to existing courses (Bioc 2100, 2101, 3106, 3107) to remove the lab components of the existing courses and renumber them (Bioc 2200, 2201, 3206, 3207).
4. Proposed modifications to joint programs

Resource Implications: Instructional Costs
Please see accompanying program change form.

## Consultations

The University Library, Grenfell Campus, the Marine Institute, Faculty of Engineering, Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Medicine, School of Pharmacy and Departments within the Faculty of Science. The consultation email dialogues are appended to the end of this document.

Signature of Unit Head (if appropriate):
 Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SUMMARY PAGE FOR SENATE

Approval Form

## Calendar Changes

Under Section 6.1 Joint Honours, subject to approval from the departments involved:

### 6.1.3 Biochemistry and Cell Biology Joint Honours

1. Biology 1001, 1002, Chemistry 1050, 1051 (or 1200 and 1001), English 1090 or the former English 1080 (or 1000), and 1110 (or equivalent), Mathematics 1000, 1001, Physics 1020 or 1050, Physics 1021 or 1051, Statistics 2550;
2. Biochemistry 2101, 2201, 2901, 3105, 3106, 3206, Chemistry 2301, 2400, 2401;
3. Either Biochemistry 3107, 3207 and $3108_{1}$ or Medicine 310A/B;
4. An additional $12 \underline{9}$ credit hours to be selected from Biochemistry 3906 or $3907,4002,4101$, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211, 4230-4249, 4231-4239;
5. Biology 2060, 2250, 2600, 2900, 3530, 4241, plus one of Biology 3401, 3402, 4245 or 4404;
6. 12 credit hours from the following: Biology 3050, 3052 (or Biochemistry 3052), 3401, 3402, 3500, 3620, 3950, 3951, 4010, 4040, 4050, 4200 (or Biochemistry 4105), 4245, 4250, 4251, 4255, 4404, 4550, 4605, 4607;
7. Biochemistry 499A/B or Biology 499A/B; and
8. Electives to make up 120 credit hours.

Note: Students may count only one of the two courses, Biochemistry 4105 or Biology 4200 , for credit in this program.

Seventy-five credit hours in Biology, Biochemistry and Chemistry courses beyond the first-year level from those listed in the program shall contribute to those in which a grade of " B " or an average of 75 or higher is required. Medicine 310A/B counts as Biochemistry for these 75 credit hours.

### 6.1.4 Biochemistry and Chemistry Joint Honours

The following courses are required:

1. Chemistry 1050 and 1051 (or Chemistry 1010, 1011 and the former 1031) (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051 (or 1021), 6 credit hours in first year English courses. Biology 1001 and 1002 are highly recommended;
2. Mathematics 2000;
3. Chemistry $2100,2210,2301,2302,2400,2401,3110,3211,4410 ;$
4. Nine further credit hours in Chemistry courses numbered 3000 or higher, at least 6 credit hours of which must be in courses numbered 4000 or higher;
5. Biochemistry $2100,2101,2200$ (or 2100), 2201, 2901, 3105, 3106, 3206
6. Either Biochemistry 3107, 3108 and 3207, or Medicine 310A/B;
7. 129 credit hours chosen from Biochemistry 3906 or $3907,4002,4101,4102,4103,4104,4105$, 4200, 4201, 4210 or 4211, 4230, 4231-4239, 4240, 4241-4249;
8. Either Chemistry 490A/B or Biochemistry 499A/B; and
9. A sufficient number of elective courses to bring the degree to a total of 120 credit hours.

Note: Students should check prerequisites for 4000 level courses before making decisions about their 3000 level courses and seek academic advice if necessary.

### 6.1.5 Biochemistry and Physics Joint Honours

The following courses are required:

1. English 1090 or the former English 1080 (or 1000), and 1110 (or equivalent), Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031) (or 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051;
2. Chemistry 2400, 2401;
3. Chemistry 2301 or Physics 2053
4. Mathematics 2000, 2050, 2260, either Mathematics 3202 or Physics 3810;
5. Biochemistry $2100,2101,2200$ (or 2100), 2201, 2901, 3105, 3106 3206;
6. Either Biochemistry 3107 and 3108 and 3207, or Medicine 310A/B;
7. An additional $12 \underline{9}$ credit hours to be selected from Biochemistry 3906 or 3907, 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211; 4230-4249;
8. Physics 2055, 2750 or 2056, 2820, 3220, 3400, 3500, 3750, 3820, 3900, plus one 4000 level Physics course;
9. Either Physics 490A/B or Biochemistry 499A/B; and
10. Other courses to complete the prescribed minimum of 120 credit hours in courses for the Joint Honours degree.

### 6.1.6 Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required to complete the 120 credit hours in courses required for the degree:

1. Chemistry 1050 and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000 and 1001, Physics 1050, (or 1020), 1051 (or 1021), English 1090 or the former English 1080 (or 1000), and 1110.
2. Biochemistry $2100,2101,2200$ (or 2100), 2201, 2901, 3105, 3106, 3206
3. Either Biochemistry 3107, 3108; and 3207, or Medicine 310A/B, either 4210 or 4211 ,
4. 129 credit hours chosen from Biochemistry 3906 or $3907,4002,4101,4102,4103,4104$, 4105, 4200, 4201, 4210 or 4211,-4230-4249, Chemistry 4701 4230,4231-4239.
5. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further courses in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
6. Either Biochemistry 499A/B or Psychology 499A/B.
7. Chemistry 2301, 2400, 2401.

Notes: 1. In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3. and 4. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required: 1090 or the former 1080 (or 1000), 1110 (or equivalent);

1. Chemistry 1010 and 1011 (or 1050, 1051) (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051), English 1090 or the former English 1080 (or 1000), and 1110 (or equivalent).
2. Biochemistry $2100,2101, \underline{2200(o r ~ 2100), ~ 2201, ~ 2600, ~ 2901, ~ 3106, ~ 3203, ~ 3206, ~ 4002, ~ 3906, ~}$ Medicine 310A/B; one course chosen from: Biochemistry 3052, 3105, 3107, 3108, 3202, 3402, 3600, 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4210, 4211, 4230, 4240, 4230-4241-4249, Biology 3050, Chemistry 4701.
3. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
4. Either Biochemistry 499A/B or Psychology 499A/B.
5. Chemistry 2400, 2401 or Chemistry 2440 .

Other courses to complete at least the prescribed minimum of 120 credit hours in courses for the Joint Honours Degree.

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

## Under Section 6.1 Joint Honours

Under Section 6.1.1 Applied Mathematics and Chemistry Joint Honours (B.Sc. Only)
The following courses are required:

1. English 1090 or the former English 1080 and English 1110 (or equivalent).
2. A computing course. Computer Science 1510 is recommended.
3. Biochemistry 2201 or 2901.
4. Physics 1050 (or 1020) and 1051 (or 1021).
5. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3001, 3132, 3161, 3202, 3210, 4160.
6. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.
7. Six additional credit hours chosen from courses numbered 3000 or higher that are offered by the Department of Chemistry.
8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty
member of either Department may act as supervisor.
9. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.

### 6.1.3 Biochemistry and Cell Biology Joint Honours

1. Biology 1001, 1002, Chemistry 1050, 1051 (or 1200 and 1001), English 1090 or the former English 1080 (or 1000), 1110 (or equivalent), Mathematics 1000, 1001, Physics 1020 or 1050, Physics 1021 or 1051, Statistics 2550;
2. Biochemistry 2201, 2901, 3105, 3206, Chemistry 2301, 2400, 2401;
3. Either Biochemistry 3207 and 3108, or Medicine 310A/B;
4. An additional 9 credit hours to be selected from Biochemistry 3906 or 3907, 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211, 4230, 4231-4239;
5. Biology 2060, 2250, 2600, 2900, 3530, 4241, plus one of Biology 3401, 3402, 4245 or 4404;
6. 12 credit hours from the following: Biology 3050, 3052 (or Biochemistry 3052), 3401, 3402, 3500, 3620, 3950, 3951, 4010, 4040, 4050, 4200 (or Biochemistry 4105), 4245, 4250, 4251, 4255, 4404, 4550, 4605, 4607;
7. Biochemistry 499A/B or Biology 499A/B; and
8. Electives to make up 120 credit hours.

Seventy-five credit hours in Biology, Biochemistry and Chemistry courses beyond the first-year level from those listed in the program shall contribute to those in which a grade of "B" or an average of 75 or higher is required. Medicine 310A/B counts as Biochemistry for these 75 credit hours.

### 6.1.4 Biochemistry and Chemistry Joint Honours

The following courses are required:

1. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051 (or 1021), 6 credit hours in first year English courses. Biology 1001 and 1002 are highly recommended;
2. Mathematics 2000;
3. Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410;
4. Nine further credit hours in Chemistry courses numbered 3000 or higher, at least 6 credit hours of which must be in courses numbered 4000 or higher;
5. Biochemistry 2200 (or 2100), 2201, 2901, 3105, 3206
6. Either Biochemistry 3108 and 3207, or Medicine 310A/B;
7. 9 credit hours chosen from Biochemistry 3906 or 3907, 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211, 4230, 4231-4239;
8. Either Chemistry 490A/B or Biochemistry 499A/B; and
9. A sufficient number of elective courses to bring the degree to a total of 120 credit hours.

Note: Students should check prerequisites for 4000 level courses before making decisions about their 3000 level courses and seek academic advice if necessary.

### 6.1.5 Biochemistry and Physics Joint Honours

The following courses are required:

1. English 1090 or the former English 1080 (or 1000), 1110 (or equivalent), Chemistry 1050 and 1051 (or 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051;
2. Chemistry 2400, 2401;
3. Chemistry 2301 or Physics 2053
4. Mathematics 2000, 2050, 2260, either Mathematics 3202 or Physics 3810;
5. Biochemistry 2200 (or 2100), 2201, 2901, 3105, 3206;
6. Either Biochemistry 3108 and 3207, or Medicine 310A/B;
7. An additional 9 credit hours to be selected from Biochemistry 3906 or $3907,4002,4101,4102$, 4103, 4104, 4105, 4200, 4201, 4210 or 4211; 4230-4249;
8. Physics 2055, 2750 or 2056, 2820, 3220, 3400, 3500, 3750, 3820, 3900, plus one 4000 level Physics course;
9. Either Physics 490A/B or Biochemistry 499A/B; and
10. Other courses to complete the prescribed minimum of 120 credit hours in courses for the Joint Honours degree.

### 6.1.6 Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required to complete the 120 credit hours in courses required for the degree:

1. Chemistry 1050 and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000 and 1001, Physics 1050, (or 1020), 1051 (or 1021), English 1090 or the former 1080 (or 1000), 1110.
2. Biochemistry 2200 (or 2100), 2201, 2901, 3105, 3206.
3. Either Biochemistry 3108 and 3207, or Medicine 310A/B.
4. 9 credit hours chosen from Biochemistry 3906 or $3907,4002,4101,4102,4103,4104,4105$, 4200, 4201, 4210 or 4211, 4230, 4231-4239.
5. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further courses in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
6. Either Biochemistry 499A/B or Psychology 499A/B.
7. Chemistry 2301, 2400, 2401.

Notes: 1. In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3. and 4. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.

The following courses (or equivalent) are required:

1. Chemistry 1010 and 1011 (or 1050, 1051) (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051), English 1090 or the former English 1080 (or 1000), 1110 (or equivalent).
2. Biochemistry 2200 (or 2100), 2201, 2600, 2901, 3203, 3206, 3906, Medicine 310A/B; one course chosen from: Biochemistry 3052, 3108, 3402, 3600, 4002, 4105, 4200-4230, 4240, 4241-4249, Biology 3050.
3. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
4. Either Biochemistry 499A/B or Psychology 499A/B.
5. Chemistry 2400.
6. Other courses to complete at least the prescribed minimum of 120 credit hours in courses for the Joint Honours Degree.

## Rationale

See rationale on page 7-8.

| Consultations Sought From | Comments Received |
| :--- | :--- |
| Biology | yes |
| Chemistry | yes |
| Computer Science | no |
| Earth Sciences | yes |
| Education | no |
| Engineering | yes |
| Geography | no |
| Grenfell | no |
| Humanities and Social Sciences | no |
| Marine Institute | yes |
| Mathematics and Statistics | no |
| Medicine | no |
| Ocean Sciences | yes |
| Pharmacy | yes |
| Physics and Physical Oceanography | yes |
| Psychology | yes |
| Library Report Received |  |

## Signature: Dean, Associate Vice-President (Academic) or Vice-President

Name

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## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary: $\qquad$
Date:

## Department of Biochemistry

## Program Learning Outcomes

## Adopted Sept 17, 2015

The Department of Biochemistry offers major and honours undergraduate programs in Biochemistry and Biochemistry(Nutrition). All programs will normally be completed in four years. Our programs are designed to meet the core values and principles enunciated in Memorial University's Teaching and Learning Framework. In particular, the department is committed to providing high quality curricula and learning experiences that are current, relevant, creative, innovative and appropriately challenging to all of our students. The department is committed to its role in educating global citizens by presenting international or intercultural perspectives in our courses when possible.

## A. Knowledge

The graduates from all four of our programs should be knowledgeable in their chosen field and in particular should have learned the basics of:

- the structure and function of the major biomolecules: DNA, RNA, proteins, lipids and carbohydrates
- the principles of enzymes and enzyme kinetics
- bioenergetics
- metabolic processes and their control
- gene structure and expression
- scientific methodology and literacy

The graduates from our Biochemistry major program should have acquired greater knowledge in five or more of the following areas; the graduates from our Biochemistry honours program should have acquired greater knowledge in seven or more of the following areas:

- The mechanisms by which gene expression is regulated, including the roles of epigenetics and inheritance
- The signal transduction pathways by which hormones and other bioactive molecules interact with cells to effect changes in growth or physiology
- The importance of the immune system in health and disease and the use of immune system components, particularly antibodies, in experimental systems
- The biochemical mechanisms controlling cell growth and division, including embryogenesis, apoptosis and other developmental pathways
- Modern "omics" approaches to understanding cell biochemistry, e.g. genomics, proteomics, metabolomics
- The structures of organic and inorganic molecules and the reactions they undergo as they apply to biochemistry
- Biomolecular structure and its relationship to biochemical mechanisms in health and disease
- The structure of biological membranes, and the roles of cholesterol and lipids in the function of biological membranes
- Oxidation and reduction reactions in biochemistry, their roles in maintaining energy balance in the cell, and the control of oxidative damage in health and disease

The graduates from our Biochemistry(Nutrition) major program should have acquired greater knowledge in five or more of the following areas; the graduates from our Biochemistry (Nutrition) honours program should have acquired greater knowledge in seven or more of the following areas:

- The structure and metabolic functions of nutrients
- The physiological and biochemical regulation or integration of micro- and macro-nutrient metabolism in humans
- The physiological and biochemical basis for nutrient intake recommendations across the lifespan
- Nutrients at greatest risks for deficiency or toxicity, and the populations most vulnerable
- The interaction of nutrients or dietary factors with the genome including nutrient control of gene expression or genotyping and personalized nutrition (e.g. nutrigenomics)
- The epidemiologic, physiologic, biochemical, genetic and nutritional factors contributing to health and wellness versus chronic diseases.
- The chemistry of foods, including non-traditional roles for nutrients, bioactive food components (functional foods and natural health products)
- Assessment tools and methods to evaluate nutritional status in humans
- The impact of food policies, such as food fortification, food label claims, or food taxation on population health outcomes
- Critical evaluation and interpretation of information on nutrition and health in the media/popular press to distinguish facts from claims, detect bias, and evaluate assumptions


## B. Skills

The graduates from all of our programs should obtain competencies in their chosen field, in particular:

- Applying appropriate lab safety procedures and relevant guidelines to their work, e.g. WHMIS
- Performing basic laboratory procedures including: following protocols, data collection, identification of experimental variables, the importance of controls, statistical analysis, troubleshooting, write-up and presentation of results
- Performing basic laboratory techniques used in molecular bioscience research (e.g. gel electrophoresis, PCR, protein analysis)
- Applying critical and practical thinking and quantitative reasoning skills to identify and solve biochemical problems-
- Preparing oral and written reports in standard scientific formats and effectively communicating scientific findings to lay and professional audiences
- Locating, retrieving, and critically evaluating scientific information, including primary literature, with regards to its adequacy, value, and logic
- Using current information technologies to locate and implement evidence-based guidelines and protocols
- Executing a range of computer skills including: literature search strategies and literature management tools, use of word-processing, spreadsheet and presentation tools, data analysis skills including graphing and fitting data to a model, use of internet-based tools for basic DNA and protein analysis
- Interacting constructively with peers and faculty, and demonstrating clear evidence of positive teamwork and leadership within group dynamics

Honours students in our programs should:

- experience a more extensive laboratory experience, including participation in hypothesis development and experimental design, design of controls, as well as the application of statistics to their analysis
- develop higher levels of independence and creativity in scientific reasoning, critical thinking and oral and written presentation.
- Be able to organize and execute planned experiments independently, and critically evaluate their own research objectives.


## C. Professionalism

The graduates from our programs should possess:

- the scientific literacy and enthusiasm necessary to be informed, responsible citizens of a diverse, everchanging, global society, and to engage in a lifetime of scientific learning
- the ability to discuss the social, multicultural, and environmental dimensions of issues relating to their field and, for Biochemistry(Nutrition) students, an understanding of how personal, cultural, ethnic, and spiritual beliefs shape food choices and nutritional/health practices
- an understanding of the importance of ethics in the process of science and the application of science in society; and the education and exposure necessary to encourage the highest levels of professionalism and integrity
- the ability to locate, interpret, evaluate and use professional literature to make evidence-based decisions, as well as to objectively assess and critique news articles related to the biochemical sciences
- knowledge of how their academic experience can be applied in the pursuit of marketplace careers or entry into professional programs or graduate schools both locally, nationally and abroad


## Consultation requests sent Oct 19, 2017:

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:08:16 AM NDT
To: "chemconsult@mun.ca" [chemconsult@mun.ca](mailto:chemconsult@mun.ca), Sharene Bungay [sharene@mun.ca](mailto:sharene@mun.ca), eascugcon@mun.ca, Engineering Consult [engrconsult@mun.ca](mailto:engrconsult@mun.ca), associatevpoffice@grenfell.mun.ca, "Catto, Norm" [ncatto@mun.ca](mailto:ncatto@mun.ca), marinat@mun.ca, miugconsultations@mi.mun.ca, Shannon Sullivan [shannon@mun.ca](mailto:shannon@mun.ca), DeanofMedicine@med.mun.ca, "Dr. Annie Mercier" [amercier@mun.ca](mailto:amercier@mun.ca), pharminfo@mun.ca, "Dr. Christina Thorpe" [cthorpe@mun.ca](mailto:cthorpe@mun.ca), univlib@mun.ca, Ivan Saika-Voivod [saika@mun.ca](mailto:saika@mun.ca), "Dr. Ian Jones" [iljones@mun.ca](mailto:iljones@mun.ca)
Cc: Biochemistry Head [biochead@MUN.CA](mailto:biochead@MUN.CA)
Dear All,
This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.

You can provide feedback to me at vbooth@mun.ca .
Best,
Valerie
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:09:58 AM NDT
To: Paul Marino [pmarino@mun.ca](mailto:pmarino@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), "Dr. Ian Jones" [iljones@mun.ca](mailto:iljones@mun.ca)
Dear Paul, Ian and Jody,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Biology.
On page 20 you'll find the description of the new "lab free" version of the newly cross-listed intro genetics course. I've deliberately not suggested modifying the Biology calendar entry for this course in case you wish to retain the labs for your students.

On page 24 you'll note we've suggested replacing the old lecture+lab course numbers except for intro genetics) with the new lab-free course numbers in (again l've deliberately not touched the any Biochemistry 2100 entries in Biology programs):
6.1.8 Biology and Earth Sciences Joint Honours
6.1.9 Biology and Psychology Joint Honours
6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours
6.2.13 Marine Biology
10.2.3.1 Major in Biology
10.2.3.2 Major in Biology (Cell and Molecular)
10.2.3.3 Major in Biology (Ecology and Conservation)
10.2.5 Honours in Biology
10.2.6 Honours in Cell and Molecular Biology
10.2.7 Honours in Ecology and Conservation Biology
10.2.8 Honours in Marine Biology

On page 30 you'll note our suggestion for updating the Biochemistry/Cell Biology Joint Honours - note we've only modified "our" portion of this entry and the number of courses required remains the same.

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie
,
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:10:38 AM NDT
To: eascugcon@mun.ca
Hello,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Earth Sciences.
On page 24 you'll note we've suggested replacing the old lecture+lab course numbers with the new lab-free course numbers in:
6.1.8 Biology and Earth Sciences Joint Honours
6.1.12 Chemistry and Earth Sciences Joint Honours

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie
Valerie Booth
Professor

Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
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St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:10:44 AM NDT
To: Travis Fridgen [chemhead@mun.ca](mailto:chemhead@mun.ca), "chemconsult@mun.ca" [chemconsult@mun.ca](mailto:chemconsult@mun.ca), Chris Flinn [cgflinn@mun.ca](mailto:cgflinn@mun.ca)

Dear Travis and Chris,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Chemistry.
On page 17 you'll find a note that there will be some changes under 10.3 Chemistry - once you figure out how you'd like to incorporate Biochem 2901.

On page 24 you'll note we've suggested replacing the old lecture+lab course numbers with the new lab-free course numbers in:
6.1.12 Chemistry and Earth Sciences Joint Honours
6.1.13 Chemistry and Physics Joint Honours
10.3.4 General Degree - Major in Chemistry
10.3.5 Honours Degree in Chemistry
10.3.8 General Degree in Chemistry (Biological)

On page 30 you'll note our suggestion for updating the Biochemistry/Chemistry Joint Honours - note we've only modified "our" portion of this entry and the number of courses required remains the same.

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie

```
Valerie Booth
Professor
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```

Date: October 19, 2017 at 9:14:22 AM NDT
To: "Dr. Annie Mercier" [amercier@mun.ca](mailto:amercier@mun.ca)
Hi Annie,

You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

Since this proposal was based on the current calendar, I'm expecting that we'll need to do a little bit of work to adjust the new Ocean Sciences programs and courses. I'm happy to work on this with you whenever you're ready. I guess I would just need the latest version of the Ocean Sciences calendar entries expected to be in place for next year to see what needs to be updated.

Best,
Valerie

Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
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phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:10:05 AM NDT
To: Christina Thorpe [cthorpe@mun.ca](mailto:cthorpe@mun.ca)
Dear Christina,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Psychology.
On page 24 you'll note we've suggested replacing the old lecture+lab course numbers with the new lab-free course numbers in:
6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

On page 30-31 you'll note our suggestions for updating the two Biochemistry/Psych Joint Honours programs - note we've only modified "our" portion of these entries and the number of courses required remains the same.

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie
Valerie Booth
Professor

Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/
From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:09:26 AM NDT
To: pharminfo@mun.ca
Hello,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Pharmacy. Note that the changes involved do not involve in change in course content whatsoever for Pharmacy students - just the addition of some updated course numbers in the pre-reqs.

On page 23-24 you'll find proposed changed to prerequisites for Phar 2004 and Phar 3111 - to include the new "lab free" course numbers. We've also suggested getting ready of the "OR: tutorials as required" since it's been many years since any special tutorials for Pharmacy students have been run.

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie

## Valerie Booth

Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:10:16 AM NDT
To: Ivan Saika-Voivod [saika@mun.ca](mailto:saika@mun.ca)
Dear Ivan,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

The purpose of this second email is to draw your attention to the aspects that particularly affect Physics and Physical Oceanography.

On page 24 you'll note we've suggested replacing the old lecture+lab course numbers with the new lab-free course numbers in:
6.1.13 Chemistry and Physics Joint Honours

On page 31 you'll note our suggestions for updating the Biochemistry/Physics Joint Honours program - note we've only modified "our" portion of this entry and the number of courses required remains the same.

Please let me know what you think. I'm happy to address any suggestions. If you decide to accept any of the proposed changes as is, please provide me a confirmation email so that I can add it to the consultation documentation.

Best,
Valerie
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
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phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: Fwd: consultation request for Biochemistry course and program changes
Date: October 19, 2017 at 9:12:01 AM NDT
To: "Foster, Andy" [afoster@mun.ca](mailto:afoster@mun.ca)
Dear Andy,
This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes.

These changes will entail some minor additions in the section of the calendar under the MOU with Acadia re the Dietetics Option. The changes, on page 23, are solely housekeeping changes to add the new course numbers into the list of options for Dietetics students.

Would you, on behalf of the Faculty of Science, be able to notify Acadia of these changes and to provide me with a copy of the notification so that I can add it to the consultation documentation.

Thanks,
Valerie

## Responses:

Biology
From: Suzanne Dufour [sdufour@mun.ca](mailto:sdufour@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: November 11, 2017 at 10:14:08 AM NST
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Cc: Paul Marino [pmarino@mun.ca](mailto:pmarino@mun.ca), Jody-Lynn Burke [jodyb@mun.ca](mailto:jodyb@mun.ca), Biochemistry Head
[biochead@mun.ca](mailto:biochead@mun.ca)
Reply-To: sdufour@mun.ca
Hi Valerie,
Thanks for your response and for offering to meet with us to discuss those changes. I am available at any time on Tuesday afternoon, but if Paul and Jody are also able to meet (and can let us know when they could meet) I think that would be best.

Best wishes,
Suzanne
On 2017-11-10 10:29, Valerie Booth wrote:
Thanks Suzanne for getting this feedback ready so quickly. We do indeed appreciate that the changes will impact Biology programs.
Given this impact, I'm wondering if you're free sometime soon to discuss the changes so we can make sure we know clearly what the biggest concerns are and can talk about some potential ways to address them? I'm not at the university today, but I can be free for a phone call pretty much anytime today, or I could meet in person on Tuesday between 8:15 and 9, or between 1:15 and 2:45 or between 3:30 and 4:30 if something in that range works for you.
In the meantime, please see below for some comments and clarifications.
On Nov 9, 2017, at 7:47 PM, Suzanne Dufour [sdufour@mun.ca](mailto:sdufour@mun.ca) wrote:
Hi Valerie,
The Biology Undergraduate Committee met today and discussed the proposed changes to BIOC 2100 (cross-listed with BIOL 2250), BIOC 2101 and BIOC 3106 (the latter two being part of Biology programs). We understand and appreciate the rationale behind separating lab and lecture components for those courses, and agree that it will offer your students a more thorough laboratory experience. These changes will have an impact on the programs in our department, as our students will no longer obtain the lab experience they had been gaining in BIOC 2101 and BIOC 3106. The instructors of upper-level Biology courses that have those courses as prerequisites are not concerned with the removal of the lab, although some faculty felt that students might lack certain lab skills after this change. Notably, it would be very difficult for our students to fit the new BIOC lab courses to their schedule, especially with the recent addition of an organic chemistry course to their programs.

I'm wondering what the particular lab skills are going to be missed the most? In terms of fitting the new lab courses in Biology student schedules, note that because of constraints on lab space, we will only be able to offer a limited number of seats to students outside Biochemistry especially in the initial offering. If desired by Biology, we can certainly work towards offering 2901 for some more Biology students it might work nicely as an option for the students in the "molecular" stream. Perhaps we should revisit this question once we see how the first 2901 offering goes.

We were wondering how removing the lab would affect the course evaluation in the new BIOC 2201 and BIOC 3206 - students in particular felt that this might affect their grade as they typically do better in lab than in lecture parts of BIOC 2100 and BIOC 3106.

I think removing the labs from 2101 and 3106 would be quite advantageous for students, including Biology students, in freeing up more of their time to study the lecture component of the courses. As an example, for 2101, no new material would be added to the course, but instead I would envision expanding our current suite of quizzes that are intended to help students perform better on exams by giving them lots of practice on skills that students historically have trouble with. We deliver the quizzes primarily on D2L where we 1) provide students examples of how the questions are done, 2) give them a practice version of the quiz, and 3) then give them a quiz that is worth a small amount of marks. Students who make a solid effort on the quizzes tend to do quite well on the exams - but I know from talking to students that they often don't spend much time on the quizzes because they're always scrambling to get their lab reports done. So, I think removing the labs would help the students by giving them enough time to better master the lecture material and would be advantageous in terms of helping them get better grades and also better mastery of the material.

We also agree with your proposal to remove the cross-listing of BIOL 2250 with BIOC 2100, given the removal of the lab from the latter course.

I may need to get some advice from folks who are more knowledgeable about the nuts and bolts of calendar rules. But, my understanding is that we'd like to proceed with the plan worked out a few months ago to have Biochemistry take the lead in teaching the lecture component of Bioc 2100/Bioc 2250 in both Fall and Winter. The change that would come in with the new lab course scheme would be that Biochemistry wouldn't be able to offer the related labs in Winter as we do now. This would leave us in a similar situation as we had for the Immunology course until recently. I.e. Biochemistry would offer the lecture component to students in Bioc 2100, Biol 2250, and Bioc 2200 simultaneously, and if desired, Biology could offer the lab component. The lecture only version of the course would be Bioc 2200 and the lecture+lab version of the course would be Biochem $2100=$ Biology 2250. This may be sometime to talk over in person to make sure that we both have the same understanding of what we want to happen and then I can check with the calendar-rules-knowledgeable people to make sure what we propose matches our intentions. We will send you secondary calendar changes that reflect those changes in our Biology programs, in the evenlt that your proposed changes are approved.

Sounds good.
Best wishes,
Valerie
Best wishes,

## Suzanne

,
Suzanne Dufour
Associate Professor
Department of Biology
Memorial University of Newfoundland
St. John's, NL
A1B 3X9

```
Canada
Tel:(709)864-8025
Fax: (709)864-3018
On 2017-11-06 16:14, Valerie Booth wrote:
Hi Suzanne.
Here it is.
It'd be great to get some feedback on Thursday afternoon or evening.
Let me know if there's anything I can help with.
Valerie
Begin forwarded message:
FROM: Valerie Booth <vbooth@mun.ca>
SUBJECT: CONSULTATION REQUEST FOR BIOCHEMISTRY COURSE AND PROGRAM
CHANGES
DATE: October 19, 2017 at 9:08:16 AM NDT
TO: "chemconsult@mun.ca" <chemconsult@mun.ca>, Sharene Bungay
<sharene@mun.ca>, eascugcon@mun.ca, Engineering Consult
<engrconsult@mun.ca>, associatevpoffice@grenfell.mun.ca, "Catto,
Norm" <ncatto@mun.ca>, marinat@mun.ca, miugconsultations@mi.mun.ca,
Shannon Sullivan <shannon@mun.ca>, DeanofMedicine@med.mun.ca, "Dr.
Annie Mercier" <amercier@mun.ca>, pharminfo@mun.ca, "Dr. Christina
Thorpe" <cthorpe@mun.ca>, univlib@mun.ca, Ivan Saika-Voivod
<saika@mun.ca>, "Dr. Ian Jones" <iljones@mun.ca>
CC: Biochemistry Head biochead@MUN.CA
Dear All,
This package of proposed changes centres around three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes. The purpose of the proposed dedicated lab courses is to better meet the Department of Biochemistry learning outcomes (appended) especially in developing practical laboratory, critical thinking and communication skills, and consequently to provide students with a more intensive and meaningful lab experience that better prepares them for the next stage in their careers.
You can provide feedback to me at vbooth@mun.ca.
Best,
Valerie
Suzanne Dufour
Associate Professor
Department of Biology
Memorial University of Newfoundland
St. John's, NL
A1B 3X9
Canada
```

Tel:(709)864-8025
Fax: (709)864-3018

Chemistry
From: Travis Fridgen [chemhead@mun.ca](mailto:chemhead@mun.ca)
Subject: Re: CHEM 1031
Date: November 8, 2017 at 12:43:07 PM NST
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)

Hi again,
Also, in secondary changes (the ones I sent you):
under 10.3.5.1 and 6.1.12 please remove the same text as below.
Thanks,
T

On 08/11/2017 12:39 PM, Travis Fridgen wrote:
Hi Valerie,
Before you send the final version to the faculty of science undergraduate, can you please make the following changes to your document:
under 6.1.4 and 6.1.5 (also in the clean versions)
remove "(or Chemistry 1010, 1011, and the former 1031)"
This is causing no end of confusion to students.

Thanks,
Travis

Travis D. Fridgen BSc, BEd, PhD
Professor and Head
Department of Chemistry
Memorial University
St. John's, NL, A1B 3X7
chemhead@mun.ca
709-864-3470
http://www.chem.mun.ca/zfac/tdf.php?

From: tfridgen [tfridgen@mun.ca](mailto:tfridgen@mun.ca)
Subject: Re: Changes to chemistry/physics, chemistry/applied math, and chemistry/earth sciences joint honours
Date: October 23, 2017 at 3:55:20 PM NDT
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Hi Valerie,
Math is also OK with that change, choice of either, and the Chemistry and chemistry (biological) taking both seems to be ok by anyone who has cared to comment. We areonly waiting on Earth sciences.
-------- Original message
From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Date: 2017-10-23 3:51 PM (GMT-03:30)
To: Ivan Saika-Voivod [saika@mun.ca](mailto:saika@mun.ca)
Cc: Fridgen Travis [tfridgen@mun.ca](mailto:tfridgen@mun.ca), rgouldng Goulding [rgoulding@mun.ca](mailto:rgoulding@mun.ca), Jolanta Lagowski
[jolantal@mun.ca](mailto:jolantal@mun.ca), vbooth@mun.ca
Subject: Re: Changes to chemistry/physics, chemistry/applied math, and chemistry/earth sciences joint honours
Thanks Ivan and Travis.
I will update the proposal with what you guys have agreed on below.

## V

```
On 2017-10-23 15:47, Ivan Saika-Voivod wrote:
> Dear Travis,
>
> We support your proposed calendar change to Section 6.1.13 Chemistry
> and Physics Joint Honours program
>
> 4. Biochemistry 2101 2201 or 2901.
>
> (replacing Bioc with }2101\mathrm{ with either 2201 or 2901) that arises from
> Biochemistry's proposed course changes.
>
> Please note that Valerie Booth sent out a request for consultation on
> behalf of Biochemistry with the proposed change of replacing Bioc 2101
> with Bioc 2201 for 6.1.13 Chemistry and Physics Joint Honours program,
> which is different from your proposed change. We do not see this as a
> problem as either variant would be okay with us, it just seems then
> that Biochemistry will have to update their proposal.
>
> Best regards,
> Ivan
>
> Ivan Saika-Voivod, Associate Professor
> Chair, Undergraduate Studies Committee
> Department of Physics and Physical Oceanography, Memorial University
> of Newfoundland
> St. John's, NL, Canada, A1B 3X7
> Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026
>
> On 2017-10-20, at 4:19 PM, Lagowski, Jolanta wrote:
>
>> Hi Ivan and Rick,
>> Please read below and see the attached. For the only change that is
>> relevant to us is to replace Biochemistry }2101\mathrm{ with either
>> Biochemistry
>> 2201 or 2901. I see no problem this. Let me know if you agree and I
>> or
>> Ivan can respond to Travis on Monday. Thanks.
>> Jolanta
>>
>> On 2017-10-20, 2:00 PM, "Travis Fridgen" <chemhead@mun.ca> wrote:
>>
>>> In the cases of the pure chemistry degrees and the chemistry
>>> (biological
>>
>>> degrees) we want them to have both because we feel it would be
>>> quite
>>
>>> beneficial. For the joint programs, as pointed out below, we also
>>> feel
>>
>>> they would be beneficial, but there is just not room to prescribe
>>
>>> another course into the program decreasing the flexibility and
>>> therefore
>>
>>> the ability to complete in 4 years. There are too few electives
```

```
>>> and too
>>
>>> hard for students to acheive them as it is. For example, the
>>> Earth
>>
>>> Sciences/chemistry joint has all 120 credit hours prescribed, so
>>> adding
>>
>>> another 3 credit hours of biochem would mean either making the
>>> program
>>
>>> 123 credit hours or losing a chemistry or earth sciences or math
>>> or
>>
>>> physics course. In the joints we felt the flexibility of one or
>>> the
>>
>>> other would benefit the students...if they don't like labs, they
>>> take
>>
>>> the lecture and vice versa.
>>
>>>
>>
>>> Travis
>>
>>>
>>
>>>
>>
>>> On 20/10/2017 1:15 PM, Lagowski, Jolanta wrote:
>> Hello Travis,
>
>>> Before I send your request for consideration to our USC, could you
>
>>> please
>
>>> comment why you are using }\mp@subsup{}{}{3}\mathrm{ and }\mp@subsup{}{}{2}\mathrm{ in some case and in others you
>>> are using
>
>>> 3}\mp@subsup{0}{}{2}\mp@subsup{}{}{2}\mathrm{ when deleting 2101 with }2201\mathrm{ and 2901. Thanks.
>
>>> Jolanta
>
>>>
>
>>> On 2017-10-20, 12:50 PM, "Travis Fridgen" <chemhead@mun.ca> wrote:
>
>>>
>
>> Colleagues,
>
>>
>
>> Due to the changes proposed by biochemistry, there are some changes
>
>> required to the honours programs joint with chemistry.
>
>>
>
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>> I believe they are very minor changes that we have proposed due to
>> the
>
>> improvement of BIOC 2101 that results in two courses: BIOC 2201 and
>
>> 2901.
>
>>
>
>> These courses are a lecture based course (2201) and a lab based
>> course
>
>> (2901). The changes we are proposing to all of the Joint Honours
>
>> involving chemistry, is simply to allow students to take one of
>> these
>
>> courses. We are proposing this rather than taking both because the
>
>> programs are so dense with very little choice as is; we thought it
>> best
>
>> not to add to the rigidity of the programs by removing an elective.
>
>>
>
>> I believe these changes will be secondary in nature to
>> biochemistry's
>
>> changes that you have already received. As we need to send these
>
>> changes
>
>> out by the end of the week for consultation to have them in the
>
>> calendar
>
>> in the fall, I would appreciate it if you could take a quick look at
>
>> the
>
>> changes and approve of them by early next week.
>
>>
>
>> Thanks and take care,
>
>>
>
>> Travis
>
>>
>
>> --
>
>> Travis D. Fridgen BSc, BEd, PhD
>
>> Professor and Head
>
>> Department of Chemistry
```

```
>
>> Memorial University
>
>> St. John's, NL, A1B 3X7
>
>> chemhead@mun.ca
>
>> 709-864-3470
>
>> http://www.chem.mun.ca/zfac/tdf.php?
>
>>
>
>>
>
>> --
>
>> Travis D. Fridgen BSc, BEd, PhD
>
>> Professor and Head
>
>> Department of Chemistry
>
>> Memorial University
>
>> St. John's, NL, A1B 3X7
>
>> chemhead@mun.ca
>
>> 709-864-3470
>
>> http://www.chem.mun.ca/zfac/tdf.php?
>
>>
>
> <Biochemistry Changes, secondary changes to chemistry
> programs.[2].docx>
```


## Computer Science

## Earth Sciences

From: UGradMattersES [eascugcon@mun.ca](mailto:eascugcon@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: October 27, 2017 at 8:49:45 AM NDT
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Hello Valerie,
The Undergrad Matters Committee for Earth Sciences has reviewed the proposals from Biochemistry and do not have any significant concerns.

All the best,
KIM...

On 27/10/2017 10:26 AM, UGradMattersES wrote:
Hi Valerie,

Yes. That same change is OK with Earth Sciences.
All the best,
KIM...
On Oct 27, 2017, at 9:34 AM, Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca) wrote:
Thanks Kim.
I do have a question for you on the joint honours between Earth Sciences and Chemistry.
For this program, I believe Chemistry is considering replacing Biochem 2101 with a choice of either Biochemistry 2201 (the lecture course) OR BIOC 2901 (the lab course)... though I believe they have yet to vote on this. If this does turn out to be Chemistry's preference, is that change OK with Earth Sciences?

Best,
Valerie
Education

## Engineering

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: November 15, 2017 at 5:43:04 PM NST
To: Engineering Consult [engrconsult@mun.ca](mailto:engrconsult@mun.ca)
Cc: Andrew Fisher [adfisher@mun.ca](mailto:adfisher@mun.ca), Howard Heys [hheys@mun.ca](mailto:hheys@mun.ca), Jayde Edmunds [edmundsj@mun.ca](mailto:edmundsj@mun.ca)
Thanks Glyn to you and the Engineering Undergrad Studies committee for your careful review of our proposal.
Please see below for answers to your questions.
On Nov 15, 2017, at 2:07 PM, Engineering Consult [engrconsult@mun.ca](mailto:engrconsult@mun.ca) wrote:
Dear Dr. Booth,
Thank you for the opportunity to comment on your proposed Calendar changes on three new dedicated laboratory courses proposed by the Department of Biochemistry and the accompanying program changes.

In its meeting on Wed. Nov. 15, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

In the Senate summary page for BIOC 3106 -> 3206, should "or one three-hour laboratory" be deleted from the "OR:" line in both the track changes and clean versions?

Yes! Nice catch.
In the Senate summary page for BIOC 3107 -> 3207, the new number 3207 should be in the "Course Number and Title" line, not the old number.

Yes again.

In the current Calendar BIOC 2100 is not cross-listed (only credit restricted) with Biology 2250. There is therefore no "(same as Biology 2250)" to delete.

Are the old lab courses BIOC 2100, 2101, 3106 and 3107 to remain in the Calendar? If so, the Calendar changes seem to be fine. If not, then all references to these four courses in the lists of credit restrictions and prerequisites in other courses in Biochemistry, Medicine and Pharmacy should be changed in secondary Calendar
changes to "the former ...".
This has been clarified a bit since the proposal went out for consultation now that Biology has had time to figure out what they want to do. Biochemistry 2100 will continue to be used - to denote the "with labs" version of the course that Biology students will take. The other courses will be phased out. I will consult with the registrar to make sure I get the timing right about when to start calling things "the former".

Best wishes,
Valerie

Yours sincerely,
---
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5
From: Engineering Consult [engrconsult@mun.ca](mailto:engrconsult@mun.ca)
Subject: Re: consultation and library report request for changes to Biochemistry programs and courses
Date: June 12, 2017 at 9:17:22 AM NDT
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Cc: Dennis Peters [dpeters@mun.ca](mailto:dpeters@mun.ca), Theodore Norvell [theo@mun.ca](mailto:theo@mun.ca), Jayde Edmunds
[edmundsj@mun.ca](mailto:edmundsj@mun.ca), biochead@mun.ca
Dear Dr. Booth,
Thank you for the opportunity to comment on the proposed changes to Biochemistry programs and courses.
The Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science will consider these proposals at its next scheduled meeting on June 21.

At this time I am replying with my opinion that the proposed changes will have no impact on the programs of the Faculty of Engineering and Applied Science. However I do have one question.

The admissions requirements for the Biochemistry major and the nutrition major omit CHEM 1051 for those students who take CHEM 1010 before CHEM 1050. Is this intentional? It doesn't seem to be a problem, as CHEM 1051 remains a requirement for the majors for all students.

If our CUGS has any further comments on this proposal then I will forward them to you after that meeting.
Yours sincerely,

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5
Geography

## Grenfell

## Humanities and Social Sciences

## Marine Institute

From: MIUG Consultations [MIUGconsultations@mi.mun.ca](mailto:MIUGconsultations@mi.mun.ca)
Subject: RE: consultation request for Biochemistry course and program changes
Date: October 30, 2017 at 9:17:03 AM NDT
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Hi Dawn,
Dear Valerie,
Thank you for the opportunity to review and comment on the proposal put forth by the Department of Biochemistry. These changes will have no impact on Marine Institute programs and we are happy to support this proposal.

However, I did pick up on a few typos in your document you may want to address before submission to SCUGS:
Page 4- typo at the top of the page, point 2. - "Those courses in which in which a grade "B"..."
Page 5- typo at the middle of the page, point 2. - "Those courses in which in which a grade "B"..."
Page 7 - typo in last paragraph - "Biochemisry (Nutrition)" - Biochemistry spelled incorrectly
Page 16 - typo at top of the page - "Calendar Changes - Additions to Section 11.1 Blochemistry" - need a lowercase "i" in Biochemistry
Throughout the document "Bioc" should be replaced with "BIOC", especially for Calendar entries
Regards,
Bev

Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca
From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: October 31, 2017 at 5:41:53 PM NDT
To: MIUG Consultations [MIUGconsultations@mi.mun.ca](mailto:MIUGconsultations@mi.mun.ca)

Thanks Bev - we'll fix those.

## Mathematics and Statistics

## Medicine

## Ocean Sciences

From: Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca)
Subject: Re: Fwd: consultation request for Biochemistry course and program changes
Date: November 10, 2017 at 1:56:19 PM NST
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Hi Valerie:
I'll try to have a look early next week and will let you know if I have any questions. Meanwhile you can certainly start outlining the secondary calendar changes (if possible using the OCSC calendar descriptions found in the latest proposals I circulated).
Cheers,
Annie

On 10/11/2017 10:55 AM, Valerie Booth wrote:
Hi Annie,

Also, please let me know if you'd like me to put through changes in the Ocean Sciences parts of the calendar as secondary changes to our proposal or if you'd like to follow Biology's lead in making your own changes.

Best,
Valerie

From: Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: November 7, 2017 at 8:44:10 AM NST
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Cc: Garth Fletcher [fletcher@mun.ca](mailto:fletcher@mun.ca)
Hi Valerie:
Following up on our meeting yesterday, I am sending you the comments from our unit on your proposed course changes. In general our committee was quite supportive of the proposed lab-based courses, which is the strategy we aim to develop ourselves.
A few minor suggestions:

1) On page 10, week 3 , a little more development on the lecture content would be welcome.
2) For BIOC 3906 on page 12: This course proposal is underdeveloped compared to the other two proposed lab courses.
3) General suggestions: you might want to specify (and make sure) that the evaluation schemes take into account the need to provide $20 \%$ of the global mark before the drop deadline.
4) BIOC 3907 on page 13: The dual evaluation scheme is somewhat confusing. What is the purpose of it?
5) On page 14, line H: One of our committee members highlighted that there are DNA sequencers on campus
(e.g. CREAIT) that could be used in a lab to complement this lecture.
6) On page 14, line J: The labs do not seem to go along with the concurrent lectures. During the "genomics" weeks, it seems like the labs should be more DNA/RNA based (e.g. cDNA library preparation and analysis) rather than protein based (e.g. Western blotting).
7) We noted a few typos (Biochemistry in last paragraph of page 7, WHMIS, Spectrophotometry X2, and chromatography in table of page 10).
8) As we have already discussed we can develop the secondary changes to OCSC programs and courses once our current proposals have been processed.
Good luck with the courses!
All the best,
Annie
```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```

On Oct 31, 2017, at 8:11 AM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I teach from 1:00 to 2:30 (and I have a meeting before that from 11:30-1:00). The other option would be before or after FoSCUGS meeting on Monday 6 Nov? Are you available?
Cheers,
Annie

On 30/10/2017 3:58 PM, Valerie Booth wrote:
I should be available between noon and 2 if that works for you? I'm not available from 2 to 3:30.

On Oct 30, 2017, at 3:56 PM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Is there any possibility of meeting any earlier? (Not sure what to do between 2:30 and 3:30). If not, we can meet where you prefer.

On 30/10/2017 3:48 PM, Valerie Booth wrote:
Is 3:30 on Wednesday OK for You? Am I going to come find you or are you going to come visit me?
On Oct 30, 2017, at 3:41 PM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I was wondering if we could meet this week to discuss about the proposed changes. When would be a good time for you? I'm on campus Wed afternoon and available 2:30 PM onward. Does it work for you? If not, what is your preference?
Cheers,
Annie

On 19/10/2017 10:39 AM, Valerie Booth wrote:
Thanks Annie.
I was thinking about secondary changes.
On Oct 19, 2017, at 10:37 AM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I have circulated your request to our committee but have not had the chance to look at it closely yet. Do you mean that your proposed changes imply secondary changes to Ocean Sciences calendar sections, or that your proposed dedicated labs may be useful as we develop our programs?
Cheers,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```

On 19/10/2017 9:14 AM, Valerie Booth wrote:
Hi Annie,
You should have just received the official request for consultation on our new dedicated lab courses and associated program changes.

Since this proposal was based on the current calendar, I'm expecting that we'll need to do a little bit of work to adjust the new Ocean Sciences programs and courses. I'm happy to work on this with you whenever you're ready. I guess I would just need the latest version of the Ocean Sciences calendar entries expected to be in place for next year to see what needs to be updated.

Best,
Valerie

## Pharmacy

From: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Subject: Re : consultation request for Biochemistry course and program changes
Date: November 3, 2017 at 2:22:28 PM NDT

To: "Phillips, Leslie" [lphillip@mun.ca](mailto:lphillip@mun.ca)
Hi Leslie,
Thanks for your comments.
I checked with the instructors for 3111 and they can't remember the last time there was a tutorial for 3111, so yes, from our point of view it would make sense to get rid of mention of tutorials in the calendar descriptions for both 2004 and 3111.

About your second question, l'm not sure what the right answer is. The old course numbers might not cease to exist because they might be used by Biology, for example, if they decide they want to retain labs in any of the courses and let us offer the lecture part while they run labs for their own students. Once I figure out the lay of the land that way, l'll have a better idea of what to do.

Best,
Valerie
On Oct 26, 2017, at 4:57 PM, Phillips, Leslie [lphillip@mun.ca](mailto:lphillip@mun.ca) wrote:
Hi Valerie,
Thanks for your email re proposed secondary calendar changes for Pharmacy as a consequence of changes in BIOC2101 and 3111. I had a couple of comments/questions...
a. We are okay with removing the tutorials if they are not being used. Did you mean to remove them from both 2004 and 3111? Because only 2004 has a strikethrough. (see copy and paste below from pages 23-24 of your application)
b. When you refer to the old course numbers (e.g. 2101 or 3106 ) under the CR or PR sections of the course description, should it read "the former 2101" etc.? While you're revising and not exactly deleting these courses...they do kind of no longer exist. I was just wondering how that's handled. Perhaps you already checked that out. Thanks, Leslie

Secondary Calendar Changes From pages 23/24:
Under School of Pharmacy 12 Course Descriptions
2004 Introduction to Biochemistry is an introduction to the major organic substances of living organisms, proteins, carbohydrates and lipids: their structure, analysis and biochemical function. Other topics include: enzymes; the biochemistry of membranes, including the plasma membrane and specialized intracellular membranes; and the biochemistry of selected differentiated cells.
CR: Biochemistry 2101, 2201
OR: tutorials as required
PR: Chemistry 2400 and Physics 1020 (or 1050), and 1021 (or 1051)
3111 General Biochemistry covers the catabolism of carbohydrates, lipids and amino acids. Mitochondria, chloroplasts and ATP synthesis. Biosynthesis of carbohydrates and lipids. Metabolic specialization of differentiated cells and tissues. Integration of metabolism.
CR: Biochemistry 3106, 3206
OR: tutorials as required
PR: One of PHAR 2004, or Biochemistry 2101, or 2201

DR. LESLIE PHILLIPS
ASSOCIATE DEAN UNDERGRADUATE STUDIES
PROFESSOR | MUN SCHOOL of PHARMACY
Joint Appointment | MUN FACULTY of MEDICINE/Psychiatry

Clinical Pharmacotherapy Specialist |EASTERN HEALTH
Health Sciences Centre
300 Prince Philip Dr | St. John's, NL | A1B 3V6
Ph: 709-777-8299
Fax: 709-777-7044

From: Csop Glew [cglew@mun.ca](mailto:cglew@mun.ca)
Date: Thursday, October 26, 2017 at 11:16 AM
To: Chair [lphillip@mun.ca](mailto:lphillip@mun.ca)
Subject: FW: consultation request for Biochemistry course and program changes
Hi Leslie
This is a follow up to my previous email about Biochem's proposed calendar changes. It's specifically addressed to us from Valerie Booth - nice of her to send us a separate note! If you want me to acknowledge/respond let me know, otherwise l'll leave it with you.

Csop
CSOP GLEW, Hon. B.A., M.U.P. I MANAGER OF ACADEMIC PROGRAMS
School of Pharmacy
Memorial University of Newfoundland
St. John's, NL I A1B 3V6
Health Sciences Centre I Room H3435
T 7097776963 I F 7097777044
www.mun.ca/pharmacy
Please note: the deadline to apply for admission to the Doctor of Pharmacy (PharmD) program for Sept. 2017 has passed. Applications for Sept. 2018 will be available Oct. 2017.

Where people and ideas become.
Follow us: Facebook: www.facebook.com/schoolofpharmacy Twitter:www.twitter.com/schoolofpharm
<image001.jpg>
From: Bugler, Heather
Sent: October 19, 2017 9:24 AM
To: Phillips, Leslie; Glew, Csop
Subject: FW: consultation request for Biochemistry course and program changes

```
Heather
Heather Bugler
Assistant to the Dean
School of Pharmacy
Memorial University of Newfoundland
Room 3441, Health Sciences Centre
300 Prince Philip Parkway
St. John's, NL A1B 3V6
Tele: 709-777-8300
Fax: 709-777-7044
www.mun.ca/pharmacy<http://www.mun.ca/pharmacy>
```

Where people and ideas become
Follow us:
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Twitter: www.twitter.com/schoolofpharm[http://www.twitter.com/schoolofpharm](http://www.twitter.com/schoolofpharm)
Please note: the deadline to apply for admission to the new Doctor of Pharmacy (PharmD) in September 2017 is February 1, 2017.
*** Our new Medication Therapy Services Clinic... now open!*** <image002.png>

## Physics and Physical Oceanography

From: Ivan Saika-Voivod [saika@mun.ca](mailto:saika@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: October 23, 2017 at 4:46:35 PM NDT
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)
Cc: Jolanta Lagowski [jolantal@mun.ca](mailto:jolantal@mun.ca)
Dear Valerie,
Thank you for your help in narrowing our focus with regards to your proposed changes. Here are some comments.

1) 6.1.13 Chemistry and Physics Joint Honours program

We note that while we are supportive of the change to replace BIOC2101 with 2201, the Chemistry Department has proposed to replace BIOC2101 with "2201 or 2901". We are supportive of this.

Since the program belongs to Chemistry and Physics, we would ask you to emend this change in your proposal so that BIOC2101 be replaced with a choice of either BIOC2201 or BIOC2901.
2) 6.1.5 Biochemistry/Physics Joint Honours program We are supportive of the proposed changes, especially since you have taken care so that the number of biochemistry courses required is unchanged.
3) Minor edits
p16, typo in "Biochemistry" in "Calendar Changes - Additions to Section 11.1 Blochemistry" for 2901
In the description of 2901,
"critical analysis and presentation of their work several formats" -> critical analysis and presentation of their work in several formats

Best regards, Ivan

Ivan Saika-Voivod, Associate Professor
Chair, Undergraduate Studies Committee
Department of Physics and Physical Oceanography, Memorial University of Newfoundland
St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

## Psychology

From: Psych Deputy Head [psychdeputyhead@mun.ca](mailto:psychdeputyhead@mun.ca)
Subject: Re: consultation request for Biochemistry course and program changes
Date: November 9, 2017 at 5:24:29 PM NST
To: Valerie Booth [vbooth@mun.ca](mailto:vbooth@mun.ca)

Hi Valerie,
We have looked over the changes that Biochemistry has suggested and we are happy to support these changes.
Christina

Christina Thorpe
Deputy Head, Undergraduate Studies
Psychology Department
Memorial University of Newfoundland
St. John's, NL,
A1B 3X9
phone: 709-864-4806
fax: 709-864-2430
e-mail: psychdeputyhead@mun.ca

## Proposal Prerequisite Change to CHEM 2210

## Executive Summary

The proposal is to remove MATH 1000 as a prerequisite to CHEM 2210 as well as some minor house-keeping with the prerequisites.

## Resource Implications: Instructional Costs

There will be no implications to resources or instructional costs.

## Library Holdings and/or Other Resources Required

No library holdings or other resources are required due to the proposed changes.

Signature of Unit Head (if appropriate):

Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SUMMARY PAGE FOR SENATE

## Approval Form

## Course Number and Title

CHEM 2210 Introductory Inorganic Chemistry

## Calendar Change(s)

## Section 11.3 of the Faculty of Science Calendar, St. John's Campus

2210 Introductory Inorganic Chemistry focuses on fundamental concepts in the chemistry of $s, p$, and $d$ block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
LH: 3
PR: Science 1807; minimum 60\% in CHEM 1051 or a minimum $65 \%$ in eitherCHEM 1001 or the former CHEM 1031; Ahathematics 1000

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

2210 Introductory Inorganic Chemistry focuses on fundamental concepts in the chemistry of $s, p$, and $d$ block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
LH: 3
PR: Science 1807; minimum 60\% in CHEM 1051 or a minimum 65\% in CHEM 1001

## Section 13.5 of the Grenfell Campus Calendar

2210 Introductory Inorganic Chemistry focuses on fundamental concepts in the chemistry of $s, p$, and $d$ block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
LH: 3
PR: Science 1807; minimum 65\% in CHEM 1001 for the former 1031) or a minimum 60\% in CHEM 1051, Mathematics 1000

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

2210 Introductory Inorganic Chemistry focuses on fundamental concepts in the chemistry of $s, p$, and $d$ block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
LH: 3
PR: Science 1807; minimum 65\% in CHEM 1001 or a minimum 60\% in CHEM 1051

## Rationale

CHEM 2210 students do not require calculus to be successful in the course. This will remove an unnecessary barrier for students who wish to take this course. Both St. John's and Grenfell Campuses have been issuing prerequisite waivers for this course. However, this is not efficient nor is it fair that only students who ask for the waiver get it. For example any student, perhaps from Biology or HKR etc., who may not have yet completed MATH 1000, but who did successfully complete CHEM 1051 and who is interested in inorganic chemistry, is fully capable of succeeding in this course.

## Consultations Sought From

Arts No
Business Administration No
Co-operative Education No
Education Yes
Engineering Yes
Grenfell Campus no
Human Kinetics and Recreation No
Marine Institute Yes
Medicine Yes
Music Yes
Nursing no
Pharmacy No
Science (Math\&Stat; Biology; Physics) Yes
Social Work No

Library Report Received
Yes

Signature: Dean, Associate Vice-President (Academic) or Vice-President

Name: $\qquad$

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Chair:

Secretary:

Date:

## Consultation email:

Original Message-----
From: Department of Chemistry Consult [mailto:chemconsult@mun.ca]
Sent: Monday, September 25, 2017 9:38 AM
To: associatevpoffice@grenfell.mun.ca; MIUG Consultations [MIUGconsultations@mi.mun.ca](mailto:MIUGconsultations@mi.mun.ca);
mathconsult@mun.ca; Judith [jmellor@mun.ca](mailto:jmellor@mun.ca); Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Annie Mercier
[amercier@mun.ca](mailto:amercier@mun.ca); psychology.head@mun.ca; Engineering Consultations [engrconsult@mun.ca](mailto:engrconsult@mun.ca);
pharminfo@mun.ca; pmarino@mun.ca; eascugcon@mun.ca; Jolanta' [jolantal@mun.ca](mailto:jolantal@mun.ca);
Kimberly.russell@mun.ca
Cc: tfridgen@mun.ca

Subject: Consultation request for proposal from Chemistry

Hello everyone,

Please send your comments to me regarding the attached proposal from chemistry.

Thanks,

Chris Flinn
Deputy Head, Undergraduate Studies
MUN Chemistry Department

## Library report:

Thanks Chris,

As this is a prerequisite change, there will be no impact on Memorial Libraries.

All the best.

Erin Alcock
Erin Alcock
Science Research Liaison Librarian
QE2 Library
Memorial University of Newfoundland
$\frac{\text { ekalcock@mun.ca }}{709-864-8316}$

Consultation responses received:

## Biochemistry:

This looks fine from Biochemistry's point-of-view.

On Sep 25, 2017, at 9:54 AM, Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca) wrote:
Well here's a surprise. Calendar changes from Chemistry :)

Mark D. Berry Ph.D.
Professor and Head
Dept. Biochemistry
Memorial University of Newfoundland
St. John's, NL, Canada

A1B 3X9

Associate Member
Beatrice Hunter Cancer Research Institute

Tel: +1-709-864-8529
E-mail: mberry@mun.ca; biochead@mun.ca

## Engineering:

Thank you for the opportunity to comment on your proposed Calendar changes to CHEM 2210 (both campuses).

In its meeting yesterday, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

Yours sincerely,

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

## Marine Institute:

Dear Chris,

Thank you for the opportunity to review and comment on the proposal for the prerequisite change to CHEM 2210. This change will have no impact on Marine Institute programs and we are happy to support this proposal.

Regards,
Bev

Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

Physics and Physical Oceanography

Dear Chris,

Thank you for the opportunity to comment on the removal of Math 1000 as a prerequisite for CHEM 2210. The rationale for the change seems fine and we are supportive of the change.

Best,
Ivan
Ivan Saika-Voivod, Associate Professor
Chair, Undergraduate Studies Committee
Department of Physics and Physical Oceanography, Memorial University of Newfoundland
St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

On 2017-09-25, at 12:31 PM, Lagowski, Jolanta wrote:

This is one is more relevant to us. I see no problem with this proposed
change.
Jolanta

## Faculty of Education

Hello Chris,
Thank you very much for the opportunity to review this proposal from Chemistry. The Faculty of Education has no concerns regarding these proposed changes.

Thank you,
Meghan
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020

Tel: 709 864-7554 |
Fax: 709 864-2623

## Ocean Sciences

Hi Chris:
I was away for the past 2 weeks so could not circulate this proposal until yesterday. However, I see that you already have it on the FoSCUGS agenda! Two weeks might be a little tight for university-wide consultations (I note that only 3 units have replied, according to your document). Perhaps this item should be rescheduled for the next meeting? Just let me know (I will only ask our undergrad committee to provide comments/approval if the proposal review is postponed).

Cheers,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```

Chemistry footnote to Ocean Sciences response:

Annie was likely confusing this proposal with previous one concerning a prerequisite change to chemistry 3210 . I didn't pick up on this confusion

Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry

## Biology

Hello Chris,
The Biology undergraduate committee has met today and reviewed your proposal for a prerequisite change $t$ o CHEM 2210 and associated minor housekeeping. We have no concerns with those proposed changes.

Best wishes,
Suzanne
--
Dr. Suzanne Dufour
Associate Professor
Department of Biology
Memorial University of Newfoundland
St. John's, NL
A1B 3X9
Canada

## Earth Sciences

## From UGradMattersES 2

To Department of Chemistry Consult 2
Date 2017-10-06 16:21
Hi Chris,

Earth Sciences is fine with this proposal.

Thanks and all the best,
KIM...

# Proposal <br> Calendar Change to MATH 2130 

## Executive Summary

The prerequisite requirement for MATH 2130 is updated.
Resource Implications: Instructional Costs
None.

## Consultations

Consultation period: Nov. 10 - Dec. 8, 2017.

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## 2130 Technical Writing in Mathematics

## Tech Writing in Mathematics

## Calendar Change

p. 556 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.1, update the 2130 computer programming prerequisite requirement to include Engineering 1020.

2130 Technical Writing in Mathematics is a project oriented course combining mathematical investigation and technical writing. By using computer programming, graphical and typesetting tools, students will explore mathematical concepts and will produce technical reports of professional quality. The latter will combine elements of writing and graphics to convey technical ideas in a clear and concise manner.

PR: admission to Applied or Pure Mathematics major and MATH 1001 and (Computer Science 1510 or 1001 or 2001, or Engineering 1020; or permission of the Head of Department)

## Secondary Calendar Changes

## None.

## Calendar Entry After Changes:

p. 556 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.1:

2130 Technical Writing in Mathematics is a project oriented course combining mathematical investigation and technical writing. By using computer programming, graphical and typesetting tools, students will explore mathematical concepts and will produce technical reports of professional quality. The latter will combine elements of writing and graphics to convey technical ideas in a clear and concise manner.

PR: admission to Applied or Pure Mathematics major and MATH 1001 and (Computer Science 1510 or 1001 or 2001, or Engineering 1020; or permission of the Head of Department)

## Rationale

Engineering 1020 is an intro programming course in the same vein as COMP 1001 or 1510. Students with this course are routinely waived into MATH 2130. This change will eliminate an unnecessary burden on students and staff.

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science
Social Work
Library Report Received

## Comments Received

Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes / No
Yes/No
Yes / No
Yes / No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

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Secretary:
Date:
$\qquad$

# Proposal <br> Calendar Change to MATH 4300 

## Executive Summary

The prerequisite requirement for MATH 4300 is updated.
Resource Implications: Instructional Costs
None.

## Consultations

Consultation period: Nov. 10 - Dec. 8, 2017.

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## 4300 General Topology

## General Topology

## Calendar Change

p. 557 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.1, update the 4300 prerequisite requirement, and make a small editorial change in the course description:

4300 General Topology is an introduction to point-set topology, centering around on the notions of the topological space and the continuous function. Topological properties such as Hausdorff, compactness, connectedness, normality, regularity and path-connectedness are examined, as are Urysohn's metrization theorem and the Tychonoff theorem.

PR: MATH 3300 or both MATH 3000 and 3303

## Secondary Calendar Changes

## None.

## Calendar Entry After Changes:

p. 558 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.2:

4300 General Topology is an introduction to point-set topology, centering on the notions of the topological space and the continuous function. Topological properties such as Hausdorff, compactness, connectedness, normality, regularity and path-connectedness are examined, as are Urysohn's metrization theorem and the Tychonoff theorem.

PR: MATH 3300 or 3000

## Rationale

MATH 3303 is an inactive course, and MATH 3000 by itself is a sufficient prerequisite for 4300 .

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science
Social Work
Library Report Received

## Comments Received

Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes / No
Yes/No
Yes / No
Yes / No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

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Secretary:
Date:
$\qquad$

# Proposal Calendar Change to STAT 1510 

## Executive Summary

We propose a minor change to the STAT 1510 course description, and a complete change of the required prerequisite.

Resource Implications: Instructional Costs
None.

## Consultations

Please respond by Thursday November 2, 2017.

Library Holdings and/or Other Resources Required
None.

Signature of Unit Head (if appropriate): $\qquad$
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

Approval Form

## 1510 Statistical Thinking and Concepts

## Statistical Thinking\&Concepts

## Calendar Changes

1510 Statistical Thinking and Concepts examines the basic statistical issues encountered in everyday life, such as data collection (both primary and secondary), ethical issues, planning and conducting statistically-designed experiments, understanding the measurement process, data summarization, measures of central tendency and dispersion, basic concepts of probability, discrete probability models, understanding sampling distributions, the central limit theorem based on simulations (without proof), linear regression, concepts of confidence intervals and testing of hypotheses. Statistical software will be used to demonstrate each technique.

CR: cannot receive credit for STAT 1510 if completed with, or subsequent to, STAT 2500, 2550 or the former 2510
LH: one 90 minute lab per week
PR: Mathematics 1090 or 109B or a combination of placement test and high school Mathematics scores acceptable to the Department.
CO: Mathematics 1000

Secondary Calendar Changes - note that these are not technically necessary. They are being suggested because they give students the false impression that STAT 1510 is appropriate for programs whose students will likely not meet the corequisite requirement. Having STAT 1510 listed in these programs creates an unnecessary burden on staff to whom prerequisite waiver requests are directed.
p. 168 in Fisheries and Marine Institute Regulations

Under 6.1, In the first column of the table at the bottom of the page, strike 1510:
"MSTM 4025 or Statistics 1510 or 2500 ."
p. 169 in Fisheries and Marine Institute Regulations

Under 6.2.1, In the first column of the first table of the page, strike 1510:
"MSTM 4025 or Statistics 1510 or 2500 or equivalent"
p. 169 in Fisheries and Marine Institute Regulations

Under 6.2.2, In the first column of the second table of the page, strike 1510:
"MSTM 4025 or Statistics 1510 or 2500 or equivalent"

## p. 457 in School of Nursing

Under 6.1, in the third row (not counting the header), strike 1510:
"Statistics 1510 or 2500 or equivalent, or Education 2900"

## p. 458 in School of Nursing

In Table 2, in the row for Winter Academic Term 4, strike 1510:
"Statistics 1510 or 2500 or equivalent, or Education 2900"

## p. 459 in School of Nursing

In Table 3, in the row for Winter Academic Term 4, strike 1510:
"Statistics 1510 or 2500 or equivalent, or Education 2900"

## p. 523 in the Faculty of Science

Under 10.8.1, remove Statistics 1510 from item \#4:
"4. Placement in Mathematics 1000, 1050, 1051, 1090, and 109A/B and Statistics 1510, shall be determined by the Department of Mathematics and Statistics on the basis of the student's score on the Mathematics Placement Test (MPT), SAT Subject Test in Mathematics Level 1, or other acceptable criteria-based test."

## Calendar Entry After Changes

1510 Statistical Thinking and Concepts examines the basic statistical issues encountered in everyday life, such as data collection (both primary and secondary), ethical issues, planning and conducting statistically-designed experiments, understanding the measurement process, data summarization, measures of central tendency and dispersion, basic concepts of probability, discrete probability models, understanding sampling distributions, the central limit theorem based on simulations (without proof), linear regression, concepts of confidence intervals and testing of hypotheses. Statistical software will be used to demonstrate each technique.

CR: cannot receive credit for STAT 1510 if completed with, or subsequent to, STAT 2500, 2550 or the former 2510
LH: one 90 minute lab per week
CO: Mathematics 1000

## Secondary Calendar Changes

## p. 168 in Fisheries and Marine Institute Regulations

Under 6.1, In the first column of the table at the bottom of the page, strike 1510: "MSTM 4025 or Statistics 2500."

## p. 169 in Fisheries and Marine Institute Regulations

Under 6.2.1, In the first column of the first table of the page, strike 1510:
"MSTM 4025 or Statistics 2500 or equivalent"

## p. 169 in Fisheries and Marine Institute Regulations

Under 6.2.2, In the first column of the second table of the page, strike 1510:
"MSTM 4025 or Statistics 2500 or equivalent"

## p. 457 in School of Nursing

Under 6.1, in the third row (not counting the header), strike 1510:
"Statistics 2500 or equivalent, or Education 2900"

## p. 458 in School of Nursing

In Table 2, in the row for Winter Academic Term 4, strike 1510:
"Statistics 2500 or equivalent, or Education 2900"

## p. 459 in School of Nursing

In Table 3, in the row for Winter Academic Term 4, strike 1510:
"Statistics 2500 or equivalent, or Education 2900"

## p. 523 in the Faculty of Science

Under 10.8.1, remove Statistics 1510 from item \#4:
"4. Placement in Mathematics 1000, 1050, 1051, 1090, and 109A/B, shall be determined by the Department of Mathematics and Statistics on the basis of the student's score on the Mathematics Placement Test (MPT), SAT Subject Test in Mathematics Level 1, or other acceptable criteria-based test."

## Rationale

The course description addition simply adds a topic that should have been included originally. The prerequisite change is to ensure that the course attracts the intended audience - potential statistics majors from the pool of first year students. Currently the course is admitting students who are very weak in mathematics and who have no desire to become a statistics major. Professional schools should not be recommending this course as a service course option.

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science
Computer Science
Social Work

## Library Report Received

## Comments Received

Yes/No
Yes/No
Yes/No
Yes/No
Yes / No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No

Yes / No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Secretary:
Date:

## Proposal <br> STAT 2410

## Executive Summary

The proposal is to create Statistics 2410 to replace Statistics 3410 . Both the title and description of the course are updated, but Statistics 2410 will be the same as Statistics 3410.

Resource Implications: Instructional Costs
None. Statistics 2410 will be the same as the former Statistics 3410.

## Consultations

The consultation period is Nov. 9, 2017 - Dec. 7, 2017.

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date: $\qquad$

## Sample Course Outline and Method of Evaluation

## Same as Stat 3410:

Course Contents and Tentative Schedule:

1. Probability and Distributions
1.1 Introduction to Probability and Set Theory ..... Week 1
1.2 Set Theory ..... Week 1
1.3 The Probability Set Function ..... Week 1-2
1.4 Conditional Probability and Independence ..... Week 2
1.5 Random variables and Distribution Functions ..... Week 2
1.6 Discrete Random Variables ..... Week 3
1.7 Continuous Random Variables. ..... Week 3
1.8 Expectation of a Random Variable ..... Week 4
1.9 Some Special Expectations ..... Week 4
1.10 Important Inequalities ..... Week 5
2. Multivariate Distributions
2.1 Distributions of Two Random Variables ..... Week 5
2.2 Transformations: Bivariate Random Variables ..... Week 6
2.3 Conditional Distributions and Expectations ..... Week 7
2.4 The Correlation Coefficient ..... Week 7
2.5 Independent Random Variables. ..... Week 8
2.6 Linear Combinations of Random Variables. ..... Week 8
3. Some Special Distributions
3.1 The Binomial and Related Distributions ..... Week 9
3.2 The Poisson Distribution ..... Week 10
3.3 The Gamma, Chi-square and Beta Distributions ..... Week 10
3.4 The Normal Distribution ..... Week 11
3.5 The $t$ and F Distributions ..... Week 11
4. Unbiasedness, Consistency, and Limiting Distributions 4.1 Unbiasedness ..... Week 12
4.2 Convergence of Probability ..... Week 12
4.3 Convergence in Distribution ..... Week 13
4.4 Central Limit Theorem ..... Week 13
TextsSame as 3410: Introduction to Mathematical Statistics (6th or 7th Edition) by Hogg, McKean and Craig
Instructor(s)

Same as 3410

# SUMMARY PAGE FOR SENATE 

## Approval Form

## 2410 Introduction to Probability Theory

## Intro to Probability Theory

## Calendar Change:

## p. 557, Addition of the following under the 11.8.2 in the Faculty of Science regulations:

2410 Introduction to Probability Theory (same as the former STAT 3410) covers combinatorial analysis, axioms of probability, conditional probability, independence, random variables, distribution function, mathematical expectation, Chebychev's inequality, joint distribution of two random variables, binomial and related distributions, Poisson, gamma, beta, normal, student t and F distributions, functions of random variables, convergence in probability, convergence in distribution, central limit theorem.
CR: The former STAT 3410
OR: one 90 minute tutorial period per week
PR: Mathematics 2000

## Secondary Calendar Changes

p. 236, in the Grenfell Campus regulations, in section 13.21, add a credit restriction to 3410:

3410 Mathematical Statistics I is basic probability concepts, combinatorial analysis, conditional probability, independence, random variable, distribution function, mathematical expectation, Chebyshev's inequality, distribution of two random variables, binomial and related distributions, Poisson, gamma, normal, bivariate normal, t , and F distributions, transformations of variables including the moment-generating function approach.
OR: one and a half hour tutorial period weekly
CR: STAT 2410
PR: MATH 2000
p. 499, under 6.1.17 Computer Science and Statistics Joint Honours, in item number 1, remove 3410 and add 2410:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2320, 3340, Statistics 1510 or 2500 or $2550,2410,2501$ or 2560, 3410, $3411,3520,3521,3540,4530,4590$.
p. 500, under section 6.1.21 Pure Mathematics and Statistics Joint Honours, in item 1, remove 3410 and add 2410:
2. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 4000, Statistics 1510 or 2500 or $2550,2410,2501$ or $2560,-3410,3411,3520,3521,4402,4410,4530$;
p. 501 under 6.2.8 Computer Science and Statistics Joint Major:
" 3 . Mathematics 1000, 1001, 2000, 2050, 2051, 2320, 3340, Statistics $3410 \underline{2410, ~ 3411, ~ 3520, ~ 3521, ~}$ 3540, 4590."
p. 502 under 6.2.11 Economics and Statistics Joint Major (B.Sc. Only) in item 1, remove 3410 and add 2410:
3. Mathematics $1000,1001,2000,2050,2051$, Statistics $2410,2550,2560,3410,3411,3520,3540$, 4590.
p. 503 in section 6.2.12 Economics (Co-operative) and Statistics Joint Major (B.Sc. Only), in the second column and first row of the table near the top of the page, change 3410 to 2410 :
"Term 3 (Fall)
Economics 4550
Mathematics 2051
Statistics 24103410
Three further credit hours in Statistics courses
Three credit hours in elective courses [see Note 2]"
p. 524, under section 10.8.4, item number 6, change 3410 to 2410 :
4. A statistics course. Statistics $3410 \underline{2410}$ is recommended.
p. 524, under section 10.8.5, item number 7 , change 3410 to 2410 :
5. A statistics course. Statistics $3410 \underline{2410}$ is recommended.
p. 524, under section 10.8.6, item number 1, remove 3410 and add 2410 :
6. Mathematics 1000, 1001, 2000, 2050, 2051, Statistics 2410, 2560, 3410, 3411, 3520, 3521, 4530;
p. 524, under section 10.8.7, item number 3 , change 3410 to 2410 :
7. Statistics 3410 2410;
p. 525, under section 10.8.9 item number 1, remove 3410 and add 2410:
8. Mathematics $1000,1001,2000,2050,2051,3000,3001,3132,3202,3210$, Statistics 2410,2560 , 3410, 3411, 3520, 3521, 4410, 4530, 4590, 459A/B;
p. 588, strike 3410 Probability and Statistics from the list of Statistics courses in 11.8.2.
p. 588, under the prerequisites for 3411 include STAT 2410:

PR: STAT 2410 or the former 3410
p. 588, under the prerequisites for 4402 include STAT 2410:

PR: STAT 2410 or the former 3410
p. 588, under the prerequisites for 4560 include STAT 2410:

PR: STAT 2410 or the former 3410

## Calendar Entry After Changes

## Addition of the following under the $\mathbf{1 1 . 8 . 2}$ in the Faculty of Science regulations, p. 557:

2410 Introduction to Probability Theory (same as the former STAT 3410) covers combinatorial analysis, axioms of probability, conditional probability, independence, random variables, distribution function, mathematical expectation, Chebychev's inequality, joint distribution of two random variables, binomial and related distributions, Poisson, gamma, beta, normal, student t and F distributions, functions of random variables, convergence in probability, convergence in distribution, central limit theorem.
CR: The former STAT 3410
OR: one 90 minute tutorial period per week
PR: Mathematics 2000

## Secondary Calendar Changes

p. 236, in the Grenfell Campus regulations, in section 13.21, add a credit restriction to 3410:

3410 Mathematical Statistics I is basic probability concepts, combinatorial analysis, conditional probability, independence, random variable, distribution function, mathematical expectation, Chebyshev's inequality, distribution of two random variables, binomial and related distributions, Poisson, gamma, normal, bivariate normal, t , and F distributions, transformations of variables including the moment-generating function approach.
OR: one and a half hour tutorial period weekly
CR: STAT 2410
PR: MATH 2000
p. 499, under 6.1.17 Computer Science and Statistics Joint Honours, in item number 1, remove 3410 and add 2410 :

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2320, 3340, Statistics 1510 or 2500 or $2550,2410,2501$ or 2560, 3411, 3520, 3521, 3540, 4530, 4590.
p. 500, under section 6.1.21 Pure Mathematics and Statistics Joint Honours, in item 1, remove 3410 and add 2410:
2. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 4000, Statistics 1510 or 2500 or $2550,2410,2501$ or $2560,3411,3520,3521,4402,4410,4530$;
p. 501 under 6.2.8 Computer Science and Statistics Joint Major:
3. Mathematics 1000, 1001, 2000, 2050, 2051, 2320, 3340, Statistics 2410, 3411, 3520, 3521, 3540, 4590.
p. 502 under 6.2.11 Economics and Statistics Joint Major (B.Sc. Only) in item 1, remove 3410 and add 2410:
4. Mathematics 1000, 1001, 2000, 2050, 2051, Statistics 2410, 2550, 2560, 3411, 3520, 3540, 4590.
p. 503 in section 6.2.12 Economics (Co-operative) and Statistics Joint Major (B.Sc. Only), in the second column and first row of the table near the top of the page, change 3410 to 2410 :
Term 3 (Fall)
Economics 4550
Mathematics 2051
Statistics 2410
Three further credit hours in Statistics courses
Three credit hours in elective courses [see Note 2]
p. 524, under section 10.8.4, item number 6, change 3410 to 2410 :
5. A statistics course. Statistics 2410 is recommended.
p. 524, under section 10.8.5, item number 7 , change 3410 to 2410 :
6. A statistics course. Statistics 2410 is recommended.
p. 524, under section 10.8.6, item number 1, remove 3410 and add 2410 :
7. Mathematics 1000, 1001, 2000, 2050, 2051, Statistics 2410, 2560, 3411, 3520, 3521, 4530;
p. 524, under section 10.8.7, item number 3, change 3410 to 2410 :
8. Statistics 2410;
p. 525, under section 10.8.9 item number 1, remove 3410 and add 2410:
9. Mathematics 1000, 1001, 2000, 2050, 2051, 3000, 3001, 3132, 3202, 3210, Statistics 2410, 2560, 3411, 3520, 3521, 4410, 4530, 4590, 459A/B;
p. 588, strike 3410 Probability and Statistics from the list of Statistics courses in 11.8.2.
p. 588, under the prerequisites for 3411 include STAT 2410:

PR: STAT 2410 or the former 3410
p. 588, under the prerequisites for 4402 include STAT 2410:

PR: STAT 2410 or the former 3410
p. 588, under the prerequisites for 4560 include STAT 2410:

PR: STAT 2410 or the former 3410

## Rationale

To make progress in the statistics program it is important that STAT 2410 is done in the $4^{\text {th }}$ semester (second winter). By renumbering the course, it is thought that it will be clearer to statistics majors that this course should be done in second year. The change in description and title makes it clear that this is a course in probability and not simply an intro to statistics course.

## Consultations Sought From

Business Administration
Computer Science
Economics
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Humanities and Social Sciences
Marine Institute
Medicine
Music

## Comments Received

Yes/No
Yes/No
Yes / No
Yes/No
Yes/No
Yes/No
Yes/No
Yes / No
Yes / No
Yes/No
Yes / No

Nursing
Pharmacy
Science
Social Work

Yes / No
Yes/No
Yes/No
Yes/No

Yes/No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

## FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Secretary: $\qquad$
Date: $\qquad$

# Proposal Calendar Change to STAT 2560 

## Executive Summary

The prerequisite requirement for STAT 2560 is updated.
Resource Implications: Instructional Costs
None.

## Consultations

Consultation period: Nov. 10 - Dec. 8, 2017.

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SUMMARY PAGE FOR SENATE

## Approval Form

## 2560 Further Statistics for Science Students

## Further Stats Science Students

## Calendar Change

p. 558 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.2, update the 2560 prerequisite requirement:


#### Abstract

2560 Further Statistics for Science Students (formerly STAT 2511) covers estimation and hypothesis testing in the two-sample and paired sample cases, one way and two way analysis of variance, simple and multiple linear regression, chi-square tests, non-parametric tests including sign test, Wilcoxon signed rank test and Wilcoxon rank test. CR: STAT 2501, Psychology 2911, 2950, and the former 2901 LH: one 90 minute lab per week. Statistical computer packages will be used in the laboratory, but no prior computing experienced is assumed. PR: STAT 1510 or 2500 or 2550 or the former 2510, Mathematics 1000-or the former 1081


## Secondary Calendar Changes

p. 524 in the Faculty of Science regulations in the 2017-18 calendar, in section 10.8.6 Major in Statistics, remove STAT 1510 from item 2:
2. One of Statistics 1510, 2500-, or 2550. Statistics 2550 is recommended;
p. 525 in the Faculty of Science regulations in the 2017-18 calendar, in section 10.8.9 Honours in Statistics, remove STAT 1510 from item 2:
2. One of Statistics 1510,2500 - or 2550 . Statistics 2550 is recommended;

## Calendar Entry After Changes:

p. 558 in the Faculty of Science Regulations of the 2017-18 calendar, section 11.8.2:

2560 Further Statistics for Science Students (formerly STAT 2511) covers estimation and hypothesis testing in the two-sample and paired sample cases, one way and two way analysis of variance, simple and multiple linear regression, chi-square tests, non-parametric tests including sign test, Wilcoxon signed rank test and Wilcoxon rank test.

CR: STAT 2501, Psychology 2911, 2950, and the former 2901
LH: one 90 minute lab per week. Statistical computer packages will be used in the laboratory, but no prior computing experienced is assumed.
PR: STAT 2500 or 2550 , Mathematics 1000

## Secondary Calendar Changes

p. 524 in the Faculty of Science regulations in the 2017-18 calendar, in section 10.8.6, remove STAT 1510 from item 2:
2. Statistics 2500 or 2550 . Statistics 2550 is recommended;
p. 525 in the Faculty of Science regulations in the 2017-18 calendar, in section 10.8.9, remove STAT 1510 from item 2:
2. Statistics 2500 or 2550 . Statistics 2550 is recommended;

## Rationale

Students who have done STAT 1510 do not have sufficient background for STAT 2560 and should not take the course.

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science
Social Work
Library Report Received

Comments Received
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes / No

Yes/No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

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Secretary:
Date:

# Proposal <br> Calendar Changes to Applied Mathematics and Computer Science Joint Major Program 

## Executive Summary

The proposal is to remove one mathematics course from the applied math computer science joint major.

Resource Implications: Instructional Costs
None.

## Consultations

Consultation period is Nov. 9, 2017 to Dec. 7, 2017.

## Library Holdings and/or Other Resources Required

No additional requirements.

Signature of Unit Head (if appropriate): $\qquad$
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Applied Mathematics and Computer Science Joint Major (B. Sc. Only)

## Calendar Change

In section 6.2 . 1 on p .500 of the Faculty of Science regulations, remove the last clause from item 2 :

### 6.2.1 Applied Mathematics and Computer Science Joint Major (B.Sc. Only)

The following courses are required

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, plus 18 further credit hours in Computer Science courses numbered 3000 or higher.
2. Mathematics $1000,1001,2000,2050,2051,2130,2260,2320,3000,3100,3132,3161,3202,4160$, and 4190 , plus one of Mathematics $3210,4131,4132,4162$.
In addition, Statistics 2550 is highly recommended.

## Calendar Entry After Changes

6.2.1 Applied Mathematics and Computer Science Joint Major (B.Sc. Only)

The following courses are required

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, plus 18 further credit hours in Computer Science courses numbered 3000 or higher.
2. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3100, 3132, 3161, 3202, 4160 , and 4190.
In addition, Statistics 2550 is highly recommended.

## Rationale

There are as many applied math courses in the joint major as there would be in the double major. Further two of the courses in the deleted clause are inactive, and the other two are honours courses, not normally done by non-honours math-majors. The change would bring the program more in line with the number of courses in other joint majors.

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science

## Comments Received

Yes / No

Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No

Computer Science
Social Work

Library Report Received

Yes/No
Yes/No

Yes / No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Secretary: $\qquad$
Date:

# Proposal Calendar Change to Pure Mathematics Honours Program 

## Executive Summary

The statistics requirement in the Honours in Pure Mathematics program is changed from STAT 2550 to STAT 2410.

Resource Implications: Instructional Costs
None.
Consultations
Consultation period: Nov. 10 - Dec. 8, 2017.

Library Holdings and/or Other Resources Required
None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Honours in Pure Mathematics

## Calendar Change(s)

## p. 525 in the 2017-18 calendar, in section 10.8.8 of the Faculty of Science regulations:

10.8.8 Honours in Pure Mathematics<br>See Regulations for the Honours Degree of Bachelor of Science. Students shall complete the following requirements:<br>1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 3300, 3320, 3331, 4300, 4310,<br>439A/B, Statistics 25502410 or the former 3410;<br>2. Either Mathematics 3340 or 3370 ;<br>3. Either Mathematics 4000 or 4001 ;<br>4. Either Mathematics 4320 or 4321;<br>5. Twelve further credit hours in Pure Mathematics courses numbered 3000 or higher, excluding the former Mathematics 3330 , at least 9 credit hours of which must be in courses numbered 4000 or higher;<br>6. A computing course early in the program is required. Computer Science 1510 is recommended.

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

## p. 525 in the 2017-18 calendar, in section 10.8 .8 of the Faculty of Science regulations:

### 10.8.8 Honours in Pure Mathematics

See Regulations for the Honours Degree of Bachelor of Science. Students shall complete the following requirements:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 3300, 3320, 3331, 4300, 4310, 439A/B, Statistics 2410 or the former 3410;
2. Either Mathematics 3340 or 3370;
3. Either Mathematics 4000 or 4001 ;
4. Either Mathematics 4320 or 4321 ;
5. Twelve further credit hours in Pure Mathematics courses numbered 3000 or higher, excluding the former Mathematics 3330, at least 9 credit hours of which must be in courses numbered 4000 or higher;
6. A computing course early in the program is required. Computer Science 1510 is recommended.

## Rationale

The original intent when statistics 3410 was introduced was that it would be the required statistics course for math students. Both the applied and pure math major programs recommend statistics 3410 , and not 2550 . The applied math honours program requires statistics 3410 . The pure math honours program was missed when these changes were made to the other math programs. Coincidentally, at this time statistics 3410 is proposed to become statistics 2410 in another proposal that is anticipated to be approved at the same time as this proposal. So that the resulting pure math honours program is fully up to date, it is proposed that the new (anticipated) course number be used for the updated calendar entry.

## Consultations Sought From

Humanities and Social Sciences
Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Science
Computer Science
Social Work
Library Report Received

Comments Received
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes/No
Yes / No
Yes/No
Yes/No
Yes/No
Yes / No

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name $\qquad$

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Secretary:
Date:

## PROPOSAL FOR CALENDAR CHANGES TO EXISTING PROGRAM Majors in Ocean Sciences

## Executive summary

A minor change is proposed to the calendar entry of Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems) to adjust the Chemistry requirements, reflecting the upcoming deletion of a course.

## Resource implications

There will be no resource implications, no additional costs associated with this change and no change in library holdings.

## Consultations

See Appendix.

## Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

Signature of Unit Head

Date

Signature of the Dean

Date

# SUMMARY PAGE FOR SENATE Approval Form 

## Program Title

Major in Ocean Sciences and Major in Ocean Sciences (Environmental Systems)

## Proposed Calendar Changes under 10.9 Ocean Sciences (showing changes)

### 10.9.3.1 Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)

Admission to the Ocean Sciences Major Programs is based on academic standing. To be considered for admission to one of the major programs, students must normally have completed 30 credit hours with an overall average of at least $65 \%$. The following courses should have been completed:

1. Biology 1001 and 1002;
2. Chemistry 1050 and 1051 (or 1010 and 1011)(or 1200 and 1001);
3. Earth Sciences 1000;
4. English 1090 and 1110 (or equivalent);
5. Mathematics 1000 (or equivalent);
6. Ocean Sciences 1000 with a minimum grade of $65 \%$; and
7. Physics 1020 or Physies-1050.

Students who wish to enroll in any of these programs should plan well in advance so that they have the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department at the earliest opportunity to prepare adequately for program admission. Each student registered in the Major will be assigned a faculty advisor who should be consulted on academic issues, including course selection.

## Clean Calendar Entry under 10.9 Ocean Sciences (after changes)

### 10.9.3.1 Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)

Admission to the Ocean Sciences Major Programs is based on academic standing. To be considered for admission to one of the major programs, students must normally have completed 30 credit hours with an overall average of at least $65 \%$. The following courses should have been completed:

1. Biology 1001 and 1002;
2. Chemistry 1050 and 1051 (or 1200 and 1001);
3. Earth Sciences 1000;
4. English 1090 and 1110 (or equivalent);
5. Mathematics 1000 (or equivalent);
6. Ocean Sciences 1000 with a minimum grade of $65 \%$; and
7. Physics 1020 or 1050.

Students who wish to enroll in any of these programs should plan well in advance so that they have the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department at the earliest
opportunity to prepare adequately for program admission. Each student registered in the Major will be assigned a faculty advisor who should be consulted on academic issues, including course selection.

## Rationale for Proposed Change

We were recently informed by the department of Chemistry that they will soon be proposing the deletion of CHEM 1011 and that other units were already committed to adjusting their programs accordingly. We were therefore encouraged to align our calendar descriptions at the earliest opportunity, leading to the current proposal.

## Consultations Sought From

Marine Institute
Grenfell campus
Department of Biochemistry
Department of Biology
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Physics and Physical Oceanography
Department of Psychology
Faculty of Business Administration
Faculty of Engineering and Applied Science
Faculty of Education
Faculty of Arts
Library Report Received

Comments Received
Yes
No
Yes
Yes
Yes
No
Yes
No
Yes
No
Yes
No
No
Yes
No
No

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice President Yes / No
Name

## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:
Date:

## APPENDIX I-CONSULTATIONS Initial request sent 24 April 2017

From: Fletcher, Garth
Sent: April-24-17 2:52 PM
To: Arts; Biochemistry Head; Business; Chuck Hurich; 'cs-chair@mun.ca'; Locke, Wade; Hicks, Sue; Engineering; Fridgen,Travis; 'Ian Neath'; Jody-Lynn Burke; Lagowski, Jolanta; Marino, Paul; 'mathconsult@mun.ca'; Meghan Gamsby; 'miugconsultations@mi.mun.ca'; Catto, Norm;
'vpoffice@grenfell.mun.ca'
Cc: amercier@mun.ca
Subject: Request for consultation

Colleagues:
Please find attached documents for consultations on our new proposed Honours program and minor changes to our existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)
3. Calendar change to the Minors (for more flexibility)

Best regards
Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED

## Geography

From: Catto, Norm
Sent: April-24-17 3:05 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation
This is also fine with us.

Norm Catto
Head, Department of Geography
Memorial University
St. John's NL A1B 3X9
Canada
1-709-864-7463
Fax 1-709-864-3119

## Physics and Physical Oceanography

From: Martin Plumer [mailto:plumer@mun.ca]
Sent: May-03-17 9:45 AM

To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca)
Subject: FW: FW: Request for consultation
Hi Garth,
See suggestion below from Entcho.
Best,
Martin
-----Original Message-----
From: Entcho Koytchev Demirov [mailto:entcho@mun.ca]
Sent: April-25-17 9:41 AM
To: Martin Plumer
Cc: 'Brad deYoung'; 'Rick Goulding'
Subject: Re: FW: Request for consultation
Hi Martin,
I do not see changes important for us in the first two documents.
They are mainly about changes in chemistry courses and rewarding of existing program of Major in Ocean Sciences.

A have a minor suggestion:
at the end of point 7 , of
9.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences
" Geography, or Physics."
should be probably
" Geography, or Physics and Physical Oceanography."
Entcho

## Engineering

From: Engineering Consult [mailto:engrconsult@mun.ca]
Sent: May-04-17 8:35 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Dennis Peters [dpeters@mun.ca](mailto:dpeters@mun.ca); Williams, Jennifer [jwilliams04@mun.ca](mailto:jwilliams04@mun.ca)
Subject: Re: Request for consultation
Dear Dr. Fletcher,
Thank you for the opportunity to comment on the proposed minor changes to various Calendar entries for Ocean Sciences:

Major in Ocean Sciences;
Major in Ocean Sciences (Environmental Systems);

```
Minor in Oceanography;
Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE);
Honours in Ocean Sciences;
new block of special topics courses in Ocean Sciences;
deletion of OCSC/BIOL 3620; and
creation of new courses OCSC 3600 and 499A/B.
```

After consultation with the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, we find that these changes will have no impact on our programs.

I wish you well in the progress of these changes.
Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
St. John's NL A1B 3X5

## Marine Institute

From: Dawn King [mailto:Dawn.King@mi.mun.ca] On Behalf Of MIUG Consultations
Sent: May-09-17 9:43 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation - the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)

Garth,
Thank you for the opportunity to review and comment on the proposed Calendar changes addressing the Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems) adjusting the Chemistry requirements.

This change will have no impact on the programs at the Marine Institute.
We are happy to support this proposal as presented.

All the best,<br>Derek<br>Derek Howse<br>Chair, Undergraduate Studies Committee<br>Marine Institute, Memorial University<br>TEL: 709-778-0586<br>FAX: 709-778-0394<br>Derek.Howse@mi.mun.ca

## Earth Sciences

Subject:Fwd: FW: Request for consultation
Date: Fri, 16 Jun 2017 12:37:12-0230
From: Penny L Morrill [pmorrill@mun.ca](mailto:pmorrill@mun.ca)
To: Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca), fletcher@mun.ca

June 16, 2017
Dear Annie and Garth,
Earth Science supports the newly proposed Honours program and minor changes to your existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)
3. Calendar change to the Minors (for more flexibility)

Cheers,
Penny
Chair of the undergraduate matters committee
Penny Morrill, Ph.D.
Associate Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL A1B 3X5
Canada
phone: (709) 864-6729
fax: (709) 864-2589

## Chemistry

From: Travis Fridgen
Sent: Wednesday, August 23, 2017 1:25 PM
To: Fletcher, Garth
Cc: amercier@mun.ca
Subject: Re: Request for consultation
Hi Garth,
All looks fine to me. The only thing is 3600 says there are no resource implications. But as I have been told, a new course has to have resource implications as the person who will be teaching it will not be able to teach something else.
Take care,
T

Travis D. Fridgen BSc, BEd, PhD
Professor \& Head
Department of Chemistry
Memorial University
St. John's, NL, A1B $3 \times 7$
http://www.chem.mun.ca/zfac/tdf.php

## Biology

From: Fletcher, Garth
Sent: August-18-17 3:57 PM
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca); Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)

## Cc: amercier@mun.ca

Subject: Request for Consultation
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSC̄Major_21April2017.pdf><CalendarChanges_OCSCMinors_2
1April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>

On 24/08/2017 12:27 PM, Jody-Lynn Burke wrote:
Hi Garth,
BIOL concerns regarding the OCSC Honours program, as well as the Joint Marine Biology Major and proposed Joint Honours in Marine Biology, were discussed at length with Annie during our June 15, 2017 meeting with Amy Todd.

In summary:
The admissions requirements for the Major, not the Honours, are listed in the proposal. There is a reference to "To qualify for the Honours in Ocean Sciences, students must complete a minimum of 45 credit hours in Ocean Sciences." Is there a core subset of OCSC courses students must complete or are all 45 credit hours (which appear to include the 6 credit hours associated with the proposed OCSC 499A/B) required before admission is considered?

- As I relayed to Annie at our June 15, 2017 meeting, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any non-BIOL major at this time.
- During the June 15 meeting I asked Annie how much lab experience students in the Honours program will receive. Are additional lab courses planned?


## Special Topics Courses:

Given the preliminary nature of the proposed blocks, have pre-requisites been identified? Specially, do you anticipate any BIOL courses as pre-requisites?

## BIOL 499A/B Proposal:

"This dissertation is mandatory for students pursuing the Honours in Ocean Sciences and is one of two choices offered to students pursuing the Joint Honours in Marine Biology." There is no Joint Honours in Marine Biology. Please omit.

OCSC 3600 Marine Microbiology Proposal:
BIOL 2060 or 2250 are highlighted as pre-requisites. As indicated above and during my June 15 meeting with Annie, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any nonBIOL major at this time.

If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 28/08/2017 11:47 AM, Annie Mercier wrote:
Hi Jody:
We thank you for your comments and feedback. Please find our replies below.
1- With regards to the OCSC Honours, I believe we have addressed all of the early concerns you voiced at the June 15 meeting in our updated proposal (circulated on June 22). In addition:

1a- Admission requirements: "To qualify for the Honours" was reworded into "To earn an Honours" in order to dispel any ambiguity that the 45 credit hours in Ocean Sciences are the overall requirements not the admission requirements. With respect to admission, the proposal states: "Honours students would normally follow one of the Major programs offered by the Department of Ocean Sciences before applying to the Honours, and must meet its admission requirements as follows: To be considered for admission to the Major in Ocean Sciences prior to admission to the Honours program, students must normally have completed..." This essentially indicates that students must typically register to the Major (after satisfying its admission requirements) before transitioning to the Honours.

1b- In direct response to your initial concern about available seats, we have made BIOL 2060 a choice among several courses (under 5a in the updated proposal).

1c- As I indicated during the meeting, we do not have specific requirements for lab vs non-lab courses, like Biology does. This is in part due to the broader science foundation that our programs require. Overall, this foundation includes 6 courses (in Biology, Chemistry, Physics) with associated lab segments. In addition, the core hands-on component of our Majors/Honours is bundled into OCSC 2500, which is a required intensive practical course providing ship-based and lab-based training. Finally, both OCSC 3000 and OCSC 4122 have lab segments. And, of course, we offer a dive course to qualifying students (OCSC 4000). In sum, based on the requirements, Honours students will typically take a minimum of 8 to 10 courses (24-30 credit hours) that either have labs or are entirely hands-on, in addition to the 6 credit hours associated with the research project (OCSC 499A/B).

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3- OCSC 499A/B: Reference to the joint Honours has been removed, although we are still keen on developing the Joint Honours in Marine Biology with you at your earliest convenience (we feel it does not make sense to have an orphan Joint Major without an Honours option).

4- OCSC 3600 Marine Microbiology: We are aware that you cannot reserve seats for our students in BIOL

2060 or BIOL 2250. This is why we list them as alternative options. We are hoping that, should this create a problem, we might explore ways to expand accessibility to these courses, since they are important foundation courses in science. We do not see any way that we could develop/offer anything similar without substantial and unnecessary overlap.

Please let us know if you have any further questions or concerns.
All the best,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```


## Biochemistry

Subject:Request for Consultation
Date: Fri, 18 Aug 2017 18:26:45 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
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Department of Ocean Sciences
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TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-
21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors_2
1April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>

On Sep 14, 2017, at 10:29 AM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I was wondering if you had had the chance to review our proposals, which were initially circulated in April -- with an updated proposal for the Honours sent out in August (see below).

The purpose of this email is actually to draw your attention to the fact that the proposal for the new course in Marine Microbiology (OCSC 3600) has recently been modified to include an option for a Biochemistry course as PR (since Biology was concerned that they could not reserve seats in BIOL 2060 for our students). This is in line with what we did for the Honours. Please let me know if you have any concerns with this updated version.
In sum, the only two documents that have changed since our initial message in April are the ones in Word format (updated OCSC 3600; updated OCSC Honours).
I look forward to your feedback.
All the best,
Annie
On 17/09/2017 9:53 AM, Valerie Booth wrote:
Hi Annie,
Sorry for the slow reply.
Biochemistry is fine with your proposal.
The choice of Biology 2250 or Biochem 2100 makes sense since these are in the process of being cross listed. We don't anticipate any trouble fitting OCSC students into 2100. Just note that the way we do our online registration and reserves, you may wind up with some students who aren't able to register online, but may need to contact the biochem department to get signed in "by hand".

Best,
Valerie
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

On 18/09/2017 08:31 AM, Annie Mercier wrote:
Hi Valerie:
Many thanks for your feedback, and for the heads up regarding BIOC 2100.
All the best,
Annie

## PROPOSAL FOR CALENDAR CHANGES TO EXISTING PROGRAM Minor in Oceanography

## Executive summary

Minor changes are proposed to the calendar entry of the Minor in Oceanography offered by the Department of Ocean Sciences, to correct typos, ensure consistency among the Minor programs offered by the Department, and to offer greater flexibility in the choice of elective courses.

## Resource implications

There will be no resource implications, no additional costs associated with this change and no change in library holdings.

## Consultations

See Appendix I.

## Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

Signature of Unit Head

Date

Signature of the Dean

Date

# SUMMARY PAGE FOR SENATE Approval Form 

## Program Title

Minor in Oceanography

## Proposed Calendar Changes under 10.9 Ocean Sciences (showing changes)

### 10.9.1 Minor in Oceanography

Students who take a Minor Inin Oceanography will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2100, 2200, 2300;
2. Ocean Sciences 2000 or Biology 3710;
3. Earth Sciences 1000; and
4. the remaining 6 Six credit hours that can-should-be selected from-Biology $3014,3709,3711$, $3712,3714,3715,4122,4601,4710,4750,4810$, Chemistry $2100,3110,4151,4156$, Earth Sciences 4302, Geography 3120, 3510, 4190, 4300, Environmental Science 3072, 3210, 3211, 4230, Ocean Sciences 2001, 3000, 3002, 3620, 4000, 4122, 4601, and Physics and Physical Oceanography $3300,3340,4300,4340$ :
a. Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810;
b. Chemistry 2100, 3110, 4151, 4156;
c. Earth Sciences 4302, 4420;
d. Geography 3120, 3510, 4190, 4300;
e. Environmental Sciences 3072, 3210, 3211, 4230;
f. Ocean Sciences 2001, 3000, 3002, 3620, 4000, 4122, 4601;
g. Physics 3300, 3340, 4300, 4340;
h. Other applicable ocean-related courses, as approved by the Head of the Department (or delegate).
Course prerequisites stipulated tin the Course Descriptions section shall apply to a Minor Inin Oceanography.

## Clean Calendar Entry under 9.9 Ocean Sciences (after changes)

### 9.9.1 Minor in Oceanography

Students who take a Minor in Oceanography will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2100, 2200, 2300;
2. Ocean Sciences 2000 or Biology 3710;
3. Earth Sciences 1000; and
4. Six credit hours that can be selected from:
a. Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810;
b. Chemistry 2100, 3110, 4151, 4156;
c. Earth Sciences 4302, 4420;
d. Geography 3120, 3510, 4190, 4300;
e. Environmental Sciences 3072, 3210, 3211, 4230;
f. Ocean Sciences 2001, 3000, 3002, 3620, 4000, 4122, 4601;
g. Physics 3300, 3340, 4300, 4340;
h. Other applicable ocean-related courses, as approved by the Head of the Department (or delegate).
Course prerequisites stipulated in the Course Descriptions section shall apply to a Minor in Oceanography.

## Rationale for Proposed Change

We propose to align the style and requirements of our Minor programs by adjusting the respective calendar entries accordingly, and we take this opportunity to add a suitable Earth Sciences elective. We also wish to allow different electives to be approved by the Department in the future. This latter change is made to address the challenges inherent to our interdisciplinary programs, whereby a large number of courses are relevant as electives, and it is difficult to provide an exhaustive list in the calendar and/or to keep up with course changes made by other departments. Last year we received over five requests for substitute electives (for new or different courses), which made sense because they were related to ocean sciences. Because there is already significant uptake for the minors, and enrollment may grow, we wish to optimize the way in which we can attend to such requests for substitute courses without involving the Faculty of Science subcommittee. The proposed language will allow us to do so at the departmental level.

## PROPOSAL FOR CALENDAR CHANGES TO EXISTING PROGRAM Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE)

## Executive summary

Minor changes are proposed to the calendar entry of the Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE) offered by the Department of Ocean Sciences, to correct typos, ensure consistency among the Minor programs offered by the Department, and to offer greater flexibility in the choice of elective courses.

## Resource implications

There will be no resource implications, no additional costs associated with this change and no change in library holdings.

## Consultations

See Appendix I.

## Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

Signature of Unit Head

Date

Signature of the Dean

Date

## SUMMARY PAGE FOR SENATE Approval Form

## Program Title

Minor in Sustainable Aquaculture and Fisheries Ecology

## Proposed Calendar Changes under 10.9 Ocean Sciences (showing changes)

### 10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology

Students who take a m쓰inor in Sustainable Aquaculture and Fisheries Ecology will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2001, 3000, 3002;
2. Biology 4750 or Geography 4300 ;
3. One of Ocean Sciences 2000 (or Biology 3710), 3620, 3640, 4000, 4100, 4122, 4601, or other applicable courses, as approved by the Head of the Department (or delegate);
4. One of Biology 2122, 3401, 3640, 3715, 4251, 4605; and
5. One of Biochemistry 2600, 3107, 3402, 4002, 4101, 4104, 4105, 4200, 4201.

Course prerequisites stipulated in the Course Descriptions shall apply to a m $\underline{M}$ inor in Sustainable Aquaculture and Fisheries Ecology.

## Clean Calendar Entry under 10.9 Ocean Sciences (after changes)

### 10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology

Students who take a Minor in Sustainable Aquaculture and Fisheries Ecology will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2001, 3000, 3002;
2. Biology 4750 or Geography 4300;
3. One of Ocean Sciences 2000 (or Biology 3710), 3620, 3640, 4000, 4100, 4122, 4601, or other applicable courses, as approved by the Head of the Department (or delegate);
4. One of Biology 2122, 3401, 3640, 3715, 4251, 4605; and
5. One of Biochemistry 3107, 3402, 4002, 4101, 4104, 4105, 4200, 4201.

Course prerequisites stipulated in the Course Descriptions shall apply to a Minor in Sustainable Aquaculture and Fisheries Ecology.

## Rationale for Proposed Change

We propose to align the style and requirements of our Minor programs. We also wish to allow different electives to be approved by the Department in the future. This latter change is made to address the challenges inherent to our interdisciplinary programs, whereby a large number of courses are relevant as electives, and it is difficult to provide an exhaustive list in the calendar and/or to keep up with course changes made by other departments. Last year we received over five requests for substitute electives (for new or different courses), which made sense because they were related to ocean sciences. Because there is already significant uptake for the minors, and enrollment may grow, we wish to optimize the way in which we can attend to such requests for substitute courses without involving the Faculty of Science subcommittee. The proposed language will allow us to do so at the departmental level.

## Consultations Sought From

Marine Institute
Grenfell campus
Department of Biochemistry
Department of Biology
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Physics and Physical Oceanography
Department of Psychology
Faculty of Business Administration
Faculty of Engineering and Applied Science
Faculty of Education
Faculty of Arts
Library Report Received

## Comments Received

No
No
Yes
Yes
Yes
No
Yes
No
Yes
No
Yes
No
No
Yes
No
No

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice President Yes / No Name

## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:
Date:
$\qquad$

## APPENDIXI-CONSULTATIONS Initial request sent 24 April 2017

From: Fletcher, Garth
Sent: April-24-17 2:52 PM
To: Arts; Biochemistry Head; Business; Chuck Hurich; 'cs-chair@mun.ca'; Locke, Wade; Hicks, Sue;
Engineering; Fridgen,Travis; 'Ian Neath'; Jody-Lynn Burke; Lagowski, Jolanta; Marino, Paul;
'mathconsult@mun.ca'; Meghan Gamsby; 'miugconsultations@mi.mun.ca'; Catto, Norm;
'vpoffice@grenfell.mun.ca'
Cc: amercier@mun.ca
Subject: Request for consultation
Colleagues:
Please find attached documents for consultations on our new proposed Honours program and minor changes to our existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)
3. Calendar change to the Minors (for more flexibility)

Best regards
Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED

## Geography

From: Catto, Norm
Sent: April-24-17 3:05 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation
This is also fine with us.

Norm Catto
Head, Department of Geography
Memorial University
St. John's NL A1B 3X9
Canada
1-709-864-7463
Fax 1-709-864-3119

## Physics and Physical Oceanography

From: Martin Plumer [mailto:plumer@mun.ca]

Sent: May-03-17 9:45 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca)
Subject: FW: FW: Request for consultation
Hi Garth,
See suggestion below from Entcho.

Best, Martin
-----Original Message-----
From: Entcho Koytchev Demirov [mailto:entcho@mun.ca]
Sent: April-25-17 9:41 AM
To: Martin Plumer
Cc: 'Brad deYoung'; 'Rick Goulding'
Subject: Re: FW: Request for consultation
Hi Martin,
I do not see changes important for us in the first two documents.
They are mainly about changes in chemistry courses and rewarding of existing program of Major in Ocean Sciences.

A have a minor suggestion:
at the end of point 7 , of
9.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences
" Geography, or Physics."
should be probably
" Geography, or Physics and Physical Oceanography."
Entcho

## Engineering

From: Engineering Consult [mailto:engrconsult@mun.ca]
Sent: May-04-17 8:35 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Dennis Peters [dpeters@mun.ca](mailto:dpeters@mun.ca); Williams, Jennifer [jwilliams04@mun.ca](mailto:jwilliams04@mun.ca)
Subject: Re: Request for consultation
Dear Dr. Fletcher,
Thank you for the opportunity to comment on the proposed minor changes to various Calendar entries for Ocean Sciences:
Major in Ocean Sciences;

Major in Ocean Sciences (Environmental Systems);
Minor in Oceanography;
Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE);
Honours in Ocean Sciences;
new block of special topics courses in Ocean Sciences;
deletion of OCSC/BIOL 3620; and
creation of new courses OCSC 3600 and 499A/B.
After consultation with the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, we find that these changes will have no impact on our programs.

I wish you well in the progress of these changes.
Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
St. John's NL A1B 3X5

## Earth Sciences

Subject:Fwd: FW: Request for consultation
Date: Fri, 16 Jun 2017 12:37:12-0230
From: Penny L Morrill [pmorrill@mun.ca](mailto:pmorrill@mun.ca)
To: Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca), fletcher@mun.ca
June 16, 2017
Dear Annie and Garth,
Earth Science supports the newly proposed Honours program and minor changes to your existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)

## 3. Calendar change to the Minors (for more flexibility)

Cheers,
Penny
Chair of the undergraduate matters committee
Penny Morrill, Ph.D.
Associate Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL A1B 3X5
Canada
phone: (709) 864-6729
fax: (709) 864-2589

## Chemistry

From: Travis Fridgen

Sent: Wednesday, August 23, 2017 1:25 PM
To: Fletcher, Garth
Cc: amercier@mun.ca
Subject: Re: Request for consultation
Hi Garth,
All looks fine to me. The only thing is 3600 says there are no resource implications. But as I have been told, a new course has to have resource implications as the person who will be teaching it will not be able to teach something else.
Take care,
T

Travis D. Fridgen BSc, BEd, PhD
Professor \& Head
Department of Chemistry
Memorial University
St. John's, NL, A1B 3X7
http://www.chem.mun.ca/zfac/tdf.php

## Biology

From: Fletcher, Garth
Sent: August-18-17 3:57 PM
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca); Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
Cc: amercier@mun.ca
Subject: Request for Consultation
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

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Garth
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Department of Ocean Sciences
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Memorial University
St John's NL
Canada, A1C 5S7
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In summary:
The admissions requirements for the Major, not the Honours, are listed in the proposal. There is a reference to "To qualify for the Honours in Ocean Sciences, students must complete a minimum of 45 credit hours in Ocean Sciences." Is there a core subset of OCSC courses students must complete or are all 45 credit hours (which appear to include the 6 credit hours associated with the proposed OCSC 499A/B) required before admission is considered?

As I relayed to Annie at our June 15, 2017 meeting, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any non-BIOL major at this time.

- During the June 15 meeting I asked Annie how much lab experience students in the Honours program will receive. Are additional lab courses planned?


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Given the preliminary nature of the proposed blocks, have pre-requisites been identified? Specially, do you anticipate any BIOL courses as pre-requisites?

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"This dissertation is mandatory for students pursuing the Honours in Ocean Sciences and is one of two choices offered to students pursuing the Joint Honours in Marine Biology." There is no Joint Honours in Marine Biology. Please omit.

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BIOL 2060 or 2250 are highlighted as pre-requisites. As indicated above and during my June 15 meeting with Annie, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any non-BIOL major at this time.

If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 28/08/2017 11:47 AM, Annie Mercier wrote:
Hi Jody:
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1- With regards to the OCSC Honours, I believe we have addressed all of the early concerns you voiced at the June 15 meeting in our updated proposal (circulated on June 22). In addition:

1a- Admission requirements: "To qualify for the Honours" was reworded into "To earn an Honours" in order to dispel any ambiguity that the 45 credit hours in Ocean Sciences are the overall requirements not the admission
requirements. With respect to admission, the proposal states: "Honours students would normally follow one of the Major programs offered by the Department of Ocean Sciences before applying to the Honours, and must meet its admission requirements as follows: To be considered for admission to the Major in Ocean Sciences prior to admission to the Honours program, students must normally have completed..." This essentially indicates that students must typically register to the Major (after satisfying its admission requirements) before transitioning to the Honours.

1b- In direct response to your initial concern about available seats, we have made BIOL 2060 a choice among several courses (under 5a in the updated proposal).

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Please let us know if you have any further questions or concerns.
All the best,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```


## Biochemistry

Subject:Request for Consultation
Date: Fri, 18 Aug 2017 18:26:45 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)

To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-
21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors_21April 2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>

On Sep 14, 2017, at 10:29 AM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I was wondering if you had had the chance to review our proposals, which were initially circulated in April -- with an updated proposal for the Honours sent out in August (see below).
The purpose of this email is actually to draw your attention to the fact that the proposal for the new course in Marine Microbiology (OCSC 3600) has recently been modified to include an option for a Biochemistry course as PR (since Biology was concerned that they could not reserve seats in BIOL 2060 for our students). This is in line with what we did for the Honours. Please let me know if you have any concerns with this updated version. In sum, the only two documents that have changed since our initial message in April are the ones in Word format (updated OCSC 3600; updated OCSC Honours).
I look forward to your feedback.
All the best,
Annie
On 17/09/2017 9:53 AM, Valerie Booth wrote:
Hi Annie,
Sorry for the slow reply.
Biochemistry is fine with your proposal.

The choice of Biology 2250 or Biochem 2100 makes sense since these are in the process of being cross listed. We don't anticipate any trouble fitting OCSC students into 2100 . Just note that the way we do our online registration and reserves, you may wind up with some students who aren't able to register online, but may need to contact the biochem department to get signed in "by hand".

Best,
Valerie
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

On 18/09/2017 08:31 AM, Annie Mercier wrote:
Hi Valerie:
Many thanks for your feedback, and for the heads up regarding BIOC 2100.
All the best,
Annie

## NEW COURSE PROPOSAL OCSC 499A/499B Honours Dissertation

## Executive Summary

This is a proposal for a new course in Ocean Sciences that will be a requirement of the Honours in Ocean Sciences, currently under development.

Resource Implications: Instructional Costs
This course will rely on current faculty members in the Department of Ocean Sciences, and existing facilities and infrastructure.

## Consultations

See Appendix.

## Library Holdings and/or Other Resources Required

There are no added library costs associated with the new course.

Signature of Unit Head (if appropriate): $\qquad$
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## COURSE OUTLINE AND METHOD OF EVALUATION

## General Concept

The Honours Dissertation is a crucial part of the Honours in Ocean Sciences. It involves an original piece of research undertaken under the supervision of a faculty member of the Department of Ocean Sciences (or someone holding cross-appointment or adjunct status in the department), as approved by the Head of the Department.

## Prospective Schedule of Activities

Ocean Sciences 499A/499B is a two-semester linked course, i.e. a grade of pass in 499A is required in the first semester to proceed to 499B. Work conducted during the course includes directed reading relevant to the dissertation topic, preparation of a project outline, supervised research, data analysis and interpretation, a written dissertation and an oral defence. Electronic copies of the dissertation, complete with figures and tables, are normally submitted to the candidate's supervisor and to the Head of the Department not less than two weeks before the end of lectures in the semester in which the candidate is registered for Ocean Sciences 499B.

## Evaluation

This course will be evaluated (pass or fail), based on the quality of the written dissertation and the outcome of the oral examination on the research results, which will normally occur before the last day for examinations in the semester. The examining committee shall consist of the Head of the Department (or delegate), the candidate's supervisor, and an examiner appointed by the Head of the Department in consultation with the candidate's supervisor.

## Learning Outcomes

At the end of the course, students should have learned to:

- Conduct a thorough search of the literature related to a selected topic
- Plan and design a research project
- Collect and analyze data, including graphical and statistical exploration
- Extract, synthesize, compare and interpret trends in the data
- Present the results of data analyses and interpretations in writing and orally


## Texts

None.

# SUMMARY PAGE FOR SENATE 

Approval Form

Course Number and Title: OCSC 499A/499B - Honours Dissertation
Abbreviated Course Title: Honours Dissertation

## Calendar Description

## New entry under under 11.9 Ocean Sciences

499A and 499B Honours Dissertation is a two-semester linked course based on independent research conducted under the supervision of an academic supervisor, who is normally a faculty member of the Department of Ocean Sciences. This dissertation is mandatory for students pursuing the Honours in Ocean Sciences. A grade of pass in 499A is required to proceed to 499B. The final written dissertation is normally submitted before the end of the tenth week of the second semester, and an oral presentation of the completed research is delivered before the end of the semester.
CH: 6
PR: Honours students in their final year or permission of the Head; Science 1807

## Secondary Calendar Changes

There are no secondary calendar changes.

## Rationale

The Honours Dissertation is a crucial part of the Honours program in Ocean Sciences that is currently being developed.

## Consultations Sought From

Marine Institute
Grenfell campus
Department of Biochemistry
Department of Biology
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Physics and Physical Oceanography
Department of Psychology
Faculty of Arts
Faculty of Education
Faculty of Engineering and Applied Science

Library Report Received

Comments Received
Yes
No
Yes
Yes
Yes
No
Yes
No
Yes
No
Yes
No
No
No
Yes

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice President Yes / No Name

FOR OFFICE USE ONLY
APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary:
Date:
$\qquad$
$\qquad$

## APPENDIX I - CONSULTATIONS

## Initial request sent 24 April 2017

From: Fletcher, Garth
Sent: April-24-17 2:41 PM
To: Arts; Biochemistry Head; Business; Chuck Hurich; 'cs-chair@mun.ca'; Locke, Wade; Hicks, Sue; Engineering; Fridgen,Travis; 'Ian Neath'; Jody-Lynn Burke; Lagowski, Jolanta; Marino, Paul; 'mathconsult@mun.ca'; Meghan Gamsby; 'miugconsultations@mi.mun.ca'; Catto, Norm; 'vpoffice@grenfell.mun.ca'
Cc: amercier@mun.ca
Subject: Request for consultation
Colleagues. Could you please have your department review the attached new courses in Ocean Sciences that we are proposing to develop.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED

## Geography

From: Catto, Norm
Sent: April-24-17 2:44 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation
No problems from Geography
Norm Catto
Head, Department of Geography
Memorial University
St. John's NL A1B 3X9
Canada
1-709-864-7463
Fax 1-709-864-3119

## Physics and Physical Oceanography

From: Martin Plumer [mailto:plumer@mun.ca]
Sent: May-03-17 8:55 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca)

Subject: FW: FW: Request for consultation
Hi Garth,
Physics and Physical Oceanography has no issues with these proposals.
Best,
Martin

## Engineering

From: Engineering Consult [mailto:engrconsult@mun.ca]
Sent: May-04-17 8:35 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Dennis Peters [dpeters@mun.ca](mailto:dpeters@mun.ca); Williams, Jennifer [jwilliams04@mun.ca](mailto:jwilliams04@mun.ca)
Subject: Re: Request for consultation
Dear Dr. Fletcher,
Thank you for the opportunity to comment on the proposed minor changes to various Calendar entries for Ocean Sciences:

Major in Ocean Sciences;
Major in Ocean Sciences (Environmental Systems);
Minor in Oceanography;
Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE);
Honours in Ocean Sciences;
new block of special topics courses in Ocean Sciences;
deletion of OCSC/BIOL 3620; and
creation of new courses OCSC 3600 and 499A/B.
After consultation with the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, we find that these changes will have no impact on our programs.

I wish you well in the progress of these changes.
Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland St. John's NL A1B 3X5

## Earth Sciences

Subject: ${ }^{\text {New course proposals }}$
Date: Wed, 17 May 2017 11:32:51-0230
From: Penny L Morrill [pmorrill@mun.ca](mailto:pmorrill@mun.ca)
To: fletcher@mun.ca, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca)
May 17, 2017

Dear Garth and Annie,
The Department of Earth Sciences has reviewed your proposed courses for:

1) a special topics course,
2) an undergraduate 499A/B course, and
3) a 3rd year Marine Microbiology course

We have no issues with the proposed courses.
Cheers,
Penny Morrill
Chair of the undergraduate matters committee
Department of Earth Sciences
--
Penny Morrill, Ph.D.
Associate Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL A1B 3X5
Canada
phone: (709) 864-6729
fax: (709) 864-2589

## Chemistry

Subject: Re: Request for consultation
Date: Wed, 23 Aug 2017 16:08:19 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
To: Fridgen,Travis [tfridgen@mun.ca](mailto:tfridgen@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Thanks Travis, some of our faculty teach very little
Therefore an under utilized resource.
Regards
Garth
From: Travis Fridgen
Sent: Wednesday, August 23, 2017 1:25 PM
To: Fletcher, Garth
Cc: amercier@mun.ca
Subject: Re: Request for consultation
Hi Garth,
All looks fine to me. The only thing is 3600 says there are no resource implications. But as I have been told, a new course has to have resource implications as the person who will be teaching it will not be able to teach something else.
Take care,
T
Travis D. Fridgen BSc, BEd, PhD
Professor \& Head

Department of Chemistry
Memorial University
St. John's, NL, A1B 3X7
http://www.chem.mun.ca/zfac/tdf.php

## Biology

From: Fletcher, Garth
Sent: August-18-17 3:57 PM
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca); Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
Cc: amercier@mun.ca
Subject: Request for Consultation
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7

```
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-
21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors_2
1April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>
```

On 24/08/2017 12:27 PM, Jody-Lynn Burke wrote:
Hi Garth,
BIOL concerns regarding the OCSC Honours program, as well as the Joint Marine Biology Major and proposed Joint Honours in Marine Biology, were discussed at length with Annie during our June 15, 2017 meeting with Amy Todd.

In summary:

- The admissions requirements for the Major, not the Honours, are listed in the proposal. There is a reference to "To qualify for the Honours in Ocean Sciences, students must complete a minimum of 45 credit hours in Ocean Sciences." Is there a core subset of OCSC courses students must complete or are all 45 credit hours (which appear to include the 6 credit hours associated with the proposed OCSC 499A/B) required before admission is considered?
- As I relayed to Annie at our June 15, 2017 meeting, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any non-BIOL major at this time.
- During the June 15 meeting I asked Annie how much lab experience students in the Honours program will receive. Are additional lab courses planned?


## Special Topics Courses:

- Given the preliminary nature of the proposed blocks, have pre-requisites been identified? Specially, do you anticipate any BIOL courses as pre-requisites?

BIOL 499A/B Proposal:

- "This dissertation is mandatory for students pursuing the Honours in Ocean Sciences and is one of two choices offered to students pursuing the Joint Honours in Marine Biology." There is no Joint Honours in Marine Biology. Please omit.

OCSC 3600 Marine Microbiology Proposal:

- BIOL 2060 or 2250 are highlighted as pre-requisites. As indicated above and during my June 15 meeting with Annie, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any nonBIOL major at this time.

If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 28/08/2017 11:47 AM, Annie Mercier wrote:
Hi Jody:
We thank you for your comments and feedback. Please find our replies below.
1- With regards to the OCSC Honours, I believe we have addressed all of the early concerns you voiced at the June 15 meeting in our updated proposal (circulated on June 22). In addition:

1a- Admission requirements: "To qualify for the Honours" was reworded into "To earn an Honours" in order to dispel any ambiguity that the 45 credit hours in Ocean Sciences are the overall requirements not the admission requirements. With respect to admission, the proposal states: "Honours students would normally follow one of the Major programs offered by the Department of Ocean Sciences before applying to the Honours, and must meet its admission requirements as follows: To be considered for admission to the Major in Ocean Sciences prior to admission to the Honours program, students must normally have completed..." This essentially indicates that students must typically register to the Major (after satisfying its admission requirements) before transitioning to the Honours.

1b- In direct response to your initial concern about available seats, we have made BIOL 2060 a choice among several courses (under 5a in the updated proposal).

1c- As I indicated during the meeting, we do not have specific requirements for lab vs non-lab courses, like Biology does. This is in part due to the broader science foundation that our programs require. Overall, this foundation includes 6 courses (in Biology, Chemistry, Physics) with associated lab segments. In addition, the core hands-on component of our Majors/Honours is bundled into OCSC 2500, which is a required intensive practical course providing ship-based and lab-based training. Finally, both OCSC 3000
and OCSC 4122 have lab segments. And, of course, we offer a dive course to qualifying students (OCSC 4000). In sum, based on the requirements, Honours students will typically take a minimum of 8 to 10 courses ( $24-30$ credit hours) that either have labs or are entirely hands-on, in addition to the 6 credit hours associated with the research project (OCSC 499A/B).

2- For the Special Topics courses: No prerequisites have been identified yet, which I believe is in line with similar Special Topics Course descriptions found in other units, including Biology. We will be sure to consult with Biology regarding BIOL prerequisites (if any) when these courses are fleshed out.

3- OCSC 499A/B: Reference to the joint Honours has been removed, although we are still keen on developing the Joint Honours in Marine Biology with you at your earliest convenience (we feel it does not make sense to have an orphan Joint Major without an Honours option).

4- OCSC 3600 Marine Microbiology: We are aware that you cannot reserve seats for our students in BIOL 2060 or BIOL 2250. This is why we list them as alternative options. We are hoping that, should this create a problem, we might explore ways to expand accessibility to these courses, since they are important foundation courses in science. We do not see any way that we could develop/offer anything similar without substantial and unnecessary overlap.

Please let us know if you have any further questions or concerns.
All the best,
Annie

On 11/09/2017 2:32 PM, Jody-Lynn Burke wrote:
Hi Annie,
Thanks for clarifying.
I'm concerned that there are no separate admission requirements for Honours, especially since all other departments within the Faculty have separate Major/Honors admission requirements.

With regards to my second point, you listed BIOL 2250 or 2060 as required pre-requisites in your proposal for OCSC 3600. As was the case with your initial Honours in Ocean Sciences proposal (April 24), you didn't consult with Biology before assigning our courses as pre-requisites for OCSC 3600 and sending it out to the wider university committee for consultation.

As l've indicated in previous emails, we can't reserve seats for OSC students in BIOL 2060.
If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 14/09/2017 10:23 AM, Annie Mercier wrote:
Hi Jody:

Many thanks for your comments.
We will give thought to separate admission requirements for the Honours; and in consultation with the instructor we propose to adjust the prerequisites of OCSC 3600 to "Biology 2250 or Biochemistry 2100" pending Biochemistry's approval.

All the best,
Annie

## Marine Institute

Subject:RE: Request for consultation
Date: Wed, 6 Sep 2017 11:50:08 +0000
From: MIUG Consultations [MIUGconsultations@mi.mun.ca](mailto:MIUGconsultations@mi.mun.ca)
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Garth,
Our group has reviewed the proposed new courses:

- OCSC 4910-4920 Special Topics in Ocean Biogeochemistry
- OCSC 4920-4929 Special Topics in Marine Ecology
- OCSC 4930-4939 Special Topics in Experimental Marine Biology
- OCSC 4940-4949 Special Topics in Applied Ocean Sciences
- OCSC 499A/499B Honours Dissertation
- OCSC 3600 Marine Microbiology

As well as the proposed calendar changes to both the OCSC Major and Minor programs. The Marine Institute has no issues with any of these proposals and we are happy to support these as presented.

All the best,
Derek
Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0586
FAX: 709-778-0394
Derek.Howse@mi.mun.ca

## Biochemistry

Subject:Request for Consultation
Date: Fri, 18 Aug 2017 18:26:45 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
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St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

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21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors_2
1April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>
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The purpose of this email is actually to draw your attention to the fact that the proposal for the new course in Marine Microbiology (OCSC 3600) has recently been modified to include an option for a Biochemistry course as PR (since Biology was concerned that they could not reserve seats in BIOL 2060 for our students). This is in line with what we did for the Honours. Please let me know if you have any concerns with this updated version.
In sum, the only two documents that have changed since our initial message in April are the ones in Word format (updated OCSC 3600; updated OCSC Honours).
I look forward to your feedback.
All the best,
Annie

On 17/09/2017 9:53 AM, Valerie Booth wrote:
Hi Annie,
Sorry for the slow reply.
Biochemistry is fine with your proposal.
The choice of Biology 2250 or Biochem 2100 makes sense since these are in the process of being cross listed. We don't anticipate any trouble fitting OCSC students into 2100. Just note that the way we do our online registration and reserves, you may wind up with some students who aren't able to register online, but may need to contact the biochem department to get signed in "by hand".

Best,
Valerie
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

On 18/09/2017 08:31 AM, Annie Mercier wrote:
Hi Valerie:
Many thanks for your feedback, and for the heads up regarding BIOC 2100. All the best,
Annie

## PROPOSAL FOR A NEW PROGRAM <br> Honours in Ocean Sciences

## Executive summary

As part of ongoing curriculum development in the Department of Ocean Sciences, and in line with our newly approved Majors in Ocean Sciences, we propose to create an Honours in Ocean Sciences.

## Resource implications

New resources are not required.

## Consultations

See Appendix.

## Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

Signature of Unit Head

Date

Signature of the Dean

Date

# SUMMARY PAGE FOR SENATE <br> Approval Form 

## Program Title

Bachelor degree with Honours in Ocean Sciences
B.Sc. Hons. (Ocean Sciences)

## Course Additions

Ocean Sciences 499A/499B (see separate proposal)

## Calendar Changes under 10.9 Ocean Sciences

## Changes under 10.9 Ocean Sciences (changes highlighted)

www.mun.ca/osc
The Department of Ocean Sciences is the newest Department within the Faculty of Science. It was created in 2012, from the transition of the Ocean Sciences Centre, a research unit and facility that was first opened in 1967. The Department's mandate as an interdisciplinary unit is to focus on increasing our understanding of biological and chemical processes within the oceans, and how they relate to aquaculture and other applied marine fields.
The Department offers graduate programs in Marine Biology outlined under School of Graduate Studies.
The Department offers the following undergraduate programs:

1. Minor in Oceanography
2. Minor in Sustainable Aquaculture and Fisheries Ecology
3. Major in Ocean Sciences
4. Major in Ocean Sciences (Environmental Systems)
5. Joint Major in Marine Biology
6. Honours in Ocean Sciences

Details of the Joint Major in Marine Biology can be found under Joint Majors.
Ocean Sciences course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Ocean Sciences.

Changes under 10.9 Ocean Sciences (after changes)
www.mun.ca/osc
The Department of Ocean Sciences is the newest Department within the Faculty of Science. It was created in 2012, from the transition of the Ocean Sciences Centre, a research unit and facility that was first opened in 1967. The Department's mandate as an interdisciplinary unit is to focus on increasing our understanding of biological and chemical processes within the oceans, and how they relate to aquaculture and other applied marine fields.

The Department offers graduate programs in Marine Biology outlined under School of Graduate Studies.
The Department offers the following undergraduate programs:

1. Minor in Oceanography
2. Minor in Sustainable Aquaculture and Fisheries Ecology
3. Major in Ocean Sciences
4. Major in Ocean Sciences (Environmental Systems)
5. Joint Major in Marine Biology
6. Honours in Ocean Sciences

Details of the Joint Major in Marine Biology can be found under Joint Majors.
Ocean Sciences course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Ocean Sciences.

## Changes under 10.9 Ocean Sciences (new entry)

### 10.9.4 Honours in Ocean Sciences

The Honours in Ocean Sciences is an interdisciplinary program that provides a solid foundation in ocean studies, including the basic principles of its main sub-disciplines (physical, chemical, geological, and biological oceanography). Possession of this degree will be of great advantage to students planning advanced work or graduate studies in a marine science field.

To earn an Honours in Ocean Sciences, students must complete a minimum of 45 credit hours in Ocean Sciences, as outlined below. The program includes a prescribed number of courses at the 3000/4000 level as well as mandatory completion of Ocean Sciences 499A and 499B, which consist of supervised research leading to the submission and oral defence of a dissertation.

The Honours program may comprise a broad base of courses following the model of the generic Major in Ocean Sciences (section 9.9.3.2) or be more narrowly focused, in line with the stream in Environmental Systems (section 9.9.3.3). Upon admission, the student's Honours program will be defined in consultation with the student's supervisor, and approved by the Head of the Department (or delegate) in accordance with the Regulations for the Honours Degree of Bachelor of Science.

Students wishing to take this program are also encouraged to carefully consult the Degree Regulations, Regulations for the General Degree of Bachelor of Science.
More information, including on how to gain admission into the Honours in Ocean Sciences, the recommended courses and time tables, can be found in the Handbook of Undergraduate Studies in Ocean Sciences at www.mun.ca/osc/undergrad/Ocean_Sciences_Handbook.pdf.

### 10.9.4.1 Admission Requirements for the Honours in Ocean Sciences

Admission to the Ocean Sciences Honours Program is based on academic standing. Students should be enrolled in one of the Major programs offered by the Department of Ocean Sciences before applying to the Honours, normally upon completing the third year of their program. For admission to the Honours program, students shall, at a minimum, have completed all admission requirements for their Major program.

Students should plan well in advance to ensure they have all the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department at the earliest opportunity to prepare adequately for program admission. Each student registered in the Honours will be assigned an advisor who should be consulted on academic issues, including course selection.

### 10.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences

Students must successfully complete:

1. the 30 specified credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);
2. Statistics 2550 (or equivalent);
3. Physics 1021 or 1051;
4. Chemistry 2400 (or equivalent);
5. a minimum of 12 credit hours among:
a. Biology 2060, 2122, 2250, 2600, 2900;
b. Biochemistry 2100, 2101, 3106, 3107, 3108;
6. a minimum of 45 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100, 2200, 2300 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 45 credit hours in Ocean Sciences;
b. At least 18 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4601, 4750;
c. Ocean Sciences 499A and 499B; and
7. elective courses as necessary to make up the total of 120 credit hours, including a minimum of 15 credit hours at the 3000 and/or 4000 level in any of Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics (these 15 credit hours can include courses completed as part of the requirements in 5b).

## NOTES:

1. Those courses in which a grade "B" or an average of $75 \%$ or higher are required to graduate with an Honours degree (as per Clause 1, under Academic Standing of the
Regulations for the Honours Degree of Bachelor of Science) are the 42 credit hours in Ocean Sciences courses at the 2000, 3000 and/or 4000 level, and 15 credit hours in courses at the 3000 and/or 4000 level in any of Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics.
2. Chemistry 2440 will be accepted as a substitute for Chemistry 2400. However, a number of advanced Science courses may require Chemistry 2400 and 2401. Students are therefore strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options.
3. Students should be aware that Biology 2250 and Biochemistry 2100 are credit restricted.

### 10.9.4.3 Honours Dissertation

The dissertation is a crucial part of the program. It involves an original piece of research undertaken under the supervision of a faculty member of the Department of Ocean Sciences (or someone holding cross-appointment or adjunct status in the department), as approved by the Head of the Department. This segment of the program corresponds to a two-semester linked course (Ocean Sciences 499A/499B; 6 credit hours), where a grade of pass in 499A is required in the first semester to proceed to 499B.
Work conducted during Ocean Sciences 499A/499B includes directed reading relevant to the dissertation topic, preparation of a dissertation outline, supervised research, data analysis and interpretation, a written dissertation and an oral defence. Electronic copies of the dissertation, complete with figures and tables, are to be submitted to the candidate's supervisor and to the Head of the Department not less than two weeks before the end of lectures in the semester in which the candidate is registered for Ocean Sciences 499B.
The candidate will be examined orally on the contents of the dissertation, normally before the last day for examinations in the semester. The examining committee shall consist of the Head of the Department (or delegate), the candidate's supervisor, and an examiner appointed by the Head of the Department in consultation with the candidate's supervisor.

## Rationale for Proposed Change

Last year, the Department of Ocean Sciences had three new Majors approved, i.e. a Major In Ocean Sciences, a Major in Ocean Sciences (Environmental Systems), and a Joint Major in Marine Biology. We would now like to follow up with the proposed Honours in Ocean Sciences. Offering solid undergraduate training in Ocean Sciences aligns perfectly with Memorial's bid to become a leading university in ocean-related research and education, particularly in the context of the newly funded Ocean Frontier Institute.

Consultations Sought From
Marine Institute
Grenfell campus
Department of Biochemistry
Department of Biology
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Physics and Physical Oceanography
Department of Psychology
Faculty of Business Administration
Faculty of Engineering and Applied Science
Faculty of Education
Faculty of Arts
Library Report Received

Comments Received
Yes
No
Yes
Yes
Yes
No
Yes
No
Yes
Yes
Yes
No
Yes
Yes
Yes
No

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice President Yes / No Name

## FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:
Date:

## APPENDIX 1A - CONSULTATIONS Initial request sent 24 April 2017

From: Fletcher, Garth
Sent: April-24-17 2:52 PM
To: Arts; Biochemistry Head; Business; Chuck Hurich; ‘cs-chair@mun.ca’; Locke, Wade; Hicks, Sue; Engineering; Fridgen,Travis; ‘Ian Neath’; Jody-Lynn Burke; Lagowski, Jolanta; Marino, Paul; 'mathconsult@mun.ca'; Meghan Gamsby; 'miugconsultations@mi.mun.ca'; Catto, Norm; 'vpoffice@grenfell.mun.ca'

## Cc: amercier@mun.ca

Subject: Request for consultation
Colleagues:
Please find attached documents for consultations on our new proposed Honours program and minor changes to our existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)
3. Calendar change to the Minors (for more flexibility)

Best regards
Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED

## Geography

From: Catto, Norm
Sent: April-24-17 3:05 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation
This is also fine with us.
Norm Catto
Head, Department of Geography
Memorial University
St. John's NL A1B 3X9
Canada
1-709-864-7463
Fax 1-709-864-3119

## Physics and Physical Oceanography

From: Martin Plumer [mailto:plumer@mun.ca]
Sent: May-03-17 9:45 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc : Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca)
Subject: FW: FW: Request for consultation
Hi Garth,
See suggestion below from Entcho.
Best,
Martin
-----Original Message-----
From: Entcho Koytchev Demirov [mailto:entcho@mun.ca]
Sent: April-25-17 9:41 AM
To: Martin Plumer
Cc: ‘Brad deYoung’; ‘Rick Goulding’
Subject: Re: FW: Request for consultation
Hi Martin,
I do not see changes important for us in the first two documents.
They are mainly about changes in chemistry courses and rewarding of existing program of Major in Ocean Sciences.

A have a minor suggestion:
at the end of point 7 , of
9.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences
" Geography, or Physics."
Should be probably
" Geography, or Physics and Physical Oceanography."
Entcho

## Engineering

From: Engineering Consult [mailto:engrconsult@mun.ca]
Sent: May-04-17 8:35 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Dennis Peters [dpeters@mun.ca](mailto:dpeters@mun.ca); Williams, Jennifer [jwilliams04@mun.ca](mailto:jwilliams04@mun.ca)
Subject: Re: Request for consultation
Dear Dr. Fletcher,

Thank you for the opportunity to comment on the proposed minor changes to various Calendar entries for Ocean Sciences:
Major in Ocean Sciences;
Major in Ocean Sciences (Environmental Systems);
Minor in Oceanography;
Minor in Sustainable Aquaculture and Fisheries Ecology (SAFE);
Honours in Ocean Sciences;
new block of special topics courses in Ocean Sciences;
deletion of OCSC/BIOL 3620; and
creation of new courses OCSC 3600 and 499A/B.
After consultation with the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, we find that these changes will have no impact on our programs.

I wish you well in the progress of these changes.
Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
St. John's NL A1B 3X5

## Earth Sciences

Subject:Fwd: FW: Request for consultation
Date: Fri, 16 Jun 2017 12:37:12-0230
From: Penny L Morrill [pmorrill@mun.ca](mailto:pmorrill@mun.ca)
To: Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca), fletcher@mun.ca
June 16, 2017
Dear Annie and Garth,
Earth Science supports the newly proposed Honours program and minor changes to your existing programs.

1. New Honours Program in Ocean Sciences
2. Calendar change to Majors (to remove CHEM 1010/1011 from requirements)
3. Calendar change to the Minors (for more flexibility)

Cheers,
Penny
Chair of the undergraduate matters committee
Penny Morrill, Ph.D.
Associate Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL A1B 3X5
Canada
phone: (709) 864-6729
fax: (709) 864-2589

## APPENDIX 1B - CONSULTATIONS ON UPDATED PROPOSAL FOR HONOURS IN OCEAN SCIENCES

## Updated request sent 22 June 2017

From: Fletcher, Garth [mailto:fletcher@mun.ca]
Sent: June-22-17 3:07 PM
To: Arts [staceym@mun.ca](mailto:staceym@mun.ca); Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Business [fba.ad.undergrad@mun.ca](mailto:fba.ad.undergrad@mun.ca); chemconsult@mun. ca (chemconsult@mun.ca)
[chemconsult@mun.ca](mailto:chemconsult@mun.ca); 'cs-chair@mun.ca' [cs-chair@mun.ca](mailto:cs-chair@mun.ca); Earth Sciences [eascugcon@mun.ca](mailto:eascugcon@mun.ca); Locke, Wade [wlocke@mun.ca](mailto:wlocke@mun.ca); Hicks, Sue [shicks@mun.ca](mailto:shicks@mun.ca); Engineering [engrconsult@mun.ca](mailto:engrconsult@mun.ca); 'lan Neath' [Psychology.Head@mun.ca](mailto:Psychology.Head@mun.ca); Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca); Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca); Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca); 'mathconsult@mun.ca' [mathconsult@mun.ca](mailto:mathconsult@mun.ca); Gamsby, Meghan [mgamsby@mun.ca](mailto:mgamsby@mun.ca); 'miugconsultations@mi.mun.ca' [miugconsultations@mi.mun.ca](mailto:miugconsultations@mi.mun.ca); Catto, Norm [ncatto@mun.ca](mailto:ncatto@mun.ca); 'vpoffice@grenfell.mun.ca' [vpoffice@grenfell.mun.ca](mailto:vpoffice@grenfell.mun.ca) Cc: amercier@mun.ca
Subject: Request for Consultation - Updated Honours in Ocean Sciences Colleagues:
We are circulating an updated version of our proposal for an Honours in Ocean Sciences (initially sent on April 24). We have corrected an oversight and made a few adjustments based on exchanges with Biology, Biochemistry and Chemistry. All edits are in red in the attached document (you may also note the change in section numbering reflecting the most recent version of the calendar, which was made available a few days ago).

Best regards, Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED AFTER UPDATED REQUEST

## Mathematics \& Statistics

From: Math Consult [mailto:mathconsult@mun.ca]
Sent: June-23-17 9:25 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for Consultation - Updated Honours in Ocean Sciences
One very minor comment from Mathematics and Statistics:

1. Under 10.9.4.1 you list seven admission requirements. Can the clause "(or equivalent)" after MATH 1000 be removed? There is no equivalent course or course sequence at MUN anymore, and "or equivalent" doesn't appear after most other requirements. I guess this language is a relic of when Math 1080+1081 sequence existed. Stating "or equivalent" will cause some students to ask "what else could I do"?, creating a possible unnecessary burden on academic advising staff.

Regards,
Tara
--
Tara Stuckless
Program Officer, Dept. Mathematics \& Statistics
Memorial University
St. John's NL A1C 5S7
Office: HH-3004; (709) 8648914
E-mail: mathugrad@mun.ca
Website: www.mun.ca/math

## Education

From: Fraize, Beverly
Sent: June-23-17 10:42 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for Consultation - Updated Honours in Ocean Sciences
Hello Dr. Fletcher,
I have reviewed the changes and confirm that they have no impact on the Faculty of Education.
Best regards,
Beverly Fraize
Student Advisor
Undergraduate Programs
Faculty of Education, Room ED 2020
MUN, St. John's, NL A1B 3X8
Phone: (709) 864-3485
Fax: (709) 864-2001
Admissions Enquiries: edadmiss@mun.ca
General Enquiries: muneduc@mun.ca

## Engineering

From: Engineering Consult [mailto:engrconsult@mun.ca]
Sent: June-26-17 10:53 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: Re: Request for Consultation - Updated Honours in Ocean Sciences
Dear Dr. Fletcher, our reply remains unchanged following the update to the proposal for an Honours in Ocean Sciences.

Yours sincerely,

## Dr. Glyn George, Chair

Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
St. John's NL A1B 3X5

## Chemistry

From: Department of Chemistry Consult [mailto:chemconsult@mun.ca]
Sent: June-25-17 9:22 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: Re: Request for Consultation - Updated Honours in Ocean Sciences
Hi Garth,
Just one comment on the proposal. Right now all the other departments are revising their programs such that chemistry 2440 would not be applicable. In 10.9.4.2 it says
4. Chemistry 2400 or Chemistry 2440

The problem with putting this into the calendar in 2018 is that 2018
is probably the last time we will offer 2440, and likely it will
only be a lab waiver section for students who took and failed the course under the guidelines where 2440 was applicable to them. By putting 2440 into the 2018 calendary, your students might think they can take it the next year, but very likely will not be able to.

I suggest requiring 2400 and making a some sort of note that those students who may have already taken 2440 are fine. Perhaps Shannon can offer a suggestion on wording.

Take care, Travis

On 2017-06-29 07:28, Annie Mercier wrote:
Dear Travis:
Many thanks for your feedback. Our undergraduate studies committee has been discussing your suggestion, and I have also exchanged with Shannon on this matter.

Shannon suggested "4. a course in Organic Chemistry" in order to avoid naming the courses Itogether. We would keep the footnote that recommends Chemistry 2400 (and 2401). What do you think?

The other option we are considering is to required "Chemistry 2400 (or equivalent)" and keep the footnote (although we are worried about the potential flurry of questions about what might be equivalent). We have similar concerns if we only list Chemistry 2440 with a note (students might be turned away or confused if they do not read the note, since our Joint Major in Marine Biology currently lists Chemistry 2440 as an option).

I look forward to your input.

All the best,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php [1] [1]
```

On 05/07/2017 11:22 AM, Department of Chemistry Consult wrote:
Hi Annie,
What about saying
4. Chemistry 2400
with a footnote about 2400 and 2401 along with saying that students who took 2440 prior to Fall 2018 will be acceptable. That way new students who took it get credit, but those who haven't yet taken it, but see that it is easier, will realize that they cannot take it (because we won't be offering it) so they won't aim to take it..
T
On 2017-07-05 12:05, Annie Mercier wrote:
Hi Travis:
Shannon was reluctant to have this type of wording in the calendar (hinting that CHEM 2440 is no longer available) since it has not been removed yet (and it has not been proposed formally yet). I have now adjusted it slightly to remove any temporal reference:
4. Chemistry 2400 (or equivalent)

The footnote says: "Chemistry 2440 will be accepted as a substitute for Chemistry 2400 . However, a number of advanced Science courses may require Chemistry 2400 and/or 2401. Students are therefore strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options. "

Do you find this suitable?
Cheers,
Annie
On 05/07/2017 2:25 PM, Department of Chemistry Consult wrote:
Hi Annie,
I suppose that is fine, it is really up to you. I would probably put 2400 without any reference to 2440 . If students come to ask you about 2440 (because they have taken it) then you could give them a waiver. I have to be honest, 2440 is pretty low level. All I had to do was show Paul Morino the final exam for

2440 and they dropped it from their program.
It is really up to you guys, but you will be the only ones who have this course mentioned in the calendar. Undoubtedly after September 2018, there will be students who want to take a Bio degree who already did 2440 and I'm sure Bio will "grandfather" them in.

Take care, Travis

On 05/07/2017 3:11 PM, Annie Mercier wrote:

## Hi Travis:

Many thanks again for the feedback. I get your point but I'm not too concerned about mentioning 2440 in a footnote. I think we can easily remove it at a later date to align with everyone. In the meantime, we have to be mindful of students who already have 2440 (and try not to invite queries, which we would if we remain too cryptic).

As for the level of 2440, I must say it was quite well suited from the perspective of our undergrad committee, our programs being interdisciplinary and students needing only a basic foundation in organic chemistry (unlike Biology or Biochemistry programs). Plus, time tabling was much easier; as we have to pack such a dense load of foundation courses in the first year and a half. I guess we'll cross that bridge when we come to it!

Cheers,
Annie
On 02/10/2017 4:59 PM, Department of Chemistry Consult wrote:
Hi Annie,
The proposal looks good and on behalf of the chemistry department I support it in my position as deputy head. Only one suggested correction:

## Section 9.9.4.2

7. 

Note: Because a number of advanced Science courses may require Chemistry 2400 and/or 2401 (rather than Chemistry 2440), students are strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options. In addition, students should be aware that Biology 2250 and Biochemistry 2100 are credit restricted.

Suggest change to:
Note: Because a number of advanced Science courses may require Chemistry 2400 and 2401 (rather than Chemistry 2440), students are strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options. In addition, students should be aware that Biology 2250 and Biochemistry 2100 are credit restricted.

Sincerely,
Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry Department

On 05/10/2017 1:00 PM, Annie Mercier wrote:
Hi Chris:
The change has been implemented. Many thanks for your feedback!
Cheers,
Annie

From: Department of Chemistry Consult [chemconsult@mun.ca]
Sent: Friday, October 27, 2017 2:58 PM
To: Fletcher, Garth
Subject: Re: Request for Consultation - Updated Honours in Ocean Sciences
Hi Garth,
Biochemistry is proposing to change some their courses with new course numbers and to introduce some new lab courses. You may want to discuss this with them since you have some biochemistry courses listed in the program.. Otherwise, I support the new honours in ocean sciences on behalf of the chemistry department.

Cheers,
Chris Flinn

## Business

From: Associate Dean of Under Graduate Faculty of Business Administration [adundgradfba@mun.ca](mailto:adundgradfba@mun.ca)
Sent: Friday, June 30, 2017 4:35 AM
To: Fletcher, Garth
Subject: Re: Request for Consultation - Updated Honours in Ocean Sciences
Hello:
Thank you for the opportunity to comment on this proposal. The Faculty of Business Administration has no concerns with the proposed changes.
--larry

## Marine Institute

From: Dawn King [mailto:Dawn.King@mi.mun.ca] On Behalf Of MIUG Consultations
Sent: August-18-17 1:45 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for Consultation - Updated Honours in Ocean Sciences

Garth,
Thank you for the opportunity to review and comment on the Proposal for a New Program Honours in Ocean Sciences.

This program will have no impact on the programs at the Marine Institute. We are happy to support this program as presented.

All the best,
Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0586
FAX: 709-778-0394
Derek.Howse@mi.mun.ca

## Biology

From: Fletcher, Garth
Sent: August-18-17 3:57 PM
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca); Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca); Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
Cc: amercier@mun.ca
Subject: Request for Consultation
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors _21April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>

On 24/08/2017 12:27 PM, Jody-Lynn Burke wrote:
Hi Garth,

BIOL concerns regarding the OCSC Honours program, as well as the Joint Marine Biology Major and proposed Joint Honours in Marine Biology, were discussed at length with Annie during our June 15, 2017 meeting with Amy Todd.

In summary:
The admissions requirements for the Major, not the Honours, are listed in the proposal. There is a reference to "To qualify for the Honours in Ocean Sciences, students must complete a minimum of 45 credit hours in Ocean Sciences." Is there a core subset of OCSC courses students must complete or are all 45 credit hours (which appear to include the 6 credit hours associated with the proposed OCSC 499A/B) required before admission is considered?

- As I relayed to Annie at our June 15, 2017 meeting, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any non-BIOL major at this time.

During the June 15 meeting I asked Annie how much lab experience students in the Honours program will receive. Are additional lab courses planned?

## Special Topics Courses:

Given the preliminary nature of the proposed blocks, have pre-requisites been identified? Specially, do you anticipate any BIOL courses as pre-requisites?

## BIOL 499A/B Proposal:

"This dissertation is mandatory for students pursuing the Honours in Ocean Sciences and is one of two choices offered to students pursuing the Joint Honours in Marine Biology." There is no Joint Honours in Marine Biology. Please omit.

OCSC 3600 Marine Microbiology Proposal:
BIOL 2060 or 2250 are highlighted as pre-requisites. As indicated above and during my June 15 meeting with Annie, BIOL 2060 is consistently at or over capacity. We can't reserve seats for any nonBIOL major at this time.

If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 28/08/2017 11:47 AM, Annie Mercier wrote:
Hi Jody:
We thank you for your comments and feedback. Please find our replies below.
1- With regards to the OCSC Honours, I believe we have addressed all of the early concerns you voiced at the June 15 meeting in our updated proposal (circulated on June 22). In addition:

1a- Admission requirements: "To qualify for the Honours" was reworded into "To earn an Honours" in order to dispel any ambiguity that the 45 credit hours in Ocean Sciences are the overall requirements not the admission requirements. With respect to admission, the proposal states: "Honours students would normally follow one of the Major programs offered by the Department of Ocean Sciences before applying to the Honours, and must meet its admission requirements as follows: To be considered for admission to the Major in Ocean Sciences prior to admission to the Honours program, students must
normally have completed..." This essentially indicates that students must typically register to the Major (after satisfying its admission requirements) before transitioning to the Honours.

1b- In direct response to your initial concern about available seats, we have made BIOL 2060 a choice among several courses (under 5a in the updated proposal).

1c- As I indicated during the meeting, we do not have specific requirements for lab vs non-lab courses, like Biology does. This is in part due to the broader science foundation that our programs require. Overall, this foundation includes 6 courses (in Biology, Chemistry, Physics) with associated lab segments. In addition, the core hands-on component of our Majors/Honours is bundled into OCSC 2500, which is a required intensive practical course providing ship-based and lab-based training. Finally, both OCSC 3000 and OCSC 4122 have lab segments. And, of course, we offer a dive course to qualifying students (OCSC 4000). In sum, based on the requirements, Honours students will typically take a minimum of 8 to 10 courses ( $24-30$ credit hours) that either have labs or are entirely hands-on, in addition to the 6 credit hours associated with the research project (OCSC 499A/B).

2- For the Special Topics courses: No prerequisites have been identified yet, which I believe is in line with similar Special Topics Course descriptions found in other units, including Biology. We will be sure to consult with Biology regarding BIOL prerequisites (if any) when these courses are fleshed out.

3- OCSC 499A/B: Reference to the joint Honours has been removed, although we are still keen on developing the Joint Honours in Marine Biology with you at your earliest convenience (we feel it does not make sense to have an orphan Joint Major without an Honours option).

4- OCSC 3600 Marine Microbiology: We are aware that you cannot reserve seats for our students in BIOL 2060 or BIOL 2250. This is why we list them as alternative options. We are hoping that, should this create a problem, we might explore ways to expand accessibility to these courses, since they are important foundation courses in science. We do not see any way that we could develop/offer anything similar without substantial and unnecessary overlap.

Please let us know if you have any further questions or concerns.
All the best,
Annie

```
Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
www.mun.ca/osc/amercier/bio.php
```

On 11/09/2017 2:32 PM, Jody-Lynn Burke wrote:
Hi Annie,
Thanks for clarifying.
I'm concerned that there are no separate admission requirements for Honours, especially since all other departments within the Faculty have separate Major/Honors admission requirements.

With regards to my second point, you listed BIOL 2250 or 2060 as required pre-requisites in your proposal for OCSC 3600. As was the case with your initial Honours in Ocean Sciences proposal (April 24), you didn't consult with Biology before assigning our courses as pre-requisites for OCSC 3600 and sending it out to the wider university committee for consultation.

As l've indicated in previous emails, we can't reserve seats for OSC students in BIOL 2060.
If you have any questions, please let me know.
Jody Burke, BSc.(Hons), M.Ed, PGC(QM) - Academic Program Officer
Department of Biology, Memorial University
Office: (709) 8648021
E-mail: jodyb@mun.ca

On 14/09/2017 10:23 AM, Annie Mercier wrote:
Hi Jody:
Many thanks for your comments.
We will give thought to separate admission requirements for the Honours; and in consultation with the instructor we propose to adjust the prerequisites of OCSC 3600 to "Biology 2250 or Biochemistry 2100 " pending Biochemistry's approval.

All the best,
Annie

## Biochemistry

Subject:Request for Consultation
Date: Fri, 18 Aug 2017 18:26:45 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Hi Mark, Paul and Jody could you please have your department review the attached proposals and send your responses to me in time for the next FoSCUGS meeting in September.

These requests were sent out earlier and I cannot find any responses. Perhaps I missed them.
Best regards
Garth

Garth L. Fletcher<br>Head and Professor Emeritus<br>Department of Ocean Sciences<br>Ocean Sciences Centre<br>Memorial University<br>St John's NL<br>Canada, A1C 5S7

TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca
<OCSC-New_Program_Proposal-Honours_22June2017.doc><OCSC_New_SpecialTopics-courses-21April2017.pdf><OCSC499_New_Course_Proposal-
21April2017.pdf><CalendarChanges_OCSCMajor_21April2017.pdf><CalendarChanges_OCSCMinors _21April2017.pdf><OCSC_New_course_Marine_Microbiology-14Sep2017.doc>

On Sep 14, 2017, at 10:29 AM, Annie Mercier [amercier@mun.ca](mailto:amercier@mun.ca) wrote:
Hi Valerie:
I was wondering if you had had the chance to review our proposals, which were initially circulated in April -- with an updated proposal for the Honours sent out in August (see below).
The purpose of this email is actually to draw your attention to the fact that the proposal for the new course in Marine Microbiology (OCSC 3600) has recently been modified to include an option for a Biochemistry course as PR (since Biology was concerned that they could not reserve seats in BIOL 2060 for our students). This is in line with what we did for the Honours. Please let me know if you have any concerns with this updated version.
In sum, the only two documents that have changed since our initial message in April are the ones in Word format (updated OCSC 3600; updated OCSC Honours).
I look forward to your feedback.
All the best,
Annie
On 17/09/2017 9:53 AM, Valerie Booth wrote:
Hi Annie,
Sorry for the slow reply.
Biochemistry is fine with your proposal.
The choice of Biology 2250 or Biochem 2100 makes sense since these are in the process of being cross listed. We don't anticipate any trouble fitting OCSC students into 2100. Just note that the way we do our online registration and reserves, you may wind up with some students who aren't able to register online, but may need to contact the biochem department to get signed in "by hand".

Best,
Valerie
Valerie Booth
Professor

Deputy Head (undergraduate) Department of Biochemistry and Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

On 18/09/2017 08:31 AM, Annie Mercier wrote:
Hi Valerie:
Many thanks for your feedback, and for the heads up regarding BIOC 2100.
All the best,
Annie

Collection Development Division Queen Elizabeth II Library St. John's, NL A1B 3 Y1

## TO: Garth Fletcher, Head and Professor Emeritus, Department of Ocean Sciences

FROM: Meghan Gamsby, Head of Information Services, Temporary Collections Librarian

RE: Proposal for a New Program - Honours in Ocean Sciences

DATE: May 17, 2017

I have reviewed the Proposal for a New Program - Honours in Ocean Sciences proposal. A collection evaluation was completed and I have determined that the changes will have no impact on library resources.

## NEW COURSE PROPOSALS <br> OCSC 4200 Marine Omics OCSC 4300 Global Marine Fisheries Dynamics

## Executive Summary

This is a proposal for (1) a new course in Marine Omics, which is both novel and timely, and will be a useful elective in various programs offered at the Department and (2) a new advanced course in Global Marine Fisheries Dynamics, which will be an integral part of all the programs delivered by the Department of Ocean Sciences, particularly the Minor in Sustainable Aquaculture and Fisheries Ecology, and eventually the newly proposed Joint Major in Fisheries and Aquaculture. The focus of the latter course will be on air-sea interactions that cause marine ecosystem regime shifts and natural change in fisheries production, and on the impact that anthropogenic global warming will likely have on future fisheries.

## Resource Implications: Instructional Costs

Since the new courses will be taught by existing faculty members at the Department of Ocean Sciences, no additional instructional costs are required.

## Consultations

Feedback received from 9 units (see Appendix I).

## Library Holdings and/or Other Resources Required

There are no added library costs associated with the new courses.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SAMPLE COURSE OUTLINE AND METHOD OF EVALUATION

## OCSC 4200 Marine Omics

## Proposed Course Outline

Marine Omics is a lecture-based course. The lectures will be based on the textbook (Marine Omics Principles and Applications; edited by Se-Kwon Kim, 2017) as well as relevant peer-reviewed literature. During the semester, the following topics from the textbook and assigned readings will be covered:

1. Introduction to Marine Omics
2. Marine Fungal Genomics and Proteomics
3. Marine Algae Genomics and Proteomics
a. Microalgal omics: biofuel applications
4. Marine Animal Genomics and Proteomics
a. Marine Fish Omics (including aquaculture and fisheries applications)
b. Marine Shellfish Omics (including aquaculture and fisheries applications)
c. Marine Bird and Reptile Omics (including toxicogenomics applications)
d. Marine Mammal Omics (including toxicogenomics applications)
5. Marine Metagenomics
a. Introduction to Marine Viruses, Bacteria, and Archaea
b. Coral Holobiont Omics
c. Metagenomics of Marine Actinomycetes
6. Marine Glycomics
7. Marine Transcriptomics
a. Marine Organism Transcriptome Responses to Pathogens
b. Marine Organism Transcriptome Responses to Environmental Stressors
8. Marine Metabolomics
9. Marine Nutrigenomics
a. Marine Nutraceuticals
b. Genomics and Marine Aquaculture Feed Development
10. Marine Pharmacogenomics
11. Omics in Marine Nanotechnology
12. Omics Approaches to Predicting the Impacts of Ocean Acidification
13. Marine Lipidomics
a. Lipidomic Analysis of Marine Microalgae

In addition to the textbook readings, relevant open-access articles will be placed on the D2L web site as assigned readings. Students will be required to write a critique of one of these articles every two weeks (see below). Each student must work independently on these written critiques.

## Evaluation

| Midterm Exam 1 (in Week 5) | $20 \%$ |
| :--- | :--- |
| Midterm Exam 2 (in Week 10) | $20 \%$ |
| Comprehensive Final Exam: | $30 \%$ |
| 6 assignments (5\% each): | $30 \%$ |

Suggested Textbook: Marine Omics Principles and Applications, edited by Se-Kwon Kim, 2017. Taylor \& Francis Group. ISBN 13: 978-1-4822-5820-2 (hardback).

Instructor: Matthew L. Rise, Ph.D., Professor, Department of Ocean Sciences, mrise@mun.ca

## SAMPLE COURSE OUTLINE AND METHOD OF EVALUATION

## OCSC 4300 Global Marine Fisheries Dynamics

## Proposed Course Outline

There will be six lecture topics; each will be covered in depth over two consecutive weeks.
Lecture Topic 1: Large scale (hundreds of km) marine ecosystem domains and fisheries resources
Lecture Topic 2: Global wind patterns and ocean current patterns, fisheries production in coastal upwelling areas and equatorial upwelling areas

Lecture Topic 3: Estimating fisheries production in large-scale marine ecosystem domains, Production to Biomass Ratios

Lecture Topic 4: Air-sea interactions: El Niño - Southern Oscillation, Pacific Decadal Oscillation, North Atlantic Oscillation and Arctic Oscillation Impact of these natural regional climate oscillations on fisheries production

Lecture Topic 5: Predicted effect of anthropogenic global warming on world fisheries production
Lecture Topic 6: Precautionary management policies to mitigate the impact of climate change on fisheries

## Computer Laboratory Segments

The laboratory component of the course will focus on increasingly complex marine ecosystem models with a fisheries component. Each of the six laboratory topics will extend over two weekly periods. During the first period for each of the six segments, multimedia will be used to introduce the relevant principles of marine ecosystem modeling. During the second lab period for each of the segments, the students will code and run the models on their own personal computers. Each student will write a computer laboratory report due at the time of the next laboratory segment. The basic software used will be Microsoft Excel, which is available for free to students at Memorial University. Laboratory assignments will be evaluated by the instructor. Each of the six laboratory assignments will be worth $5 \%$, for a total of $30 \%$ toward the final grade.

Lab Segment 1: Formulating marine ecosystem models with a fisheries component
Lab Segment 2: Simple marine ecosystem models with analytical solutions
Lab Segment 3: Analytical sensitivity analyses of simple marine ecosystem models
Lab Segment 4: Numerical methods to solve complex marine ecosystems models
Lab Segment 5: Coupled physical-biological oceanographic models with a fisheries component
Lab Segment 6: Limitations to predictions by coupled physical-biological oceanographic models

## Evaluation

| Midterm Exam | $35 \%$ |
| :--- | :--- |
| Final Exam | $35 \%$ |
| Computer Lab Assignments (6x5\%) | $30 \%$ |

## Suggested Resources

Peer-reviewed journal articles of relevance will be identified prior to the start of each semester. For example:

Brander, K.M. 2007. Global fish production and climate change. Proceedings of the National Academy of Sciences 104 (50): 19709-19714.

Drinkwater, K.F. 2005. The response of Atlantic cod (Gadus morhua) to future climate change. ICES Journal of Marine Science 62: 1327-1337.

Food and Agriculture Organization of the United Nations. Fisheries Department (2016). The State of World Fisheries and Aquaculture (FAO, Rome)

Jiao, Y. 2009. Regime shift in marine ecosystems and implications for fisheries management. Reviews in Fish Biology and Fisheries 19: 177-191.

Pershing, A.J. and 11 other authors. 2015. Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery. Science 350, issue 6262.

Seggel, A., C. DeYoung and D. Soto. 2016. Climate Change Implications for Fisheries and Aquaculture. Summary of the findings of the Intergovernmental Panel on Climate Change Fifth Assessment Report. Food and Agriculture Organization of the United Nations, Rome.

Stenseth, N.C. 2002. Ecological effects of climate fluctuations. Science 297: 1292-1296.

In addition, the following books will be placed in the library reserve for easy access:
Cushing, D.H. 1975. Marine Ecology and Fisheries. Cambridge University Press. Cambridge. 278p.
Cushing, D.H. 1982. Climate and Fisheries. Academic Press. London. 373p.
deYoung, B., and eight other authors. 1999. Canadian Marine Fisheries in a Changing and Uncertain World. Spec. Publ. Fish. Aquat. Sci. 139. 199p.

Goldberg, E.D., I.N. McCave, J.J. O'Brien and J.H. Steele. 1977. The Sea. Ideas and Observations on Progress in the Study of the Seas. Volume 6. Marine Modeling. John Wiley and Sons, New York. 1048p.

Harrison, P.J. and T.R. Parsons. 2000. Fisheries Oceanography. An Integrative Approach to Fisheries Ecology and Management. Fish and Aquatic Resources Series 4. Blackwell Science. 347p.

Kaiser, M.J. and nine other authors. 2011, Marine Ecology: Processes, Systems, and Impacts. $2^{\text {nd }}$ Edition. Oxford University Press, New York. 501p.

Longhurst. A.R. 1981. Analysis of Marine Ecosystems. Academic Press, London. 741p.

Mann, K.H. and J.R.N. Lazier. 1996. Dynamics of Marine Ecosystem. Biological-Physical Interactions in the Oceans. $2^{\text {nd }}$ Ed. Blackwell Sience. Malden, MA.394p.

Platt, T., K.H. Mann and R.E. Ulanowicz. 1981. Mathematical Models in Biological Oceanography. The Unesco Press. Paris. 156p.

Steele, J.H. 1974. The Structure of Marine Ecosystems. Harvard University Press. Cambridge. 128p.

Instructor: Dr. Joseph Wroblewski, Professor, Department of Ocean Sciences, jwroblew@mun.ca

## SUMMARY PAGE FOR SENATE <br> Approval Form

***Note that changes proposed here are in addition to those approved earlier this semester. Therefore, changes are combined on this document***

Course Numbers and Titles
OCSC 4200 Marine Omics
OCSC 4300 Global Marine Fisheries Dynamics

Abbreviated Course Titles<br>Marine Omics<br>Global Marine Fisheries Dyn

## Calendar Changes under 11.9 Ocean Sciences (new entries)

4200 Marine Omics provides an overview of marine genomics, transcriptomics, proteomics, glycomics, metabolomics, and lipidomics. Omics-based studies of a variety of marine organisms (e.g. fungi, algae, animals), as well as several industrial applications (e.g. biofuel, nutrigenomics, pharmacogenomics, aquaculture and fisheries), will be considered.

PR: OCSC 1000 and Biology 2250 (or Biochemistry 2100), or OCSC 3002
4300 Global Marine Fisheries Dynamics explores the effects of ocean-atmosphere dynamics on large scale marine ecosystem domains, with a special focus on assessing the impact of anticipated climate change on global fisheries production. The course uses a blend of lectures and computer simulation laboratories to familiarize students with current research on fisheries and climate change.

LH: 3
PR: OCSC 1000, 2000 (or Biology 3710) and 2001

## Calendar Changes under 10.9 Ocean Sciences (showing changes)

### 10.9.1 Minor in Oceanography

Students who take a Minor in Oceanography will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2100, 2200, 2300;
2. Ocean Sciences 2000 or Biology 3710;
3. Earth Sciences 1000; and
4. Six credit hours that can be selected from:
a. Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810;
b. Chemistry 2100, 3110, 4151, 4156;
c. Earth Sciences 4302, 4420;
d. Geography 3120, 3510, 4190, 4300;
e. Environmental Science 3072, 3210, 3211, 4230;
f. Ocean Sciences 2001, 3000, 3002, 3600, 4000, 4122, 4300, 4601;
g. Physics 3300, 3340, 4300, 4340;
h. Other applicable ocean-related courses, as approved by the Head of the Department (or delegate).
Course prerequisites stipulated In the Course Descriptions section shall apply to a Minor in Oceanography.

### 10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology

Students who take a Minor in Sustainable Aquaculture and Fisheries Ecology will complete 24 credit hours as follows:

1. Ocean Sciences $1000,2001,3000,3002,4300$;
2. One-Six credit hours selected among of-Ocean Sciences 2000 (or Biology

3710 ), 3600, 3640, 4000, 4100, 4200, 4122, 4601, or other applicable courses, as approved by the
Head of the Department (or delegate);
3. Three credit hours selected among:
a. Biology 2122, 3401, 3640, 3715, 4251, 4605, 4750;
b. Biochemistry $3107,3402,4002,4101,4104,4105,4200,4201$;
c. Geography 4300.
2. Biology 4750 or Geography 4300 ;
4. One of Biology $2122,3401,3640,3715,4251,4605 ;$
5. One of Biochemistry 3107, 3402, 1002, 4101, 4104, 4105, 4200, 4201.

Course prerequisites stipulated in the Course Descriptions shall apply to a Minor in Sustainable Aquaculture and Fisheries Ecology.

### 10.9.3 No change

### 10.9.3.1 No change

### 10.9.3.2 Program Regulations for the Bachelor of Science with Major in Ocean Sciences

 Students must successfully complete:1. the 30 specified credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);
2. Statistics 2550 (or equivalent);
3. Physics 1021 or Physics-1051;
4. a minimum of 30 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 30 credit hours in Ocean Sciences;
b. at least one of Ocean Sciences 2200 or 2300; and
c. at least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601;
5. extra Science courses as necessary to fulfil the minimum requirement for 78 credit hours in Science as stipulated in Clause 3.a. of the Degree Regulations, Regulations for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level; and
6. elective courses as necessary to make up the total of 120 credit hours.

### 10.9.3.3 Program Regulations for the Bachelor of Science with Major in Ocean Sciences (Environmental Systems) <br> Students must successfully complete: <br> 1. the 30 credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);

2. Statistics 2550 (or equivalent);
3. Physics 1021 or Physics-1051;
4. Geography 1050, and at least two of Geography 2102, 2195, or 2425;
5. Earth Sciences 1002, 2502;
6. at least 9 credit hours at the 3000 and/or 4000 level chosen from:
a. Geography 3120, 3140, 3250, 3425, 3510, 3905, the former 3907, 4250, 4908, 4917; and
b. Earth Sciences 3600, 4605, 4903.
7. a minimum of 30 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 30 credit hours in Ocean Sciences;
b. at least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601; and
8. elective courses as necessary to make up the total of 120 credit hours.

### 10.9.4 No change

10.9.4.1 No change

### 10.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences

Students must successfully complete:

1. the 30 specified credit hours required under Admission Requirements for the Honours in Ocean Sciences;
2. Statistics 2550 (or equivalent);
3. Physics 1021 or 1051 ;
4. Chemistry 2400 (or equivalent);
5. a minimum of 12 credit hours among:
a. Biology 2060, 2122, 2250, 2600, 2900;
b. Biochemistry 2100, 2101, 3106, 3107, 3108;
6. a minimum of 45 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100, 2200, 2300 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Honours in Ocean Sciences, will count as 3 of the required 45 credit hours in Ocean Sciences;
b. At least 18 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601;
c. Ocean Sciences 499A and 499B; and
7. elective courses as necessary to make up the total of 120 credit hours, including a minimum of 15 credit hours at the 3000 and/or 4000 level in any of Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics (these 15 credit hours can include courses completed as part of the requirements in 5 b).
NOTES:
8. Those courses in which a grade " $B$ " or an average of $75 \%$ or higher are required to graduate with an Honours degree (as per Clause 1, under Academic Standing of the Regulations for the Honours Degree of Bachelor of Science) are the 42 credit hours in Ocean Sciences courses at the 2000, 3000 and/or 4000 level, and 15 credit hours in courses at the 3000 and/or 4000 level in any of Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics.
9. Chemistry 2440 will be accepted as a substitute for Chemistry 2400. However, a number of advanced Science courses may require Chemistry 2400 and 2401. Students are therefore strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options.
10. Students should be aware that Biology 2250 and Biochemistry 2100 are credit restricted.
10.9.4.3 No change

## Clean Calendar Changes under 10.9 Ocean Sciences (after changes)

### 10.9.1 Minor in Oceanography

Students who take a Minor in Oceanography will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2100, 2200, 2300;
2. Ocean Sciences 2000 or Biology 3710;
3. Earth Sciences 1000; and
4. Six credit hours that can be selected from:
a. Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810;
b. Chemistry 2100, 3110, 4151, 4156;
c. Earth Sciences 4302, 4420;
d. Geography 3120, 3510, 4190, 4300;
e. Environmental Science 3072, 3210, 3211, 4230;
f. Ocean Sciences 2001, 3000, 3002, 3600, 4000, 4122, 4300, 4601;
g. Physics $3300,3340,4300,4340$;
h. Other applicable ocean-related courses, as approved by the Head of the Department (or delegate).
Course prerequisites stipulated in the Course Descriptions section shall apply to a Minor in
Oceanography.
10.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology

Students who take a Minor in Sustainable Aquaculture and Fisheries Ecology will complete 24 credit hours as follows:

1. Ocean Sciences 1000, 2001, 3000, 3002, 4300;
2. Six credit hours selected among of Ocean Sciences 2000 (or Biology 3710), 3600, 3640, 4000, 4100, 4200, 4122, 4601, or other applicable courses, as approved by the Head of the Department (or delegate);
3. Three credit hours selected among:
a. Biology 2122, 3401, 3640, 3715, 4251, 4605, 4750;
b. Biochemistry 3107, 3402, 4002, 4101, 4104, 4105, 4200, 4201;
c. Geography 4300.

Course prerequisites stipulated in the Course Descriptions shall apply to a Minor in Sustainable Aquaculture and Fisheries Ecology.
10.9.3 No change

### 10.9.3.1 No change

### 10.9.3.2 Program Regulations for the Bachelor of Science with Major in Ocean Sciences

Students must successfully complete:

1. the 30 specified credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);
2. Statistics 2550 (or equivalent);
3. Physics 1021 or 1051;
4. a minimum of 30 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 30 credit hours in Ocean Sciences;
b. at least one of Ocean Sciences 2200 or 2300; and
c. at least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601;
5. extra Science courses as necessary to fulfil the minimum requirement for 78 credit hours in Science as stipulated in Clause 3.a. of the Degree Regulations, Regulations for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level; and
6. elective courses as necessary to make up the total of 120 credit hours.

### 10.9.3.3 Program Regulations for the Bachelor of Science with Major in Ocean Sciences (Environmental Systems)

Students must successfully complete:

1. the 30 credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);
2. Statistics 2550 (or equivalent);
3. Physics 1021 or 1051;
4. Geography 1050, and at least two of Geography 2102, 2195, or 2425;
5. Earth Sciences 1002, 2502;
6. at least 9 credit hours at the 3000 and/or 4000 level chosen from:
a. Geography $3120,3140,3250,3425,3510,3905$, the former $3907,4250,4908,4917$; and
b. Earth Sciences $3600,4605,4903$.
7. a minimum of 30 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 30 credit hours in Ocean Sciences;
b. at least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601; and
8. elective courses as necessary to make up the total of 120 credit hours.
10.9.4 No change

### 10.9.4.1 No change

### 10.9.4.2 Program Regulations for the Bachelor in Science with Honours in Ocean Sciences

Students must successfully complete:

1. the 30 specified credit hours required under Admission Requirements for the Honours in Ocean Sciences;
2. Statistics 2550 (or equivalent);
3. Physics 1021 or 1051;
4. Chemistry 2400 (or equivalent);
5. a minimum of 12 credit hours among:
a. Biology 2060, 2122, 2250, 2600, 2900;
b. Biochemistry 2100, 2101, 3106, 3107, 3108;
6. a minimum of 45 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100, 2200, 2300 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Honours in Ocean Sciences, will count as 3 of the required 45 credit hours in Ocean Sciences;
b. At least 18 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3600, 3640, 4000, 4100, 4122, 4200, 4300, 4601;
c. Ocean Sciences 499A and 499B; and
7. elective courses as necessary to make up the total of 120 credit hours, including a minimum of 15 credit hours at the 3000 and/or 4000 level in any of Biochemistry, Biology,

Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics (these 15 credit hours can include courses completed as part of the requirements in 5 b).

## NOTES:


#### Abstract

1. Those courses in which a grade " $B$ " or an average of $75 \%$ or higher are required to graduate with an Honours degree (as per Clause 1, under Academic Standing of the Regulations for the Honours Degree of Bachelor of Science) are the 42 credit hours in Ocean Sciences courses at the 2000, 3000 and/or 4000 level, and 15 credit hours in courses at the 3000 and/or 4000 level in any of Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Sciences, Geography, or Physics. 2. Chemistry 2440 will be accepted as a substitute for Chemistry 2400. However, a number of advanced Science courses may require Chemistry 2400 and 2401. Students are therefore strongly encouraged to complete the Chemistry 2400/2401 sequence or otherwise carefully plan their options.


3. Students should be aware that Biology 2250 and Biochemistry 2100 are credit restricted.

### 10.9.4.3 No change

## Rationale

The proposed Marine Omics course will be a suitable elective in the various programs offered by the Department of Ocean Sciences (DOS). Due to the importance of omics technologies in fundamental studies and industrial applications involving marine organisms, the course will not only be valuable for DOS programs (e.g. Major in Ocean Sciences, Major in Fisheries and Aquaculture), it may also be attractive as a general elective in other Biology and Biochemistry programs. Background theory on techniques (e.g. genomics, transcriptomics, proteomics, glycomics, metabolomics, lipidomics) will be presented using studies of marine organisms as examples. Lectures will be based on the textbook (Marine Omics Principles and Applications; edited by Se-Kwon Kim, 2017) as well as relevant peerreviewed literature.

There is currently no other course at Memorial University that focuses on marine omics. Since this course will explore a variety of omics techniques (e.g. genomics, transcriptomics, proteomics, glycomics, metabolomics, lipidomics) and focus on marine organisms (e.g. bacteria, fungi, algae, fish, shellfish, birds, reptiles, mammals), it will have minimal (less than 20\%) overlap with other related courses (e.g. Genomics; Aquaculture and Fisheries Biotechnology) offered at Memorial University. Importantly, the proposed course will draw material from publications in peer-reviewed journals that demonstrate the application of omics techniques in studies involving marine organisms, and thus will always remain at the cutting edge of omics knowledge.

The proposed course in Global Marine Fisheries Dynamics will benefit all programs offered by the Department of Ocean Sciences, particularly the Minor in Sustainable Aquaculture and Fisheries Ecology, and the newly proposed Joint Major in Fisheries and Aquaculture (under development). While there are currently a few courses related to fisheries being offered at Memorial University, their focus is either different or more superficial (see below). Because the Department of Ocean Sciences offers BSc programs in fisheries subjects, it is imperative that it develops and offers a relevant advanced course to complement the 2000 and 3000 level courses.

Since the proposed Fisheries course focuses on the dynamics of global marine fisheries, with particular reference to climate impacts, it has minimal (less than 10\%) overlap with other lecture/lab based courses related to fisheries, including Biology 4750 (Fisheries Ecology; which is not restricted to marine fisheries and focuses on ecological principles and on regional case studies), and Geography 4300 (World Fisheries: Current Discourse and Future Directions; which is a general overview). It also differs
significantly from the newly proposed Fisheries 3100 (Fisheries Technology) and Fisheries 3200 (Fisheries Management), which focus on gear and capture technology, and on governance and management strategies, respectively.

The proposed Global Marine Fisheries Dynamics course will be exploring recently developed physicalbiological oceanographic models coupled to general atmospheric circulation models that offer predictions of the effects of anthropogenic global warming on world fisheries. There is currently no other course at Memorial University that links broad oceanographic processes and fisheries production at such an advanced level.

## Consultations Sought From

Marine Institute
Grenfell campus
Department of Biochemistry
Department of Biology
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Physics and Physical Oceanography
Department of Psychology
Faculty of Arts
Faculty of Education
Faculty of Engineering and Applied Science
School of Medicine

Library Report Received

Comments Received
Yes
No
Yes
Yes
Yes
No
Yes
No
Yes
No
Yes
No
No
No
Yes
Yes

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice President Yes / No Name

## FOR OFFICE USE ONLY

## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary:

Date: $\qquad$

## APPENDIX I - CONSULTATIONS <br> REQUEST SENT 24 OCTOBER 2017

Subject:Request for consultation
Date: Tue, 24 Oct 2017 12:40:44 +0000
From: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
To: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca), Business [fba.ad.undergrad@mun.ca](mailto:fba.ad.undergrad@mun.ca), chemconsult@mun. ca (chemconsult@mun.ca) [chemconsult@mun.ca](mailto:chemconsult@mun.ca), 'cs-chair@mun.ca' [cs-chair@mun.ca](mailto:cs-chair@mun.ca), Earth Sciences [eascugcon@mun.ca](mailto:eascugcon@mun.ca), Locke, Wade [wlocke@mun.ca](mailto:wlocke@mun.ca), Hicks, Sue [shicks@mun.ca](mailto:shicks@mun.ca), Engineering [engrconsult@mun.ca](mailto:engrconsult@mun.ca), Alcock, Erin [ekalcock@mun.ca](mailto:ekalcock@mun.ca), Grenfell Campus [associatevpoffice@grenfell.mun.ca](mailto:associatevpoffice@grenfell.mun.ca), Faculty of Humanities and Social Sciences [hss@mun.ca](mailto:hss@mun.ca), 'Ian Neath' [Psychology.Head@mun.ca](mailto:Psychology.Head@mun.ca), Jody-Lynn Burke [jrotchford@mun.ca](mailto:jrotchford@mun.ca), Lagowski, Jolanta [jolantal@mun.ca](mailto:jolantal@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca), 'mathconsult@mun.ca' [mathconsult@mun.ca](mailto:mathconsult@mun.ca), Medicine [deanofmedicine@med.mun.ca](mailto:deanofmedicine@med.mun.ca), 'miugconsultations@mi.mun.ca' [miugconsultations@mi.mun.ca](mailto:miugconsultations@mi.mun.ca), Catto, Norm [ncatto@mun.ca](mailto:ncatto@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca), Ed.Durnford@mi.mun.ca [Ed.Durnford@mi.mun.ca](mailto:Ed.Durnford@mi.mun.ca)
Colleagues, could you please have your department review the attached new courses in Ocean Sciences that we are proposing to develop: OCSC 4200 Marine Omics and OCSC 4300 Global Marine Fisheries Dynamics.
We would like to get your responses by November 13, in order to be prepared for the next FoScUGs meeting.

Best regards
Garth
Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
Memorial University
St John's NL
Canada, A1C 5S7
TEL: 709-864-3276
FAX 709-864-3220
Email fletcher@mun.ca

## FEEDBACK RECEIVED

## Biochemistry

From: Valerie Booth [mailto:vbooth@mun.ca]
Sent: October-24-17 3:00 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Biochemistry Head [biochead@mun.ca](mailto:biochead@mun.ca)
Subject: Re: Request for consultation
The proposed courses look fine from Biochemistry's point-of-view.

## Valerie Booth

Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

## Geography

From: Catto, Norm
Sent: October-24-17 12:23 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: RE: Request for consultation
Dear Garth:
I am ok with this, although my colleagues may ask why Geog 4300 has been removed from the suggested optional courses.

Best wishes
Norm
Norm Catto
Head, Department of Geography
Memorial University
St. John's NL A1B 3X9
Canada
1-709-864-7463
Fax 1-709-864-3119

On 25/10/2017 7:32 AM, Annie Mercier wrote:
Hi Norm:
You are right, we did not remove GEOG 4300 as an optional course in the Minor in Oceanography (see section 4d). However, we did remove it from original section 2 ("Biology 4750 or Geography 4300") as requirement in order to replace it with OCSC 4300 (added to section 1 of the Minor). The undergrad committee has discussed it again, and we see no problem with inserting back GEOG 4300 as a suitable option for the remaining credits. The instructor confirmed that there is very little overlap between OCSC 4300 and GEOG 4300 (as the former is quantitative). Thank you for highlighting this.

Cheers,
Annie

## Medicine

From: cvardy@mun.ca [mailto:cvardy@mun.ca]
Sent: October-25-17 10:40 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: FW: Request for consultation
The Faculty of Medicine is supportive of your proposal to develop OCSC 4200 Marine Omics and OCSC 4300 Global Fisheries Dynamics.

Regards
Cathy Vardy, MD, FRCPC
Vice Dean and Professor of Pediatrics
Faculty of Medicine
Health Sciences Centre, M2M319
Memorial University of NL
Tel: 709-864-6417
Fax: 709-864-6336

## Physics \& Physical Oceanography

From: Ivan Saika-Voivod [saika@mun.ca]
Sent: Wednesday, October 25, 2017 4:50 PM
To: Fletcher, Garth
Cc: rgouldng Goulding; Lagowski, Jolanta
Subject: Re: Request for consultation
Dear Garth,
Thank you for the invitation to provide feedback on the Ocean Science courses OCSC 4200 and OCSC 4300, and the resulting small modifications to programs, the minor in Oceanography in particular. We are supportive of the changes.

Best regards,
Ivan
Ivan Saika-Voivod, Associate Professor
Chair, Undergraduate Studies Committee
Department of Physics and Physical Oceanography, Memorial University of Newfoundland St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

## Chemistry

From: Department of Chemistry Consult [chemconsult@mun.ca]
Sent: Friday, October 27, 2017 3:05 PM
To: Fletcher, Garth
Subject: Re: Request for consultation
Hi Garth,
The new courses look interesting, especially the Marine Omics course. I
would like to lend my support for these two courses on behalf of the chemistry department.

Sincerely,
Chris Flinn
Deputy Head. Undergraduate Studies
MUN Chemistry Department

## Biology

Subject:Re: FW: Request for consultation
Date: Mon, 6 Nov 2017 12:05:50-0330
From: Suzanne Dufour [sdufour@mun.ca](mailto:sdufour@mun.ca)
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca), Marino, Paul [pmarino@mun.ca](mailto:pmarino@mun.ca)
CC: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Hi Garth,
Here is the response from BUGS regarding those two courses. I apologize for the delay. Best wishes,
Suzanne
BUGS has reviewed your proposals for OCSC 4200 (Marine Omics) and OCSC 4300 (Global Marine Fisheries Dynamics). We believe that the proposed courses have interesting content and have the potential of enhancing the current offerings in the Department of Biology, the Department of Ocean Sciences, and the School of Fisheries. The courses could provide students with valuable skills (in demand by many employers) provided that they are truly offered at an advanced level. We therefore suggest that the OCSC consider a better integration of those courses in existing programs in order to be most valuable to students.

Our existing concerns with those courses are described below. In particular, we are concerned with the similarity of the content between OCSC 4300 and BIOL 4750 (Fisheries Ecology), especially as we move forward and course instructors inevitably change.

## OCSC 4300, Global Marine Fisheries Dynamics

The committee notes that there is significant conceptual overlap between the proposed OCSC 4300 and the current BIOL 4750, a course which has been an important component of our Marine Biology major and is highly subscribed (between 25-30 students each year). The calendar description for the Biology course is as follows: "4750 Fisheries Ecology is the application of ecological principles to the problem of managing exploited fish populations. Laboratory exercises will be based on a simulation approach to fisheries problems using computer and animal models". The proposed OCSC 4300 calendar description is: " 4300 Global Marine Fisheries Dynamics explores the effects of ocean-atmosphere dynamics on large scale marine ecosystem domains, with a special focus on assessing the impact of anticipated climate change on global fisheries production. The course uses a blend of lectures and computer simulation laboratories to familiarize students with current research on fisheries and climate change." While we appreciate that the same instructor could ensure that different content is covered in each course, we are concerned about what would happen if different instructors taught the course, as there is potential for a large degree of overlap between the two.

You state your current programs would benefit from an advanced course in global marine fisheries dynamics and cite the need to develop a "relevant advanced course to complement the 2000 and 3000 level courses. Your proposal goes on to state that the courses related to fisheries currently being offered
at Memorial University have a different focus or are more superficial. The different focus and more superficial fisheries courses, as highlighted in your proposal are:

■ GEOG 4300 (World Fisheries: Current Discourse and Future Directions); a seminar course focused on key concepts, principles and challenges in fisheries resources worldwide. Topics of discussion include the state of world fisheries, analysis of various management approaches and tools, and future scenarios for world fisheries. Students must complete a minimum of 6 credit hours in Geography at the 3000-level or have permission of Head of Department to register for this course. As a 4000 level course, students are strongly recommended that GEOG 3222 (Research Design and Quantitative Methods in Geography) and GEOG 3226 (Field Methods II) prior to registration.

■ BIOL 4750 (Fisheries Ecology); a lecture and lab based course that explores the application of ecological principles to the problem of managing exploited fish populations. Laboratory exercises will be based on a simulation approach to fisheries problems using computer and animal models. Students are required to have completed BIOL 1001, 1002, and 2600 in order to register for this course. Students following the normal Biology Major outlines are ineligible to take this course until the start of their third year.

The proposed OCSC 4300 has only one pre-requisite, OCSC 2000 (or BIOL 3710). As OCSC 2000 has a pre-requisite of OCSC 1000 and one 1000-level course in one of Biology, Chemistry, Earth Sciences or Physics, students would be eligible to take OCSC 4300 in the first semester of their second year. Given the minimal pre-requisites, it's difficult to see how this course is more advanced that current fisheries courses offered at Memorial. We suggest that OCSC lists BIOL 4750 as a pre-requisite, such that this new course could build upon the knowledge that students gain in the popular BIOL 4750 course, to achieve greater learning outcomes for students.

On 10/11/2017 8:41 AM, Annie Mercier wrote:
Dear Suzanne:
We thank you for your support of our proposed courses and for highlighting that they have the potential of providing students with valuable skills and thus of enhancing the current offerings in Biology, Ocean Sciences, and the School of Fisheries. Our undergraduate studies committee has carefully assessed your concerns and prepared the following response:

## For OCSC 4200 Marine Omics:

Regarding the prerequisite of BIOL 2550 for OCSC 4200 (and limited space in BIOL 2550): Based on earlier discussions with Biology around this particular topic, we have adopted the strategy of including both BIOL 2250 and BIOC 2100 as alternative prerequisites to relevant upper level OCSC courses, to make sure students can gain the required knowledge. There is currently no other option offered to us.

Regarding the fact that, come Fall 2018, CHEM 2440 (Organic Chemistry for Biologists) will be removed and only CHEM 2400 (Intro Organic Chemistry I) will remain as PR for BIOL 2250: Thank you for this reminder. We have already started to adjust our programs to reflect this change (requiring Chemistry 2400 instead of 2440, and encouraging students to take Chemistry 2401); we are also updating our handbook. If students follow the suggested schedules, they will normally take OCSC 4200 in the third or fourth year of their programs, after having completed the necessary prerequisites.

## For OCSC 4300 Global Marine Fisheries Dynamics:

Regarding any potential conceptual overlap with BIOL 4750 (Fisheries Ecology): As you mentioned, BIOL 4750 has been designed and taught by the same instructor who developed OCSC 4300 and he purposely made sure there is minimal overlap (both conceptually and in the descriptions). The main difference in the calendar descriptions is that OCSC 4300 integrates the role of oceanographic processes and climate change impacts on fisheries dynamics, whereas BIOL 4750 applies ecological principles to fisheries management issues. Furthermore, the prerequisites of the two courses emphasize their different foci (introductory ocean sciences and biological oceanography in one vs. introductory biology and ecology in the other). In other words, students taking BIOL 4750 have no foundation knowledge in any oceanrelated/marine topic.

Regarding the course advanced nature, its PR, and the potential addition of BIOL 4750 as PR: Let us start by confirming that our programs are also designed so that students will normally only be eligible to take OCSC 4300 at the start of the third year (this is similar to GEOG 4300 and BIOL 4750). The requirements for OCSC 4300 involve a 1000 -level introductory course to the subject (OCSC 1000) and a 2000-level course (OCSC 2000). In this sense it is equivalent to BIOL 4750 that requires BIOL 1001/1002 and 2600. The "more advanced" nature is not in reference to the number of prerequisites alone, but rather to the integrative nature of the course that builds on principles of marine biology and ocean sciences. While we appreciate your suggestion to add BIOL 4750 as a prerequisite, we feel it would be unreasonable to require that our students take a 4000-level course in Biology to gain access to a 4000level course in Ocean Sciences (especially since the stream of prerequisites that leads to BIOL 4750 only pertains to biology/ecology and not to oceanography or marine biology). Instead we have decided to add OCSC 2001 (Introduction to Sustainable Fisheries and Aquaculture) as a prerequisite. We are confident that the mix of introductory ocean sciences, biological oceanography and fisheries is adequate to ensure that students get optimal learning outcomes out of the proposed Global Marine Fisheries Dynamics course. It also clearly sets OCSC 4300 apart from BIOL 4750 and from GEOG 4300.

Please let us know if you have any further comments/questions.
Best regards,
Annie

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Annie Mercier, PhD
Professor and Deputy Head,
Department of Ocean Sciences
Memorial University (Ocean Sciences Centre)
St. John's, NL, Canada, A1C 5S7
Tel: (709) 864-2011
Email: amercier@mun.ca
```


## Earth Sciences

From: UGradMattersES [mailto:eascugcon@mun.ca]
Sent: November-06-17 2:50 PM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Cc: Graham Layne [gdlayne@mun.ca](mailto:gdlayne@mun.ca); Michelle Miskell [mmiskell@mun.ca](mailto:mmiskell@mun.ca); John Hanchar [jhanchar@mun.ca](mailto:jhanchar@mun.ca)
Subject: Re: Request for consultation
Hello Garth,
Earth Sciences has no concerns about these two new courses in Ocean Sciences.

All the best,
KIM...

## Engineering

From: Engineering Consult [engrconsult@mun.ca]
Sent: Wednesday, November 15, 2017 2:25 PM
To: Fletcher, Garth
Cc: Fisher, Andrew; Howard Heys; Edmunds, Jayde
Subject: Re: Request for consultation
Dear Dr. Fletcher,
Thank you for the opportunity to comment on your proposed new courses OCSC 4200 and 4300.

In its meeting on Wed. Nov. 15, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

Yours sincerely,

## ---

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

## Marine Institute

-------- Forwarded Message $\qquad$
Subject:RE: Request for consultation
Date: Thu, 16 Nov 2017 13:49:30 +0000
From: MIUG Consultations [MIUGconsultations@mi.mun.ca](mailto:MIUGconsultations@mi.mun.ca)
To: amercier@mun.ca [amercier@mun.ca](mailto:amercier@mun.ca)
Dear Annie,
Thank you for the opportunity to review and comment on the proposals for the new courses OCSC 4200 and OCSC 4300. The Marine Institute is happy to support these proposals as presented.

Regards,
Bev
Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

Collection Development Division
Queen Elizabeth II Library

16 November 2017

To: $\quad$ Garth Fletcher, Department of Ocean Sciences
From: Erin Alcock, Science Research Liaison Librarian
Subject: New Course Proposal, OCSC 4200

Upon review of the new course proposal for OCSC 4200 - Marine Omics, I have determined that Memorial University Library system has sufficient resources to support the objectives of this course.

The Library holds an electronic copy of the proposed course text with a perpetual license. As illustrated in the Table One below, the Memorial Libraries have a small number of physical monographs on the topics listed in the course outline but more can be purchased under existing budget allocations. Searching 'Books, Articles \& More...' in our OneSearch system points to numerous subscription items that could be of use. Additional items will be discovered in subject specific databases such as ASFA (Aquatic Science and Fisheries Abstracts), as well as, Biological Abstracts, Web of Science and Scopus.

Table One: Marine Omics Course Topics in OneSearch

| Course Outline Topics | Library Holdings from OneSearch |  |
| :---: | :---: | :---: |
|  | Catalogue | Books, Articles \& More... |
| Marine Omics | 8 | 2941 |
| Marine Fungal Genomics \& Proteomics | 1 | 995 |
| Microalgal omics | 1 | 224 |
| Marine Animal Genomics \& Proteomics | 2 | 2547 |
| Marine Fish omics | 0 | 1052 |
| Marine Shellfish omics | 0 | 191 |
| Marine Bird \& Reptile omics | 0 | 237 |
| Marine Mammal omics | 0 | 141 |
| Marine Metagenomics | 19 | 5867 |
| Marine Viruses, Bacteria \& Archaea | 4 | 3706 |
| Coral Holobiont omics |  | 47 |
| Metagenomics of Marine Actinomycetes | 2 | 357 |
| Marine Glycomics | 1 | 306 |
| Marine Transriptomics | 3 | 3301 |
| Marine Organism Transcriptome Response to Pathogens | 0 | 1142 |
| Marine Organism <br> Transcriptome Response to Environmental Stressors |  | 610 |
| Marine Metabolomics | 3 | 3278 |
| Marine Nutrigenomics | 1 | 418 |
| Marine Nutraceuticals | 12 | 3371 |
| Genomics \& Marine Aquaculture Feed Development | 1 | 1130 |
| Marine Pharmacogenomics | 2 | 545 |
| Omics in Marine Nanotechnology | 1 | 123 |
| Omics...Ocean Acidification |  | 137 |
| Marine Lipidomics | 4 | 615 |
| Lipidomic Analysis of Marine Microalgae | 0 | 124 |

Collection Development Division
Queen Elizabeth II Library

16 November 2017

To: Garth Fletcher, Department of Ocean Sciences
From: Erin Alcock, Science Research Liaison Librarian
Subject: New Course Proposal, OCSC 4300

Upon review of the new course proposal for OCSC 4300 - Global Marine Fisheries Dynamics, I have determined that Memorial University Library system has more than sufficient resources to support the objectives of this course.

Physical items will be held at both the Queen Elizabeth II Library and the C.R. Barrett Library. Online subscriptions are numerous. The topics covered in this course have long been a strength of Memorial University Libraries, a trend that will undoubtedly continue (particularly as this was the area of my graduate work).

Table One outlines the results obtained with searches based upon the proposed lecture topics. In addition to the resources suggested in the proposal there are thousands of electronic books and articles to be found in OneSearch on these topics. Additional items will be discovered in subject specific databases such as ASFA (Aquatic Science and Fisheries Abstracts), as well as, Biological Abstracts, Web of Science and Scopus.

Table One: OCSC 4300 Topics in OneSearch

| Course Topics | Library Holdings from OneSearch |  |
| :---: | :--- | :--- |
|  | Catalogue | Books, Articles \& More... |
| Marine ecosystem fisher* | 289 | $125000+$ |
| Fisher* production | 7 | $28000+$ |
| Global Wind | 14 | $53000+$ |
| Ocean Current | 4 | $12000+$ |
| Upwelling | 4 | $2400+$ |
| Equatorial Upwelling |  | $42000+$ |
| Biomass Ratio | $7300+$ |  |
| El Nino | 2 | $6300+$ |
| Southern Oscillation | $1900+$ |  |
| Pacific Decadal <br> Oscillation |  | $3900+$ |
| North Atlantic <br> Oscillation | 1 | $2000+$ |
| Arctic Oscillation | 8 | $27000+$ |
| Global Warming | $7800+$ |  |
| Anthropogenic Global <br> Warming |  | $10000+$ |
| Fisher* climate change <br> precaution* polic* |  |  |

# Proposal: Calendar Change to Existing Course Psychology 2100 

## Executive Summary

We would like to add a note that Psychology 2100 cannot be used towards the major.
Resource Implications: Instructional Costs
N/A

## Consultations

Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library

Library Holdings and/or Other Resources Required
N/A

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Course Number and Title PSYC 2100 Attitudes and Social Cognition

## Abbreviated Course Title

## Calendar Change(s)

Psychology 2100 Attitudes and Social Cognition is an examination of the concepts and principles involved in the interaction between the individual and others. Emphasis will be on the theoretical and empirical concerns of attitude formation and change, social perception, and social cognition.
CR: the former PSYC 2125, PSYC 3100
PR: PSYC 1000 and 1001
UL: cannot be used towards the Psychology major

## Secondary Calendar Changes

N/A

## Calendar Entry After Changes

Psychology 2100 Attitudes and Social Cognition is an examination of the concepts and principles involved in the interaction between the individual and others. Emphasis will be on the theoretical and empirical concerns of attitude formation and change, social perception, and social cognition.
CR: the former PSYC 2125, PSYC 3100
PR: PSYC 1000 and 1001
UL: cannot be used towards the Psychology major

## Rationale

This notation was accidently omitted when the course was made active again. Majors should take PSYC 3100.

## Consultations

| Consultations Sought From | Comments Received |
| :--- | :--- |
| Humanities and Social Sciences | no |
| Education | yes |
| Engineering and Applied Science | yes |
| Grenfell Campus | no |
| Human Kinetics and Recreation | yes |
| Marine Institute | yes |
| Social Work | yes |
| Science |  |
| Biochemistry | yes |


| - Biology | yes |
| :--- | :--- |
| $\bullet$ Chemistry | no |
| - Earth Sciences | no |
| - Mathematics and Statistics | no |
| - Ocean Sciences | no |
| - Physics and Physical Oceanography | no |

The following e-mail was sent to Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library on October 17, 2017.

Hi,

Please find attached three sets of calendar changes from the Psychology department,

1) A request to change the course description for Psychology 2100 .
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements for the Behavioural Neuroscience degree.

We would very much appreciate any feedback that you may have on these calendar changes.
Christina

## The following replies were received:

## Education (October 17, 2017)

Hello Christina,
Thank you very much for the opportunity to provide feedback on these calendar changes. The Faculty of Education does not have any concerns with these changes. However I do suggest one minor editorial change: in the third proposal regarding Chemistry 2440, there is a ${ }^{* * *}$ note at the bottom of Tables 5 and 6 . I believe this note should be removed since it is no longer relevant.

Thank you,
Meghan
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs

Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020

Tel: 709 864-7554
Fax: 709 864-2623

## Reply to Education (October 17, 2017)

Thank you Meghan for catching that additional note. I will remove it from the proposal going forward.

## Engineering \& Applied Sciences:

Thank you for the opportunity to comment on your proposed Calendar changes re

1) A request to change the course description for Psychology 2100.
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements for the Behavioural Neuroscience degree.

In its meeting yesterday, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

## Human Kinetics and Recreation (November 6, 2017):

Hi,
I have reviewed the proposed calendar changes from the Psychology Department and have no concerns.
Linda
Linda E. Rohr PhD
Associate Professor \& Associate Dean Undergraduate Studies
Human Kinetics and Recreation, Memorial University
t: 709.864.6202 f: 709.864.7531 e: lerohr@mun.ca
PE 2025

## $\underline{\text { Marine Institute: }}$

Dear Christina,
Thank you for the opportunity to review and comment on three proposals for Calendar changes from the Psychology Department. These changes will have no impact on Marine Institute programs and we are happy to support all three proposals.

Regards, Bev

Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

## School of Social Work (November 13)

Hello Christina,

Sorry about my delay in getting back to you. I have reviewed your proposed calendar changes and I do not have any suggestions.

The changes you propose do not impact the School of Social Work undergraduate programs.
Regards,
Heather
Heather J. Hair, PhD, RMFT, RSW
Associate Dean Undergraduate Programs
School of Social Work, Memorial University
St. John's, NL, Canada, A1C 5S7
T: 709-864-2562 or 709-864-7349

## Biochemistry ((October 1, 2017)

Hi Christina,
No concerns from Biochemistry on any of these.
VB

```
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/
```


## Biology (October 31, 2017):

## Hi Christina,

The Biology undergraduate committee has met and reviewed the three calendar change proposals from your department:

1) Psychology 2100
2) Co-op program
3) Phasing out of chemistry courses.

We have no concerns with those proposed changes.
Best wishes,
Suzanne

[^0]
## Library:

Hello Christina,
The proposed changes will have no impact on library resources.
Alison

Alison Ambi<br>7098647125<br>Interim Head, Collections<br>Subject Librarian:<br>Earth Sciences<br>Computer Science<br>Mathematics and Statistics<br>Physics and Physical Oceanography<br>Psychology<br>QEII Library<br>Memorial University of Newfoundland<br>www.library.mun.ca

Name

Chair:
Secretary:
Date: $\qquad$

## Proposal:Calendar Changes to Existing Programs

10.11.8 Requirements for Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.), and Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)

## Executive Summary

The purpose of these changes is to clarify the requirements for the Co-Op program in Psychology/Behavioural Neuroscience and make sure that the text of the calendar is in line with practice. We also wanted to bring our descriptions of the co-op program in line with updates that have been or are being made to other co-op programs.

Resource Implications: Instructional Costs
None.

## Consultations

Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library

## Library Holdings and/or Other Resources Required

None.

Signature of Unit Head (if appropriate):
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

## SUMMARY PAGE FOR SENATE

## Approval Form

Program Title 10.11.8 Requirements for Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.), and Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)

## Calendar Change(s)

See attached

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

### 10.11.8 Requirements for Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.), and Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)

## Psychology Co-op Program (PCOP)

The Psychology Co-op Program (PCOP) is available to full-time Psychology (B.A. and B.Sc.) and Behavioural Neuroscience Majors and Honours students only.

The PCOP provides an opportunity for students to learn valuable practical skills while working in fields related to Psychology. Students complete three Work Terms which consist of full-time paid employment. The timing of the Work Terms is such that employers stand to gain from the acquired skills of psychology majors in training. The objectives of the Work Term component of the PCOP are embodied in the Work Term Descriptions.

### 10.11.8.1 Admission Requirements

1. Admission is limited, competitive, and selective.
2. The primary criteria used in reaching decisions on applications for admission are motivation and overall academic performance. Students may be required to participate in an interview as part of the selection process.
3. Students must first be admitted to the Psychology (B.A. or B.Sc.) or Behavioural Neuroscience Major.
4. To be eligible for admission, students must have completed a minimum of 30 credit hours with an overall average of at least $65 \%$, and an average of at least $65 \%$ in all Psychology courses. Students must have a passing grade in all required courses, and must have full-time status in the semester in which they apply.
5. Applications are accepted in the fall semester only; students should consult the department for the specific application deadline.

### 10.11.8.2 Program of Study

1. In addition to the requirements below students must fulfill all requirements for either a Major in Psychology (B.A.), a Major in Psychology (B.Sc.), Major in Behavioural Neuroscience, Honours in Psychology (B.A.), Honours in Psychology (B.Sc.), or Honours in Behavioural Neuroscience. Courses in
each program are normally taken in blocks as shown in the appropriate program table. Students should consult with a faculty advisor each semester regarding course selection.
2. Students' status in the program is assessed at the end of each semester. To remain in PCOP, students must receive a passing grade in all required courses, and must maintain an average of at least $65 \%$ in all Psychology courses and a cumulative average of at least $65 \%$. A student who fails a required course, fails to maintain an average of $65 \%$ in Psychology courses, or fails to maintain a cumulative average of $65 \%$, will be required to withdraw from PCOP. The student in question may apply for readmission in a subsequent year after passing the specified required course(s) previously failed, or re-establishing the required average.
3. Students are required to complete three work terms.

### 10.11.8.3 Work Term Placement

1. General management of the PCOP is the responsibility of the designated Academic Staff Member in Co-operative Education (ASM-CE). ASM-CEs are responsible for facilitating the engagement of potential employers in the program, organizing competitions for Work Term employment, arranging job interviews, managing the co-operative education program database, developing employment opportunities and monitoring students during the work term. The ASM-CEs work with the department to counsel students, visit students on their work assignments and evaluate the work term.
2. Students are ultimately responsible for securing their work term placements. ASM-CEs provide support for the job search and inform students of potential opportunities.
3. A student in the co-operative education program gives permission to the University to provide a copy of the applicant's resume, university transcript and work term evaluations to potential employers.
4. A student who is enrolled in a co-operative education program may independently obtain a work term placement in consultation with the ASM-CE. Such employment positions must satisfy the criteria for work terms, be confirmed in writing by the employer and be approved by the ASM-CE before the first day of the work term according to the University Diary.
5. Work terms are normally 12 weeks in duration, full-time and paid. Remuneration for work placements is determined by employers based on their internal wage structures. The start and end dates for the work term are shown in the University Diary.

### 10.11.8.4 Registration and Evaluation of Performance

1. In Work Terms I, II, and III, students must register for Psychology 199W, 299W, and 399W respectively.
2. Student performance evaluations are to be completed by the employer in conjunction with the student and returned to the ASM-CE. The Work Term evaluations shall consist of at least two components:
a. On-the-job Student Performance: assessed by the ASM-CE using information gathered during the Work Term and input from the employer towards the end of the Work Term. Formal written documentation from the employer shall be sought. Evaluation of the job performance will result in one of the following classifications: OUTSTANDING, EXCEEDS EXPECTATIONS, SATISFACTORY, OR FAIL
b. Work Term Assignment(s)
i. Students are required to submit Work Term assignments as outlined in the course syllabus.
ii. Work Term assignments are evaluated by the ASM-CE.

Evaluation of the work term assignment(s) will result in one of the following classifications: OUTSTANDING, EXCEEDS EXPECTATIONS, SATISFACTORY, OR FAIL.
c. The evaluation of the job performance and the work term assignments are recorded separately on the transcript. Overall evaluation of the work term will result in one of the following final grades being awarded:

- Pass with Distinction: Indicates OUTSTANDING PERFORMANCE in both the work term assignment(s) and the job performance.
- Pass: Indicates that PERFORMANCE MEETS EXPECTATIONS in both the work term assignment(s) and the job performance.
- Fail: Indicates FAILING PERFORMANCE in the work term assignment(s) or the job performance, or both.
To remain in PCOP, a student must obtain a final grade of PAS.

3. If a student fails to achieve the Work Term standards specified above, the student will be required to withdraw from PCOP. Such a student may reapply to the program, at which time the student will be required to repeat the Work Term with satisfactory performance. Only one Work Term may be repeated in the entire program.
4. In order to be considered for readmission, students must formally apply for readmission to the program not later than the deadline date specified in Admission Requirements.
5. A student who withdraws from a Work Term without acceptable cause subsequent to a job placement will be required to withdraw permanently from PCOP.
6. Students who drop a Work Term without prior approval from both the ASM-CE and the Head of the Department of Psychology, or who fail to honour an agreement to work with an employer, or conduct themselves in such a manner as to cause their discharge from the job, will be awarded an overall grade of FAL for the Work Term in question and will be required to withdraw permanently from PCOP.
7. Permission to drop a Work Term does not constitute a waiver of degree requirements, and students who have obtained such permission must complete an approved Work Term in lieu of the one dropped.

### 10.11.9 Suggested Course Sequences

The tables below show suggested course sequences for the B.A. in Psychology (Co-operative), the B.Sc. in Psychology (Co-operative), the B.A. Honours in Psychology (Co-operative), the B.Sc. Honours in Psychology (Co-operative), the B.Sc. in Behavioural Neuroscience (Co-operative), and the B.Sc. Honours in Behavioural Neuroscience (Co-operative).

Course patterns may vary. Students are encouraged to meet with the undergraduate coordinator early in their program in order to establish a course pattern that meets the requirements as set out in these regulations.

Table 1 Suggested Course Sequence for B.A. in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - $\begin{aligned} & \text { Fall } \\ & \text { - } \\ & \text { Semester } 1\end{aligned}$ | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1090 or the former English 1080 <br> - Mathematics 1000 or one of Mathematics 1090, 1050, 1051 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - One of Mathematics 1000, 1090, 1050 or $1051^{*}$ <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement |


|  | - Psychology 2911 <br> - Psychology 2930 or 2520 |
| :---: | :---: |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Winter <br> - Semester 6 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 4000-Level <br> - Psychology Selected Topics course |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 4000-Level <br> - Psychology Research Experience course |

*Psychology Majors are required to complete Mathematics 1000 or two of 1090 , 1050, 1051(or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000 was taken in Semester 1.

Table 2 Suggested Course Sequence for B.Sc. in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 <br> - Chemistry 1010 (1050) or Physics 1020 (1050)* <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 <br> - Chemistry 1011 (1051) or Physics 1021 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Elective or Science requirement <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2520 or 2930 |


|  | - Psychology 2910 |
| :---: | :---: |
| - Winter <br> - Semester 4 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Winter <br> - Semester 6 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 4000-Level <br> - Psychology Selected Topics |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 4000-Level <br> - Psychology Research Experience |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). |  |

Table 3 Suggested Course Sequence for B.A. (Honours) in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1090 or the former English 1080 <br> - Mathematics 1000 or one of Mathematics 1090, 1050, 1051 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - One of Mathematics 1000, 1090, 1050 or $1051^{*}$ <br> - Psychology 1001 |
| $\begin{array}{ll} \hline- & \text { Fall } \\ - & \text { Semester } 3 \\ \hline \end{array}$ | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement |


|  | - Elective or Humanities and Social Sciences requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| :---: | :---: |
| - Winter <br> - Semester 4 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| $\begin{array}{\|ll\|} \hline- & \text { Spring } \\ - & \text { Work Term } 1 \\ \hline \end{array}$ | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology 3900 |
| - Winter <br> - Semester 6 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology Research Experience course <br> - Psychology 4910 |
| $\begin{array}{ll} \hline- & \text { Spring } \\ - & \text { Work Term } 2 \end{array}$ | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level Core <br> - Psychology Selected Topics course <br> - Psychology 499A |
| $\begin{array}{\|ll\|} \hline- & \text { Winter } \\ - & \text { Work Term } 3 \\ \hline \end{array}$ | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level Core <br> - Psychology 499B |

*Psychology Majors are required to complete Mathematics 1000 or two of 1090, 1050, 1051(or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000 was taken in Semester 1.

Table 4 Suggested Course Sequence for B.Sc. (Honours) in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 <br> - Chemistry 1010 (1050) or Physics 1020 (1050)* <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 <br> - Chemistry 1011 (1051) or Physics 1021 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, |


|  | or 1110 <br> - Mathematics 1000 or Elective or Science requirement <br> - Psychology 1001 |
| :---: | :---: |
| - Fall <br> - Semester 3 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology 3900 |
| - Winter <br> - Semester 6 | - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology Research Experience <br> - Psychology 4910 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level <br> - Psychology Selected Topics <br> - Psychology 499A |
| - Winter  <br> - Work Term 3  <br>   | Psychology 399W |
| Spring <br> (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level Core <br> - Psychology 499B |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). |  |
| Table 5 Suggested Course Sequence for B.Sc. in Behavioural Neuroscience (Co-operative) |  |
| Term | Suggested Courses |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 |


|  | - Psychology 1000 |
| :---: | :---: |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Mathematics 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement 1** <br> - Elective or Science requirement <br> - Physics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Physics 1021 (1051) or Biology 1002 <br> - Mathematics 1001 or Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). <br> - **BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience (B.Sc. Only) |  |

Table 6 Suggested Course Sequence for B.Sc. (Honours) in Behavioural Neuroscience (Co-operative)

| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| :---: | :---: |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101,1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement $1^{* *}$ <br> - Elective or Science requirement <br> - Physics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Mathematics 1001 or Elective or Science requirement <br> - Physics 1021 (1051) or Biology 1002 <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| $\begin{array}{\|l} \hline \text { - } \\ \text { - } \end{array}$ | Psychology 199W |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 <br> - Psychology 3900 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-level core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - $\quad$ Fall | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course <br> - Psychology 499A |
| - Winter <br> - Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course <br> - Psychology 499B |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). |  |

**BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience (B.Sc. Only).

## Rationale

The majority of changes were to have the calendar reflect what is currently being done. There are also some minor word changes to ease with clarity. The following are some of the rationale for more substantial changes:

- We wanted to avoid deterring average students from applying to the program, and to instead focus on a combination of academics and motivation (10.11.8.1.2)
- We changed the requirement that students must be registered for 15 additional credit hours in the semester in which they apply to having full-time status (10.11.8.1.4). This will allow students to apply even if they had to drop a course or were unable to take 15 credit hours.
- A mid-October deadline is preferred; it allows enough time for international students to secure a work permit and avoids a hectic admissions process at the start of the winter term. This text allows us to make future adjustments to the deadline without having to make calendar changes. The deadline will be October 15 or next business day. (10.11.8.1.5)
- Language in Section 10.11.8.3 (Work Term Placements) reflects updates that have been made or are being made to other co-op programs, including the new general co-op regulations in HSS.
- We are moving away from a single end of term report to a series of smaller reflective assignments during the term. (10.11.8.4.2b)
- The information in 10.11 .8 .4 b iii and iv are better suited to the course syllabus.
- 10.11.9 adds the statement that "Course patterns may vary. Students are encouraged to meet with the undergraduate coordinator early in their program in order to establish a course pattern that meets the requirements as set out in these regulations." This statement is meant to clarify that the patterns outlined here are recommended but not mandatory. This allows for flexibility for students who do not follow the typical pattern.


## Consultations

| Consultations Sought From | Comments Received |
| :--- | :--- |
| Humanities and Social Sciences | no |
| Education | yes |
| Engineering and Applied Science | yes |
| Grenfell Campus | no |
| Human Kinetics and Recreation | yes |
| Marine Institute | yes |
| Social Work | yes |
| Science |  |
| Biochemistry | yes |
| $\bullet$ Biology | yes |
| • Chemistry | no |
| $\bullet$ Earth Sciences | no |
| • Mathematics and Statistics | no |
| • Ocean Sciences | no |
| $\bullet$ Physics and Physical Oceanography | no |

The following e-mail was sent to Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library on October 17, 2017.

Hi,
Please find attached three sets of calendar changes from the Psychology department,

1) A request to change the course description for Psychology 2100.
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements for the Behavioural Neuroscience degree.

We would very much appreciate any feedback that you may have on these calendar changes.
Christina

## The following replies were received:

## Education (October 17, 2017)

Hello Christina,
Thank you very much for the opportunity to provide feedback on these calendar changes. The Faculty of Education does not have any concerns with these changes. However I do suggest one minor editorial change: in the third proposal regarding Chemistry 2440 , there is a ${ }^{* * *}$ note at the bottom of Tables 5 and 6 . I believe this note should be removed since it is no longer relevant.

Thank you,
Meghan
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs

Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020

Tel: 709 864-7554
Fax: 709 864-2623

## Reply to Education (October 17, 2017)

Thank you Meghan for catching that additional note. I will remove it from the proposal going forward.
Christina

## Engineering \& Applied Sciences:

Thank you for the opportunity to comment on your proposed Calendar changes re

1) A request to change the course description for Psychology 2100.
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements
for the Behavioural Neuroscience degree.
In its meeting yesterday, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

## Human Kinetics and Recreation (November 6, 2017):

Hi,
I have reviewed the proposed calendar changes from the Psychology Department and have no concerns.
Linda
Linda E. Rohr PhD
Associate Professor \& Associate Dean Undergraduate Studies
Human Kinetics and Recreation, Memorial University
t: 709.864.6202 f: 709.864.7531 e:lerohr@mun.ca
PE 2025

## Marine Institute:

Dear Christina,
Thank you for the opportunity to review and comment on three proposals for Calendar changes from the Psychology Department. These changes will have no impact on Marine Institute programs and we are happy to support all three proposals.

Regards,
Bev

Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

## School of Social Work (November 13)

Hello Christina,
Sorry about my delay in getting back to you. I have reviewed your proposed calendar changes and I do not have any suggestions.

The changes you propose do not impact the School of Social Work undergraduate programs.
Regards,

Heather

Heather J. Hair, PhD, RMFT, RSW<br>Associate Dean Undergraduate Programs<br>School of Social Work, Memorial University<br>St. John's, NL, Canada, A1C 5S7<br>T: 709-864-2562 or 709-864-7349

## $\underline{\text { Biochemistry ((October 1, 2017) }}$

## Hi Christina,

No concerns from Biochemistry on any of these.
VB

Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: $709864-2422$
homepage: http://www.faculty.mun.ca/vbooth/

## Biology (October 31, 2017):

Hi Christina,
The Biology undergraduate committee has met and reviewed the three calendar change proposals from your department:

1) Psychology 2100
2) Co-op program
3) Phasing out of chemistry courses.

We have no concerns with those proposed changes.
Best wishes,
Suzanne

## --

Dr. Suzanne Dufour
Associate Professor
Department of Biology
Memorial University of Newfoundland
St. John's, NL
A1B 3X9
Canada
Tel: (709) 864-8025
Fax: (709) 864-3018
http://www.mun.ca/biology/dufour/index.php

## Library:

Hello Christina,

The proposed changes will have no impact on library resources.
Alison

Alison Ambi<br>7098647125<br>Interim Head, Collections<br>Subject Librarian:<br>Earth Sciences<br>Computer Science<br>Mathematics and Statistics<br>Physics and Physical Oceanography<br>Psychology<br>QEII Library<br>Memorial University of Newfoundland<br>www.library.mun.ca

Library Report Received yes

Signature: Dean, Associate Vice-President (Academic) or Vice-President
Name
$\qquad$
FOR OFFICE USE ONLY
APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary: $\qquad$
Date:

## Version with Track Changes

# 10.11.8 Requirements for Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.), and Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only) 

## Psychology Co-op Program (PCOP)

The Psychology Co-op Program (PCOP) is available to full-time Psychology (B.A. and B.Sc.) and Behavioural Neuroscience Majors and Honours students only.

The PCOP provides an opportunity for students to learn valuable practical skills while working in fields related to Psychology. Students complete three Work Terms; which consist of full-time paid employment. The timing of the Work Terms is such that employers stand to gain from the acquired skills of psychology majors in training. The objectives of the Work Term component of the PCOP are embodied in the Work Term Descriptions.

### 10.11.8.1 Admission Requirements

1. Admission is limited, competitive, and selective.
2. The primary criterion criteria used in reaching decisions on applications for admission is-are motivation and overall academic achievementperformance. Students with average overall academic records are unlikely to be admitted.Students may be required to participate in an interview as part of the selection process.
3. Students must first be admitted to the Psychology (B.A. or B.Sc.) or Behavioural Neuroscience Major.
4. To be eligible for admission, students must have completed a minimum of 30 credit hours with an overall average of at least 65\%, and an average of at least $65 \%$ in all Psychology courses. Students must have a passing grade in all required courses, and must be registered for 15 additional credit hourshave full-time status in the semester in which they apply.
5. Applications are accepted in the fall semester only; students should consult the department for the specific application deadline. The deadline date for application is December 15 .

### 10.11.8.2 Program of Study

1. In addition to the requirements below students must fulfill all requirements for either a Major in Psychology (B.A.), a Major in Psychology (B.Sc.), Major in Behavioural Neuroscience, Honours in Psychology (B.A.), Honours in Psychology (B.Sc.), or Honours in Behavioural Neuroscience. Courses in each program are normally taken in blocks as shown in the appropriate program table. Students should consult with a faculty advisor each semester regarding course selection.
2. Students' status in the program is assessed at the end of each semester. To remain in PCOP, students must receive a passing grade in all required courses, and must maintain an average of at least $65 \%$ in all Psychology courses and a cumulative average of at least $65 \%$. A student who fails a required course, fails to maintain an average of $65 \%$ in Psychology courses, or fails to maintain a cumulative average of $65 \%$, will be required to withdraw from PCOP. The student in question may apply for readmission in a subsequent year after passing the specified required course(s) previously failed, or re-establishing the required average.
3. Students are required to complete three work terms. at the prescribed times.

### 10.11.8.3 Work Term Placement

1. General management of the work terms inthe PCOP is the responsibility of the designated Academic Staff Member in Co-operative Education (ASM-CE). ASM-CEs are to is-responsible for facilitating the engagement ofassisting potential employers to become involved in the program, organizing competitions for Work Term employment, arranging student employerjob interviews and facilities, managing the cooperative education program -data-base management, developing employment opportunities and monitoring students during the work termand for the continual development of employment opportunities. The ASM-CEs Co-operative Education will work with the department to counsel students, visit students on their work assignments and evaluate the work term.
2. Students are ultimately responsible for securing their work term placements. ASM-CEs provide support for the job search and inform students of potential opportunities. Work placement is not guaranteed but every effort is made to ensure that appropriate employment is made available. In the case of students Who are required to withdraw from the program, Co-operative Education has no responsibility for placement until they have been re-admitted to the program.
3. A student in the co-operative education who applies for admission to the co-op-program gives permission to the University to provide a copy of the applicant's resume, university transcript and work term evaluations to potential employers.
4. A student who is enrolled in a co-operative education program may independently obtain a work term placement in consultation with the ASM-CE. Such employment positions must satisfy the criteria for work terms, be confirmed in writing by the employer and be approved by the ASM-CE before the first day of the work term according to the University Diary.
5. Work terms are normally 12 weeks in duration, full-time and paid. Remuneration for work placements is determined by employers based on their internal wage structures. The start and end dates for the work term are shown in the University Diary.

- A student who has been accepted to PCOP may obtain his/her own work term placement outside the competition. Such employment positions must be confirmed by the employer, and must be approved by Go-operative Education.
- Students are expected to submit to Co-operative Education, within a month from starting a Work Term, a plan of the intended work that term.
- Salaries paid to co-operative students are determined by employers based on their internal wage structures. However, students should not expect the income from work terms to make them completely self-supporting.


### 10.11.8.4 Registration and Evaluation of Performance

1. In Work Terms I, II, and III, students must register for Psychology 199W, 299W, and 399W respectively.
2. Student performance evaluations are to be completed by the employer in conjunction with the student and returned to Co-operative Educationthe ASM-CE. The Work Term evaluations shall consist of at least two components:
a. On-the-job Student Performance: Job performance shall be-assessed by the ASM-CE Co-operative Education in consultation with the Department using information gathered during the Work Term and input from the employer towards the end of the Work Term. Formal written documentation from the employer shall be sought. Evaluation of the job performance will result in one of the following classifications: OUTSTANDING, EXCEEDS EXPECTATIONS, SATISFACTORY, OR FAIL
b. Work Term Assignment(s)
i. The Work Report
ii.i. Students are required to submit a-Work Term report-assignments as outlined in the course syllabus. to Co-operative Education on the first day of final exams.
iii.ii.

Work Term reports shall beassignments are evaluated by a faculty member and Co-operative Educationthe ASM-CE.
-If an employer designates a report to be of a confidential nature, both employer and Cooperative Education must agree as to the methods to protect the confidentiality of such a report before the report may be accepted for evaluation.
iii. Reports must contain original work related to the Work Term placement. The topic must relate to the work experience and will be chosen by the student in consultation with the employer. The topic must be approved by Co-operative Education or a faculty member of the Department of Psychology.
Evaluation of the work term reportassignment(s) will result in one of the following classifications: OUTSTANDING, EXCEEDS EXPECTATIONS, SATISFACTORY, OR FAIL.
c. The evaluation of the job performance and the work term assignmentsreport are recorded separately on the transcript. Overall evaluation of the work term will result in one of the following final grades being awarded:

- Pass with Distinction: Indicates OUTSTANDING PERFORMANCE in both the work term report assignment(s) and the job performance.
- Pass: Indicates that PERFORMANCE MEETS EXPECTATIONS in both the work term assignment(s) reportand the job performance.
- Fail: Indicates FAILING PERFORMANCE in the work term assignment(s) report or the job performance, or both.
To remain in PCOP, a student must obtain a final grade of PAS.

3. If a student fails to achieve the Work Term standards specified above, the student will be required to withdraw from PCOP. Such a student may reapply to the program, at which time the student will be required to repeat the Work Term with satisfactory performance. Only one Work Term may be repeated in the entire program.
4. In order to be considered for readmission, students must formally apply for readmission to the program not later than the deadline date specified in Admission Requirements.
5. A student who withdraws from a Work Term without acceptable cause subsequent to a job placement will be required to withdraw permanently from PCOP.
6. Students who drop a Work Term without prior approval from both Co-operative Educationthe ASM-CE and the Head of the Department of Psychology, or who fail to honour an agreement to work with an employer, or conduct themselves in such a manner as to cause their discharge from the job, will be awarded an overall grade of FAL for the Work Term in question and will be required to withdraw permanently from PCOP.
7. Permission to drop a Work Term does not constitute a waiver of degree requirements, and students who have obtained such permission must complete an approved Work Term in lieu of the one dropped.

### 10.11.9 Suggested Course Sequences

The tables below show suggested course sequences for the B.A. in Psychology (Co-operative), the B.Sc. in Psychology (Co-operative), the B.A. Honours in Psychology (Co-operative), the B.Sc. Honours in Psychology (Cooperative), the B.Sc. in Behavioural Neuroscience (Co-operative), and the B.Sc. Honours in Behavioural Neuroscience (Co-operative).

Course patterns may vary. Students are encouraged to meet with the undergraduate coordinator early in their program in order to establish a course pattern that meets the requirements as set out in these regulations.

Table 1 Suggested Course Sequence for B.A. in Psychology (Co-operative)
Term
Suggested Courses

| - Fall <br> - Semester 1 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1090 or the former English 1080 <br> - Mathematics 1000 or one of Mathematics 1090, 1050, 1051 <br> - Psychology 1000 |
| :---: | :---: |
| - Winter <br> - Semester 2 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - One of Mathematics $1000,1090,1050$ or 1051* <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - $\quad$ Spring | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Winter <br> - Semester 6 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| $\text { - } \quad \text { Spring }$ | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 4000-Level <br> - Psychology Selected Topics course |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Elective or Humanities and Social Sciences requirement <br> - Psychology 4000-Level <br> - Psychology Research Experience course |

*Psychology Majors are required to complete Mathematics 1000 or two of 1090, 1050, 1051(or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000 was taken in Semester 1.

Table 2 Suggested Course Sequence for B.Sc. in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 <br> - Chemistry 1010 (1050) or Physics 1020 (1050)* <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 <br> - Chemistry 1011 (1051) or Physics 1021 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Elective or Science requirement <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Winter <br> - Semester 6 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core |
| - Spring <br> - Work Term <br> 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 4000-Level <br> - Psychology Selected Topics |


| - Winter <br> - Work Term 3 | Psychology 399W |
| :---: | :---: |
| - Fall <br> - Semester 8 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 4000-Level <br> - Psychology Research Experience |
| - *Students re | stered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). |

Table 3 Suggested Course Sequence for B.A. (Honours) in Psychology (Co-operative)

| Term | Suggested Courses |  |
| :--- | :--- | :--- |
|  | $\bullet$ | Elective or Humanities and Social Sciences requirement |
| - Fall | - | Elective or Humanities and Social Sciences requirement |


|  |  | $\bullet$ |
| :--- | :--- | :--- |
| - | Elective or Humanities and Social Sciences requirement |  |
| - | Semester 7 | Psychology 3000-Level Core |
|  | -Psychology 4000-Level Core <br> Psychology Selected Topics course <br> - <br> - |  |
| - Winter | Psychology 499A |  |

*Psychology Majors are required to complete Mathematics 1000 or two of 1090, 1050, 1051(or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000 was taken in Semester 1.

Table 4 Suggested Course Sequence for B.Sc. (Honours) in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 <br> - Chemistry 1010 (1050) or Physics 1020 (1050)* <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 <br> - Chemistry 1011 (1051) or Physics 1021 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Elective or Science requirement <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - Biology, Chemistry, or Physics Lab Course <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology 3900 |


| - Winter <br> - Semester 6 | - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3000-Level Core <br> - Psychology Research Experience <br> - Psychology 4910 |
| :---: | :---: |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level <br> - Psychology Selected Topics <br> - Psychology 499A |
| - Winter <br> - Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 4000-Level Core <br> - Psychology 499B |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). |  |

Table 5 Suggested Course Sequence for B.Sc. in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Mathematics 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement $1^{* *}$ <br> - Chemistry 2440*** <br> - Elective or Science requirement <br> - Physics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Physics 1021 (1051) or Biology 1002 <br> - Mathematics 1001 or Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |


| - Spring <br> - Work Term 1 | Psychology 199W |
| :---: | :---: |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). <br> - **BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience (B.Sc. Only) <br> - $\quad * *$ Students may choose to instead take Chemistry 2400 and 2401 . These students should consult with the Psychology Undergraduate Advisor. |  |

Table 6 Suggested Course Sequence for B.Sc. (Honours) in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement 1** <br> - Chemistry 2440*** <br> - Elective or Science requirement |


|  | $\bullet$ | Physics 1020 (1050)* or Biology 1001 |
| :--- | :--- | :--- |
|  | $\bullet$ | Psychology 2520 or 2930 |
|  | Psychology 2910 |  |

## Proposal: Calendar Changes to Existing Programs

10.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only)
6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours
6.1.9 Biology and Psychology Joint Honours
6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

## Executive Summary

The Chemistry department is phasing out Chemistry 1010 and 1011 (Introductory Chemistry) and Chemistry 2440 (Organic Chemistry for Biologists). We are therefore deleting these courses from our programs.

## Resource Implications: Instructional Costs

None.

## Consultations

Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library

Library Holdings and/or Other Resources Required
None.

Signature of Unit Head (if appropriate): $\qquad$
Date:

Signature of Dean/Associate Vice-President (Academic)/Vice-President:

Date:

# SUMMARY PAGE FOR SENATE 

Approval Form

## Program Title

10.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only)
6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours
6.1.9 Biology and Psychology Joint Honours
6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

Calendar Change(s)
See attached

## Secondary Calendar Changes

None.

## Calendar Entry After Changes

### 10.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only)

Students completing this program cannot receive credit for Psychology 2920.
A program is offered in the Psychology Department to provide an education in Behavioural Neuroscience. Students planning to enroll in the program are advised to consult with the Head of the Department at the earliest opportunity because certain course choices may restrict later options. Students who intend to pursue graduate studies should take courses leading to the Honours degree.
The program for a Major in Behavioural Neuroscience shall include:
1.
a. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820.
b. Three credit hours in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750.
c. Any research experience course and one of Psychology 4250, 4251,4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
2.
a. Mathematics 1000 (or equivalent) and 1001.
b. Chemistry 1050 and 1051.
c. Physics 1020 (or 1050) and 1021 (or 1051).
d. Biology 1001 and 1002.
e. English 1090 or the former English 1080 and one of 1191 or the former 1101, 1192 or the former 1102,1193 or the former 1103, or 1110, or equivalent.
3. Eighteen credit hours from the following courses chosen from at least two different sciences:
a. Biochemistry: Any 2000-, 3000-, or 4000-level course except the former 2000, 2005, the former 2010, the former 2011, 3202, 3402, or 4502.
b. Biology: 2060, 2122, 2210, 2250, 2900, 3050, 3160, 3202, 3295, 3401, 3500, 3530, 3540, 3750, 4 $200,4241,4245,4250,4402$, the former $4450,4601,4605,4701$, the former 4900 (see note below).
c. Chemistry: 2100, 2210, 2301 (or the former Chemistry 2300), 2400, 2401, or any 3000 or 4000 level course.
d. Computer Science: Any 2000, 3000, or 4000 level course except the former 2650 and the former 2801.
e. Mathematics: $\mathbf{2 0 0 0}, \mathbf{2 0 5 0}, 2051,3000,3001$ or any 3000 or 4000 level pure or applied mathematics course.
f. Physics: Any 2000, 3000, or 4000 level course except 2151, 3150, 3151.

## Notes:

7. Credit may not be obtained for both Biology 3750 and Psychology 3750 or for both Biology 4701 and Psychology 4701.
8. The courses listed under Clause 3 may have prerequisites. It is the student's responsibility to ensure that all prerequisites have been met, or that waivers have been obtained, before registering for these courses.

Table 5 Suggested Course Sequence for B.Sc. in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1050 <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1051 <br> - English 1191 or the former 1101,1192 or the former 1102,1193 or the former 1103 , or 1110 <br> - Mathematics 1000 or Mathematics 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement 1** <br> - Elective or Science requirementPhysics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Physics 1021 (1051) or Biology 1002 <br> - Mathematics 1001 or Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall | - BHNR Requirement 5 |


| - Semester 7 | - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course |
| :---: | :---: |
| - Winter | Psychology 399W |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course |
| $\begin{array}{\|l} \hline \text { • } \end{array} \text { *Students regist }$ | isted in Physics 1050 must also be registered in Mathematics 1000 (not 1090). airement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience |

Table 6 Suggested Course Sequence for B.Sc. (Honours) in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1050 <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1051 <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement $1^{* *}$ <br> - Elective or Science requirement <br> - Physics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Mathematics 1001 or Elective or Science requirement <br> - Physics 1021 (1051) or Biology 1002 <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 <br> - Psychology 3900 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-level core <br> - Psychology 3820 |


| - Spring <br> - Work Term 2 | Psychology 299W |
| :---: | :---: |
| - Fall <br> - Semester 7 | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course <br> - Psychology 499A |
| - Winter <br> - Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course <br> - Psychology 499B |
| - *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). <br> - **BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience (B.Sc. Only). |  |

### 6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required:

1. Chemistry 1050 and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051), English 1090 or the former English 1080 and 1110.
2. Biochemistry $2100,2101,2600,3106,3203,4002,4300,4301,4502$, Medicine $310 \mathrm{~A} / \mathrm{B}$; one course chosen from:
Biochemistry 3105, 3107, 3108, 3202, 3402, 3600, 4101, 4103, 4104, 4105, 4200, 4201, 4210, 4211, 423 0-4249, Biology 3050, Chemistry 4701.
3. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251,4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
4. Either Biochemistry 499A/B or Psychology 499A/B.
5. Chemistry 2400, 2401 or Chemistry 2440.
6. Other courses to complete at least the prescribed minimum of 120 credit hours in courses for the Joint Honours Degree.

## Notes:

1. In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3., and 4. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations as outlined for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 6.1.9 Biology and Psychology Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.

The following forty courses (or equivalent) are required:

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of 3401, 3402, 4245, 4404; four Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology $1000,1001,2520,2910,2911,2930,3250,3800 ; 3900,4910$; one of the following: 3050, 3100, 3350, 3450, 3620, 3650; one further 4000 level Psychology research experience course.
3. Biology or Psychology 3750, 4701, 499A/B.
4. English 1090 or the former English 1080 and 1110; Mathematics 1000; Chemistry 1050, 1051, 2400, and 2401; Physics 1020 (or 1050) and 1021 (or 1051); Biochemistry 2101 and 3106.
5. Other courses, if necessary, to complete at least 120 credit hours of courses.

### 6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following forty courses (or equivalent) are required:

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of 3401, 3402, 4245, 4404; five Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology $1000,1001,2520,2910,2911,2930,3250,3800,3820,3900$; one further course in

Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251,4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
3. Biology or Psychology 499A/B.
4. Biochemistry 2101, 3106.
5. English 1090 or the former English 1080 and 1110; Mathematics 1000 and 1001; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1050, 1051, 2400, and 2401.
6. Other courses, if necessary, to complete at least 120 credit hours of courses.

## Note:

In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, OR average of $75 \%$ or higher in all the required courses listed in Clauses 1, 2, 3, and 4 above, except those at the 1000 level.

## Rationale

The Chemistry department is phasing out Chemistry 1010 and 1011 (Introductory Chemistry) and Chemistry 2440 (Organic Chemistry for Biologists). We are therefore deleting these courses from our programs.

## Consultations

| Consultations Sought From | Comments Received |
| :--- | :--- |
| Humanities and Social Sciences | no |
| Education | yes |
| Engineering and Applied Science | yes |
| Grenfell Campus | no |
| Human Kinetics and Recreation | yes |
| Marine Institute | yes |
| Social Work | yes |
| Science |  |
| Biochemistry |  |
| $\bullet$ Biology | yes |


| $\bullet$ Chemistry | no |
| :--- | :--- |
| $\bullet$ Earth Sciences | no |
| $\bullet$ Mathematics and Statistics | no |
| $\bullet$ Ocean Sciences | no |
| - Physics and Physical Oceanography | no |

The following e-mail was sent to Humanities and Social Sciences, Education, Engineering and Applied Science, Grenfell Campus, Human Kinetics and Recreation, Marine Institute, Social Work, Science, and the Library on October 17, 2017.

Hi,
Please find attached three sets of calendar changes from the Psychology department,

1) A request to change the course description for Psychology 2100.
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements for the Behavioural Neuroscience degree.

We would very much appreciate any feedback that you may have on these calendar changes. Christina

## The following replies were received:

## Education (October 17, 2017)

Hello Christina,
Thank you very much for the opportunity to provide feedback on these calendar changes. The Faculty of Education does not have any concerns with these changes. However I do suggest one minor editorial change: in the third proposal regarding Chemistry 2440 , there is a ${ }^{* * *}$ note at the bottom of Tables 5 and 6 . I believe this note should be removed since it is no longer relevant.

Thank you,
Meghan
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs

Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020

Tel: 709 864-7554
Fax: 709 864-2623

## Reply to Education (October 17, 2017)

Thank you Meghan for catching that additional note. I will remove it from the proposal going forward.
Christina

## Engineering \& Applied Sciences:

Thank you for the opportunity to comment on your proposed Calendar changes re

1) A request to change the course description for Psychology 2100.
2) A request to make some changes to the calendar description for the departmental co-operative program.
3) A request to remove Chemistry 1010, 1011, and 2440 from the requirements for the Behavioural Neuroscience degree.

In its meeting yesterday, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

Yours sincerely,
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

## Human Kinetics and Recreation (November 6, 2017):

Hi,
I have reviewed the proposed calendar changes from the Psychology Department and have no concerns.
Linda

Linda E. Rohr PhD<br>Associate Professor \& Associate Dean Undergraduate Studies<br>Human Kinetics and Recreation, Memorial University<br>t: 709.864.6202 f: 709.864.7531 e: lerohr@mun.ca<br>PE 2025

## Marine Institute:

Dear Christina,
Thank you for the opportunity to review and comment on three proposals for Calendar changes from the Psychology Department. These changes will have no impact on Marine Institute programs and we are happy to support all three proposals.

Regards,
Bev
Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

## School of Social Work (November 13)

Hello Christina,
Sorry about my delay in getting back to you. I have reviewed your proposed calendar changes and I do not have any suggestions.

The changes you propose do not impact the School of Social Work undergraduate programs.
Regards,
Heather
Heather J. Hair, PhD, RMFT, RSW
Associate Dean Undergraduate Programs
School of Social Work, Memorial University
St. John's, NL, Canada, A1C 5S7
T: 709-864-2562 or 709-864-7349

## Biochemistry ((October 1, 2017)

## Hi Christina,

No concerns from Biochemistry on any of these.
VB

Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
phone 709 864-4523 fax: 709 864-2422
homepage: http://www.faculty.mun.ca/vbooth/

## Biology (October 31, 2017):

Hi Christina,
The Biology undergraduate committee has met and reviewed the three calendar change proposals from your department:

1) Psychology 2100
2) Co-op program
3) Phasing out of chemistry courses.

We have no concerns with those proposed changes.
Best wishes,
Suzanne

Dr. Suzanne Dufour
Associate Professor
Department of Biology
Memorial University of Newfoundland
St. John's, NL
A1B 3X9
Canada

Tel: (709) 864-8025
Fax: (709) 864-3018
http://www.mun.ca/biology/dufour/index.php

## Library:

Hello Christina,
The proposed changes will have no impact on library resources.
Alison

Alison Ambi
7098647125
Interim Head, Collections

Subject Librarian:
Earth Sciences
Computer Science
Mathematics and Statistics
Physics and Physical Oceanography
Psychology
QEII Library
Memorial University of Newfoundland
www.library.mun.ca

Library Report Received

## Signature: Dean, Associate Vice-President (Academic) or Vice-President

Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary: $\qquad$
Date:

## Version with Track Changes

### 10.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only)

Students completing this program cannot receive credit for Psychology 2920.
A program is offered in the Psychology Department to provide an education in Behavioural Neuroscience. Students planning to enroll in the program are advised to consult with the Head of the Department at the earliest opportunity because certain course choices may restrict later options. Students who intend to pursue graduate studies should take courses leading to the Honours degree.
The program for a Major in Behavioural Neuroscience shall include:
1.
a. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820.
b. Three credit hours in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750.
c. Any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
2.
a. Mathematics 1000 (or equivalent) and 1001 .
b. Chemistry 1010 and 1011 (or 1050 and 1051), and 2440 (or 2400/2401).
c. Physics 1020 (or 1050) and 1021 (or 1051).
d. Biology 1001 and 1002.
e. English 1090 or the former English 1080 and one of 1191 or the former 1101,1192 or the former 1102,1193 or the former 1103, or 1110 , or equivalent.
3. Eighteen credit hours from the following courses chosen from at least two different sciences:
a. Biochemistry: Any 2000-, 3000-, or 4000-level course except the former 2000, 2005, the former 2010, the former 2011, 3202, 3402, or 4502.
b. Biology: 2060, 2122, 2210, 2250, 2900, 3050, 3160, 3202, 3295, 3401, 3500, 353 $0,3540,3750,4200,4241,4245,4250,4402$, the former 4450, 4601, 4605, 4701, the former 4900 (see note below).
c. Chemistry: $2100,2210,2301$ (or the former Chemistry 2300), 2400, 2401, or any 3000 or 4000 level course.
d. Computer Science: Any 2000, 3000, or 4000 level course except the former 2650 and the former 2801.
e. Mathematics: 2000, 2050, 2051, 3000, 3001 or any 3000 or 4000 level pure or applied mathematics course.
f. Physics: Any 2000, 3000, or 4000 level course except 2151, 3150, 3151.

## Notes:

7. Credit may not be obtained for both Biology 3750 and Psychology 3750 or for both Biology 4701 and Psychology 4701.
8. The courses listed under Clause 3 may have prerequisites. It is the student's responsibility to ensure that all prerequisites have been met, or that waivers have been obtained, before registering for these courses.
Table 5 Suggested Course Sequence for B.Sc. in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or Mathematics 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or Mathematics 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement $1^{* *}$ <br> - Chemistry $2440 * * *$ Elective or Science requirement <br> - Physics $1020(1050)^{*}$ or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Physics 1021 (1051) or Biology 1002 <br> - Mathematics 1001 or Elective or Science requirement <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| $\begin{array}{\|ll\|} \hline- & \text { Spring } \\ - & \text { Work Term } 1 \\ \hline \end{array}$ | Psychology 199W |
| - Fall <br> - Semester 5 | - BHNR Requirement 3 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-Level Core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - $\quad$ Semester 7 | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement |


|  | - Elective or Science requirement <br> - Psychology Research Experience course |
| :---: | :---: |
| - Winter <br> - Work Term 3 | Psychology 399W |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course |
| - $\begin{aligned} & \text { *Students regi } \\ & \text { Mathematics } 1 \\ & \text { - } \\ & \\ & \text { - Behavioural } \\ & \text { - } \\ & \quad * * \text { Students m } \\ & \text { consult with th }\end{aligned}$ | tered in Physics 1050 must also be registered in $000($ not 1090). <br> airement 1-6 specified in clause 3, Requirements for a Major in Neuroscience (B.Sc. Only) <br> ay choose to instead take Chemistry 2400 and 2401 . These students should e Psychology Undergraduate Advisor. |

Table 6 Suggested Course Sequence for B.Sc. (Honours) in Behavioural Neuroscience (Cooperative)

| Term | Suggested Courses |
| :---: | :---: |
| - Fall <br> - Semester 1 | - Biology 1001 or Physics 1020 (1050)* <br> - Chemistry 1010 (1050) <br> - English 1090 or the former English 1080 <br> - Mathematics 1090 or 1000 <br> - Psychology 1000 |
| - Winter <br> - Semester 2 | - Biology 1002 or Physics 1021 (1051) <br> - Chemistry 1011 (1051) <br> - English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 <br> - Mathematics 1000 or 1001 <br> - Psychology 1001 |
| - Fall <br> - Semester 3 | - BHNR Requirement 1** <br> - Elective or Science requirement <br> - Chemistry 2440*** <br> - Physics 1020 (1050)* or Biology 1001 <br> - Psychology 2520 or 2930 <br> - Psychology 2910 |
| - Winter <br> - Semester 4 | - BHNR Requirement 2 <br> - Mathematics 1001 or Elective or Science requirement <br> - Physics 1021 (1051) or Biology 1002 <br> - Psychology 2911 <br> - Psychology 2930 or 2520 |
| - Spring <br> - Work Term 1 | Psychology 199W |
| - Fall | - BHNR Requirement 3 |


| - Semester 5 | - Elective or Science requirement <br> - Psychology 3250 <br> - Psychology 3800 <br> - Psychology 3900 |
| :---: | :---: |
| - Winter <br> - Semester 6 | - BHNR Requirement 4 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology 3000-level core <br> - Psychology 3820 |
| - Spring <br> - Work Term 2 | Psychology 299W |
| - Fall <br> - Semester 7 | - BHNR Requirement 5 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Research Experience course <br> - Psychology 499A |
| - Winter <br> - Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| - Fall <br> - Semester 8 | - BHNR Requirement 6 <br> - Elective or Science requirement <br> - Elective or Science requirement <br> - Psychology Selected Topics course <br> - Psychology 499B |
| - *Students regis <br> Mathematics 1 <br> **BHNR Requ <br> Behavioural N <br> ***Students m censult with th | stered in Physics 1050 must also be registered in 000 (not 1090). <br> irement 1-6 specified in clause 3, Requirements for a Major in Neuroscience (B.Sc. Only). <br> ay choose to instead take Chemistry 2400 and 2401 . These students should e Psychology Undergraduate Advisor. |

### 6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required:

1. Chemistry 1010 and 1011 (or 1050 , and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051), English 1090 or the former English 1080 and 1110.
2. Biochemistry $2100,2101,2600,3106,3203,4002,4300,4301,4502$, Medicine $310 \mathrm{~A} / \mathrm{B}$; one course chosen from:
Biochemistry $3105,3107,3108,3202,3402,3600,4101,4103,4104,4105,4200,4201$, 4210, 4211, 4230-4249, Biology 3050, Chemistry 4701.
3. Psychology $1000,1001,2520,2910,2911,2930,3250,3800,3820,3900$, one further course in Psychology chosen from the
following: $3050,3100,3350,3450,3620,3650,3750$; any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
4. Either Biochemistry 499A/B or Psychology 499A/B.
5. Chemistry 2400,2401 or Chemistry 2440.
6. Other courses to complete at least the prescribed minimum of 120 credit hours in courses for the Joint Honours Degree.

## Notes:

1. In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3., and 4. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations as outlined for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 6.1.9 Biology and Psychology Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following forty courses (or equivalent) are required:

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of $3401,3402,4245,4404$; four Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800; 3900, 4910; one of the following: 3050, $3100,3350,3450,3620,3650$; one further 4000 level Psychology research experience course.
3. Biology or Psychology 3750, 4701, 499A/B.
4. English 1090 or the former English 1080 and 1110; Mathematics 1000; Chemistry _1010 and 1011 (or 1050, and 1051), and 24402400, and 2401; Physics 1020 (or 1050) and 1021 (or 1051); Biochemistry 2101 and 3106.
5. Other courses, if necessary, to complete at least 120 credit hours of courses.

### 6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920. The following forty courses (or equivalent) are required:

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of $3401,3402,4245,4404$; five Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900; one further course in Psychology chosen from the following: $3050,3100,3350,3450,3620,3650,3750$; any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
3. Biology or Psychology 499A/B.
4. Biochemistry 2101, 3106.
5. English 1090 or the former English 1080 and 1110; Mathematics 1000 and 1001; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry _ 1010 and 1011 (or 1050, and 1051), and 2440 (or 2400, and 2401).
6. Other courses, if necessary, to complete at least 120 credit hours of courses.

## Note:

In accordance with Clause 6.a. of the Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " $B$ " or better, OR average of $75 \%$ or higher in all the required courses listed in Clauses 1, 2, 3, and 4 above, except those at the 1000 level.

# Proposal <br> Calendar Changes to Existing Courses: Science 1000, 1001, 1150, 1151 

## Executive Summary

We propose to delete Science 1000, 1001, 1150 and 1151.

## Resource Implications: Instructional Costs

There will be no new resources required.

## Consultations

Consultations were sought from Grenfell Campus and the Marine Institute, as well as from the other academic units on the St. John's campus and internal to the Faculty of Science.

The Faculty of Science had several preliminary consultations with the Faculty of Education and with College of the North Atlantic, as the proposed course deletions have implications for their programs. The Faculty of Education is in the process of revising its B.Ed. (Primary/Elementary) entry requirements which would be affected by these changes. We have consulted with CNA because of an existing MOU on college-university transfer of Science courses. CNA expressed some concerns about finding other course options for weaker students.

## Library Holdings and/or Other Resources Required

None.
As indicated in the attached memo from Alison Ambi, Collections Librarian, these changes will have no impact on library resources.

Signature of Dean:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Course Number and Title

Science 1000: Introduction to Science I
Science 1001: Introduction to Science II
Science 1150: Introduction to Physical and Life Sciences
Science 1151: Introduction to Physical and Life Sciences

## Calendar Changes

Under the Faculty of Science, page 565, 2017-2018 Calendar, 11.12 Science Courses, delete the entries for Science 1000, Science 1001, Science 1150 and Science 1151 as follows:
"1000 Introduction to Science I is a liberal science course for Humanities and Social Sciencesstudents, which reflects the way scientists think and work through historical, philosophical and social considerations of the environment we live in. Typical course content includes: the concepts of matter, motion and energy; the chemical basis for life and the interdependence of organisms; and the abundance and distribution of the Earth's natural resources.

UL: may not be used to fulfill any of the Science course requirements for the Honours and General Degrees in Science

1001 Introduction to Science II is continuation of Science 1000.
PR: Science 1000
UL: may not be used to fulfill any of the Science course requirements for the Honours and General Degrees in Science

1150 Introduction to Physical and Life Sciences (formerly Science 115A) is an introduction to some concepts in the Physical and Life Sciences. This course is primarily intended for the nonscience major (Bachelor of Arts; Bachelor of Education (Primary/Elementary)).

CR: the former Science 115A
LH: 3
PR: Science 1807
UL: not acceptable as a prerequisite for 2000 level courses in Physics, Chemistry, Biology, Geography or Earth Sciences

1151 Introduction to Physical and Life Sciences (formerly Science 115B) is an introduction to some concepts in the Physical and Life Sciences. This course is primarily intended for the nonscience major (Bachelor of Arts; Bachelor of Education (Primary/Elementary)).

CR: the former Science 115B
LH: 3

PR: Science 1807
UL: not acceptable as a prerequisite for 2000 level courses in Physics, Ghemistry, Biology, Geography or Earth Sciences"

## Secondary Calendar Changes

Under the Faculty of Education, page 109, 2017-2018 Calendar, 8.5 Bachelor of Education (Primary/Elementary) as a First Degree, amend Regulation 3(d) as follows:
"d. The former Science 1150 and 1151; or 9 credit hours from 3 separate Science areas. The science areas are: Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Science, Physics; or a Focus Area in Science;"

Under the Faculty of Education, page 110, 2017-2018 Calendar, 8.6 Bachelor of Education (Primary/Elementary) as a Second Degree, amend the fourth bullet point under Regulation 3(c) as follows:
"* The former Science 1150 and 1151 or 6 credit hours in science in any combination to be chosen from: Biochemistry, Biology, Chemistry, Earth Sciences, Environmental Science, Physics. It is recommended that applicants have 9 credit hours in Science."

## Rationale

Science 1000, 1001, 1150 and 1151 are general introductory science courses intended for nonscience majors. Enrolment in the courses has declined in recent years, from 469 registrations in 20102011 to 182 registrations in 2016-2017. SC 1001 has not been offered in recent years. As elective courses aimed at non-science majors, SC 1000, 1001, 1150, 1151 are not essential to the core academic requirements of the Faculty of Science as specified in its Strategic Plan. The courses are not required for any academic program in the University. SC 1150 and 1151 are ineligible as prerequisites for entry into second year courses in Physics, Chemistry, Biology, Geography or Earth Sciences. SC 1000 cannot be used to fulfil a Science course requirement for any of the Majors or Honours Degrees in Science.

## Consultations Sought From

Business Administration
Education
Engineering and Applied Science
Grenfell Campus
Humanities and Social Sciences
Human Kinetics and Recreation
Marine Institute
Medicine
Music
Nursing
Pharmacy
Social Work

## Comments Received

No
Yes
Yes
Yes
No
Yes
Yes
Yes
No
No
Yes
No

Library Yes
Faculty of Science, Department of:
Biochemistry
Yes
Biology
No
Chemistry
No
Computer Science No
Earth Sciences No
Mathematics and Statistics No
Ocean Sciences
Physics and Physical Oceanography Psychology

Yes
Yes

Library Report Received Yes

Approved by Dean:
Dr. Mary Courage

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## APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary: $\qquad$
Date: $\qquad$

## Appendix: Consultations

## Consultation request:

From: Andy Foster<br>Sent: Monday, October 30, 2017 2:29 PM<br>Subject: FW: Calendar Change consultation: Science course deletions

Good afternoon,

Attached is a proposed Calendar change to delete the courses Science 1000, 1001, 1150 and 1151.
If you have any comments on this proposal, we would appreciate receiving your responses no later than Monday, November 27th. Comments can be sent directly to me at afoster@mun.ca.

Thank you,
Andy

DR. ANDY FOSTER \| ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155

## Responses

## Education

Hello Meghan,

Thank you for the kind response. We deeply appreciate the professionalism and understanding attitude of the Faculty of Education in our consultations while this proposal was being considered in its early stages. The effect of the Science 1150/1151 course deletions on the entry requirements for the Bachelor of Education (Primary/Elementary) was of considerable concern to us. The current proposal from the Faculty of Education to modify these entry requirements is gratefully acknowledged.

All the best,
Andy

DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155

Hello Dr. Foster,
Thank you very much for the opportunity to provide formal feedback on the Faculty of Science Calendar change proposal to remove Science $1000,1001,1150$, and 1151 . As well, thank you very much for consulting with the Faculty of Education in preparation of this proposal. This allowed us time to also review our science admission requirements and adjust them as necessary.

The Faculty of Education approves the secondary calendar change as noted in your proposal. We would like to note that the Faculty of Education is currently circulating a proposal for consultation to change this section of the calendar so the
word "former" should be added to the adjusted section found in our proposed calendar change once both proposals have received final approval.

All the best,
Meghan
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020

Tel: 709 864-7554
Fax: 709 864-2623
www.mun.ca/educ

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## Engineering and Applied Science

Thank you for the opportunity to comment on your proposals to revise the Faculty of Science General Regulations and for the deletion of Science 1000, 1001, 1150 and 1151.

In its meeting on Wed. Nov. 15, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found that these changes will have no impact on our programs.

We do note one minor typo in the existing regulations: 13.4 Computer Science, list of undergraduate programs: In item 11 the second instance of the word "Honours" should be deleted.

Yours sincerely,
---

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5

On 2017-10-27 16:30, Bishop, Nancy wrote:

## Greetings,

Attached is a proposed set of Calendar changes to update and revise
the general regulations for the Faculty of Science.
If you have any comments on this proposal, we would appreciate
receiving your responses no later than FRIDAY, NOVEMBER 24TH. Comments
can be sent to Shannon Sullivan at shannon@mun.ca."
Thank you,
Andy
DR. ANDY FOSTER \| ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155

## Grenfell Campus:

## School of Science and the Environment

From: Dean - School of Science and the Environment [mailto:ssedean@grenfell.mun.ca]
Sent: November-18-17 11:14 AM
To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca)
Subject: Re: Calendar Change consultation: Science course deletions

Dear Nancy,
The request for feedback on the Science course deletions was circulated among the program chairs within the School of Science and the Environment (SSE). There seems to be no impact on the SSE.
Kind regards,
Michele

MICHELE PIERCEY-NORMORE, Ph.D. | PROFESSOR AND DEAN
School of Science and the Environment
Grenfell Campus, Memorial University of NL
20 University Drive
Corner Brook, NL | A2H 5G4
T 7096377166
grenfell.mun.ca

## School of Arts and Social Science

From: Robinson, Laura [mailto:Irobinson@grenfell.mun.ca] Sent: November-04-17 12:05 PM To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca) Subject: RE: Calendar Change consultation: Science course deletions

Hi Nancy,
These changes seem fine with the School of Arts and Social Science at Grenfell.

Best,
Laura

LAURA ROBINSON | DEAN
School of Arts and Social Science
20 University Drive
Grenfell Campus, Memorial University
Corner Brook, Newfoundland A2H 5G4 709.637.7660

## GRENFELL CAMPUS <br> UNIVERSITY

We acknowledge that the land on which we gather is in traditional Mi'kmaw territory, and we acknowledge with respect the diverse histories and cultures of the Beothuk, Mi'kmaq, Innu and Inuit of this province.

## School of Fine Arts

From: Hennessey, Todd [mailto:THENNESSEY@grenfell.mun.ca] Sent: November-03-17 1:50 PM To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca) Subject: RE: Calendar Change consultation: Science course deletions

Thanks for sending this info. The School of Fine Arts has nothing substantive to add, except to say the rationale seems entirely reasonable.

Cheers, Todd

TODD HENNESSEY, PhD (Birmingham) | DEAN
School of Fine Arts
Grenfell Campus, Memorial University
Corner Brook, Newfoundland 709.637.6277
www.grenfell.mun.ca
 CAMPUS

## Human Kinetics and Recreation

Hi Andy,
No concerns from HKR regarding the deletion of Science 1000, 1001, 1150 and 1151.
Thanks,

Linda

Linda E. Rohr PhD
Associate Professor \& Associate Dean Undergraduate Studies
Human Kinetics and Recreation, Memorial University
t: 709.864.6202 f: 709.864.7531 e:lerohr@mun.ca
PE 2025

## Marine Institute

Dear Andy,

Thank you for the opportunity to review and comment on the proposal to delete the courses Science 1000, 1001, 1150 and 1151. This will have no impact on Marine Institute programs and we support this proposal.

Regards,
Bev

Bev Fleet
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0369
FAX: 709-778-0535
Bev.Fleet@mi.mun.ca

## Medicine

From: cvardy@mun.ca [mailto:cvardy@mun.ca]
Sent: November-08-17 11:00 AM
To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca)
Subject: FW: Calendar Change consultation: Science course deletions
The Faculty of Medicine is supportive of the proposal to delete the science courses 1000, 1001, 1150 and 1151.

Regards

Cathy Vardy, MD, FRCPC
Vice Dean and Professor of Pediatrics
Faculty of Medicine
Health Sciences Centre, M2M319
Memorial University of NL

Tel: 709-864-6417
Fax: 709-864-6336

From: Steele, Dr. Margaret: Dean of Medicine
Sent: Monday, October 30, 2017 9:29 PM
To: Vardy, Cathy [cvardy@mun.ca](mailto:cvardy@mun.ca)
Subject: FW: Calendar Change consultation: Science course deletions

## Pharmacy

Hi Andy,

The School of Pharmacy is not impacted by the proposed course deletions.
Thanks,
Leslie

DR. LESLIE PHILLIPS
ASSOCIATE DEAN UNDERGRADUATE STUDIES
PROFESSOR | MUN SCHOOL of PHARMACY
Joint Appointment | MUN FACULTY of MEDICINE/Psychiatry
Clinical Pharmacotherapy Specialist |EASTERN HEALTH

Health Sciences Centre
300 Prince Philip Dr \| St. John's, NL | A1B 3V6
Ph: 709-777-8299
Fax: 709-777-7044

## Library

Hello Andy, These proposed changes will have no impact on library resources.
Alison

## Alison Ambi

7098647125
Interim Head, Collections

## Subject Librarian:

## Earth Sciences

Computer Science
Mathematics and Statistics
Physics and Physical Oceanography
Psychology

QEII Library<br>Memorial University of Newfoundland<br>www.library.mun.ca

How Should Memorial University Libraries Change?
Winn ww. library.mun.ca/stratplan
From: Cleyle, Susan Sent: November-01-17 7:53 PM To: Ambi, Alison
[aambi@mun.ca](mailto:aambi@mun.ca) Cc: Pitcher-March, Jackie [jpmarch@mun.ca](mailto:jpmarch@mun.ca) Subject: FW: Calendar
Change consultation: Science course deletions

## Biochemistry

This change is fine from Biochemistry's point-of-view.
Valerie

```
Valerie Booth
Professor
Deputy Head (undergraduate) Department of Biochemistry and
Department of Physics and Physical Oceanography
Memorial University of Newfoundland
St. John's, NL, A1B 3X9, Canada
```

phone 709 864-4523 fax: 709 864-2422

## Ocean Sciences

Thank you, Garth. And thanks to undergraduate studies committee for the careful reading of the proposal and discovering the typo in the Calendars changes.

All the best,
Andy

DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155
From: Fletcher, Garth
Sent: October-30-17 3:41 PM
To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca)
Subject: RE: Calendar Change consultation: Science course deletions

Hi Nancy, the Department of Ocean Sciences
has no reservations concerning the proposed changes.
Regards
Garth

Hi Andy, As you can see from Annie's note below our undergraduate studies committee did review the proposed changes and did not have concerns about them. However Annie did make some suggestions for changes to the document.

Best regards
Garth

From: Annie Mercier [mailto:amercier@mun.ca]
Sent: November-10-17 9:41 AM
To: Fletcher, Garth [fletcher@mun.ca](mailto:fletcher@mun.ca)
Subject: Re: FW: Calendar Change consultation: Science course deletions
Hi Garth:
We did not have much concerns, but I did annotate the document with what we highlighted.
Cheers,
Annie

Annie Mercier, PhD<br>Professor and Deputy Head,<br>Department of Ocean Sciences<br>Memorial University (Ocean Sciences Centre)<br>St. John's, NL, Canada, A1C 5S7<br>Tel: (709) 864-2011<br>Email: amercier@mun.ca<br>www.mun.ca/osc/amercier/bio.php

On 30/10/2017 3:39 PM, Fletcher, Garth wrote:
Great, thanks Annie.
Regards
Garth

From: Annie Mercier [amercier@mun.ca]
Sent: Monday, October 30, 2017 3:38 PM
To: Fletcher, Garth
Subject: Re: FW: Calendar Change consultation: Science course deletions
Yes I sent it out for the committee's feedback / approval.
Cheers,
Annie
On 30/10/2017 3:23 PM, Fletcher, Garth wrote:
Hi Annie, would you like our committee to look at these changes?

Regards
Garth
From: Fletcher, Garth
Sent: October-30-17 3:41 PM
To: Bishop, Nancy [nlbishop@mun.ca](mailto:nlbishop@mun.ca)
Subject: RE: Calendar Change consultation: Science course deletions

Hi Nancy, the Department of Ocean Sciences
has no reservations concerning the proposed changes.
Regards
Garth

## Physics and Physical Oceanography

Hi Ivan,

Thank you very much for your thoughtful feedback on the proposed deletions of Science 1000/1, 1150/51.

The Faculty of Education currently is proposing to change its entry requirements in its Bachelor of Education (Primary/Elementary) as a First Degree program from "Science 1150 and 1151; or nine credit hours from 3 separate Science areas" to "nine credit hours from three separate Science areas, 6 credit hours of which must have a laboratory component". Furthermore, its current proposal to change entry requirements in its Bachelor of Education (Primary/Elementary) as a Second Degree program is from "Science 1150 and 1151; or six credit hours in science" to "nine credit hours from three separate Science areas, 6 credit hours of which must have a laboratory component". It is a strengthening of the Science component of the entry requirements and will serve to enhance the exposure to science and science laboratory skills in future primary and elementary teachers. Some departments in the Faculty of Science have quite recently introduced general introductory courses in their subject areas. This is an opportunity for the departments in the Faculty of Science to consider the viability of such courses for non-Science majors.

Unfortunately, the Faculty of Science has limited resources. The decision to propose the deletion of these courses was not solely a financial one but we do need to weight the costs of eliminating these courses versus the alternative of not being able to fully support our core B.Sc. programs. The enrolment of students in 1150 and 1151 may not seem particularly low, but it has declined in recent years, and is nowhere near the average enrolment in first year courses in the Faculty of Science.

Cheers,
Andy

DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155

Dear Andy,
Thank you for the opportunity to comment on the deletions of Science 1000, 1001, 1150 and 1151.
We are supportive of the deletions of Science 1000 and 1001, especially since 1001 has not been offered in so long. However, we do note the resulting reduction in science course offerings for non-science majors.

We are more concerned about the deletion of Science 1150 and 1151 , courses which seem very well tailored to preparing primary/elementary school teachers who have non-science backgrounds. It would be a shame to lose the significant laboratory component and the breadth of topics offered in this two-course sequence. From our perspective, having future teachers pass these courses would ensure exposure to physics, which might otherwise slip through the cracks.

The enrolment of 180 or so students over the three courses $(1000,1150,1151)$ does not seem to us to be particularly low.

On a related note, members of our Undergraduate Studies Committee have expressed some lament over their own experience with a perceived general lack of exposure to science in primary and elementary teachers. If there is indeed a relative lack of science graduates becoming primary and elementary teachers, it would be prudent to know whether there is a structural reason for it.

Best regards, Ivan

Ivan Saika-Voivod, Associate Professor
Chair, Undergraduate Studies Committee
Department of Physics and Physical Oceanography, Memorial University of Newfoundland St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

On 2017-10-30, at 4:39 PM, Physics Head wrote:

Hi Ivan and Rick.
For your consideration. I support these deletions. Jolanta

Thank you, Andy.

This should be enough for now. I'll email Oscar directly if necessary.

Thanks again, Ivan

Ivan Saika-Voivod, Associate Professor Department of Physics and Physical Oceanography, Memorial University of Newfoundland St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

Hi Ivan,
The syllabi for Science 1150 and 1151 are attached here. I obtained them from the current course instructor, Sheldon Huelin.

The Science 1000 course is not being taught this year. Last year's Science 1000 course instructor, Oscar Meruvia-Pastor, is away on sabbatical so it may take some time to track down the syllabus for that course. Do you still want it?

Science 1001 has not been taught for more than ten years. Would you like me to try to locate an old syllabus for that course?

Thanks,
Andy

DR. ANDY FOSTER \| ASSOCIATE DEAN OF SCIENCE
(Administration \& Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155

Hi Ivan,
The Calendar course descriptions in the Science section of the Calendar (and are shown in the Calendar Change section of the proposal) but they do not have specific information on the topics covered in recent offerings of the courses. I will ask the course instructor to send you the recent course syllabi.

```
Andy
DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration & Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155
```

Dear Andy,

To help us provide feedback on the deletions of Science 1000, 1001, 1150 and 1151 , could you please send us the course outlines for these courses.

Thank you, Ivan

Ivan Saika-Voivod, Associate Professor Chair, Undergraduate Studies Committee
Department of Physics and Physical Oceanography, Memorial University of Newfoundland St. John's, NL, Canada, A1B 3X7
Phone: (709) 864-8886 Fax: (709) 864-8739 Room C3026

## Proposal

# Calendar Changes to Existing Program: Faculty of Science General Regulations 

## Executive Summary

We propose to update and revise the regulations governing the Faculty of Science, and particularly those concerning the General and Honours Degrees of Bachelor of Science. Most of these revisions are editorial in nature, but they also include: (a) the replacement of the existing requirement of six credit hours in English with a new requirement of six credit hours in Critical Reading and Writing courses, consistent with the corresponding requirement for the Bachelor of Arts; (b) the formal definition of a Bachelor of Science as requiring a minimum of 120 credit hours rather than exactly 120 credit hours; (c) a stronger residency requirement for the General Degree; and (d) increased flexibility with regards to credit hour requirements from the subject(s) of Major/Minor in the composition of all programs.

## Resource Implications: Instructional Costs

There are no direct resource implications inherent in this proposal. Some elements of the present document could lead to the proposal by individual departments of additional Calendar changes with resource implications, but this would be addressed in the relevant proposals should they arise.

## Consultations

Consultations took place in two phases. An early draft of the proposal was informally distributed to all departments within the Faculty of Science during Winter 2017. The responses received at this stage facilitated preliminary discussion within the Faculty of Science Committee on Undergraduates Studies and helped guide the version of the proposal which was subsequently circulated for formal feedback. During the formal phase of consultation, responses were received from Grenfell Campus (School of Science and the Environment), the Faculty of Education, the Faculty of Engineering and Applied Science, the Faculty of Medicine, the School of Human Kinetics and Recreation, and the School of Pharmacy; within the Faculty of Science, responses were received from the Department of Chemistry, the Department of Earth Sciences and the Department of Physics and Physical Oceanography. These responses can be found in Appendix A (page 128). At In addition, advice was sought at this stage from the Calendar Editor.

Of note, the School of Science and the Environment inquired as to the mechanism for creating Critical Reading \& Writing (CRW) courses within the Faculty of Science. In the first instance, it is intended that Science students will avail of CRW courses offered by the Faculty of Humanities and Social Sciences and/or by Grenfell Campus. However, the Faculty of Science will work towards developing formal regulations to address this option.

## Library Holdings and/or Other Resources Required

As indicated in the attached memo from Alison Ambi, Collections Librarian, these changes will not require additional library holdings.

Signature of Dean:

Date:

# SUMMARY PAGE FOR SENATE 

## Approval Form

## Program Title

Faculty of Science

## Calendar Change(s)

See pages 9 to 53 .

## Secondary Calendar Changes

See pages 54 to 57 .
Calendar Entry After Changes
See pages 58 to 127.

## Rationale

The regulations governing the Faculty of Science have not been thoroughly reviewed since the former Faculty of Arts and Sciences was split into the Faculty of Arts and the Faculty of Science in the early 1970s. In recent years, a number of issues with the existing regulations have been observed, including various instances of inconsistency, anachronism and ambiguity. Simultaneously, the Faculty of Science Committee on Undergraduate Studies has debated several substantive changes to the regulations, most notably with regards to the existing English requirement, which fell out of step with the requirements for the Bachelor of Arts when the Faculty of Humanities and Social Sciences conducted its own regulatory overhaul in 2014. The present document unifies all of this into a single Calendar change proposal.

Most of the revisions proposed herein are editorial in nature, designed with the aim of improving readability, maintaining consistency (both internally and with the General Academic Regulations), and ensuring that current practices are accurately reflected. This rationale will not attempt to address every change of wording, but we will strive to justify any amendments with substantive implications.

To assist in the navigation of this document, Appendix B (page 136) provides a chart which maps the existing Faculty of Science regulations to the proposed revised regulations. Appendix C (page 139) provides additional background on the current composition of programs in the Faculty of Science.

## Overall Organisation

No changes are proposed to the first four sections of the Faculty of Science chapter of the Calendar (the unnumbered Personnel section, Section 1 The Memorial University of Newfoundland Code, Section 2 Student Code of Conduct, Section 3 Faculty Description). We then propose to bring forward the current Section 7 Degree Regulations to become Section 4, in order to ensure that no program information appears before the regulations which govern it. The other programs leading to a Bachelor of Science which are affiliated with the Faculty of Science then more naturally follow this section, such that the current Section 4 Bachelor of Science in Nutrition (Dietetics Option), Memorandum of Understanding (MOU) between Memorial University of Newfoundland Acadia University becomes Section 5 (with its title abbreviated), while the current Section 5 Joint Degrees of Bachelor of Science and Bachelor of Arts becomes Section 6. We then propose to promote the current Section 7.2 Limited Enrolment Courses and Section 7.3 Regulations to Govern Supplementary Examinations in the Departments of Biochemistry, Computer Science, and Mathematics and Statistics to become new Sections 7 and 8, respectively, since they are out of place in their current positioning under Degree Regulations. The current Section 7 Waiver of Regulations for Undergraduate Students and Section 8 Appeal of Decisions are combined into a single Section 9. The current Section 6 Joint Programs is then repositioned and renamed as Section 10 Joint Program Regulations so that it is positioned adjacent to the current Section 10 (now Section 11) Program Regulations. Finally, Section 11 (now Section 12) Course Descriptions retains its position at the end of the chapter and is unchanged.

## 4 Degree Regulations

### 4.1 Programs in the Faculty of Science

The proposed Section 4.1 is largely new. We felt it was useful and appropriate to begin with an overview of the programs which the Faculty offers to students (unlike the current Calendar, which begins by describing admissions criteria for the General Degree). Of note:

- General Degrees and Honours Degrees are broken down into three primary components: Core Requirements, a Program of Study, and Electives. This makes explicit the current structure of these degrees, and enables each of the three components to be easily referenced elsewhere in the regulations.
- Programs leading to a General Degree or Honours Degree of Bachelor of Science are now described as requiring a "minimum" of 120 credit hours, rather than precisely 120 credit hours. This better aligns the Degree Regulations with the language used in many of the specific Program Regulations, and furthermore addresses existing issues in which students who require more than 120 credit hours to complete all program requirements are forced to seek a waiver in order to graduate (or are accommodated by cumbersome additional Calendar regulations), and in which the requirements of certain programs prevent students from completing a minor. It also accounts for the lone remaining 135 credit hour Joint Honours program (in Biology and Earth Sciences).
- The list of subject areas available as Major or Minor subjects is enhanced from the corresponding list in the current Calendar, with "Ocean Sciences" added to the list to reflect the Major and Minor programs which that department has recently introduced.


### 4.2 Admission

The proposed Section 4.2 brings together all of the admission regulations, which are currently spread across Sections 7.1 (for the General Degree), 7.4 (for the Minor program) and 7.5 (for the Honours Degree). Of note:

- The existing ability of students to declare themselves as Science students prior to declaring a Major is made explicit.


### 4.3 Core Requirements and Academic Advising

The proposed Section 4.3 establishes the set of courses which is a required component of all General and Honours Degrees. By clearly labelling this set of courses, we are able to refer them as such elsewhere in the Degree Regulations (for example, under Section 4.2 Admission) which reduces repetition in the text.

A significant change to the Bachelor of Science regulations is proposed within this section. During the preparation of these revisions, the Faculty of Science Committee on Undergraduate Studies was simultaneously re-examining the question of the appropriateness of the Faculty's requirement of six credit hours in English courses. This has been a longstanding point of contention within the Committee (and amongst members of the Faculty of Science as a whole), and the discussion was reignited by the decision of the Faculty of Humanities and Social Sciences in 2014 to replace its corresponding regulation with a more flexible requirement for six credit hours in designated Critical Reading and Writing (CRW) courses, including at least three credit hours in English. Over a period of several years, the Committee considered various alternatives, such as the introduction of an English course specifically targeted at Science students; ultimately, however, the Committee felt that it would be most appropriate to follow the lead of the Faculty of Humanities and Social Sciences, and asked that such an amendment be integrated into the present document. Note that departments could still designate specific CRW courses as requirements for their students, should they wish to do so; hence, for example, a department could continue to require two English courses if that is deemed an appropriate departmental regulation. By default, we have assumed that all programs in the Faculty of Science will adopt the revised requirement; the lone exception is the Joint Major in Economics (Co-operative) and Statistics, in recognition of the fact that the Major in Economics (Co-operative) itself continues to require two English courses for both Bachelor of Arts and Bachelor of Science candidates.

### 4.4 Program of Study for the General Degree of Bachelor of Science

The proposed Section 4.4 sets out the framework under which departmental regulations for a specific Major program should operate. Of note:

- At present, the distinction between Joint Major and Double Major programs is unclear in the regulations. These revisions would make it explicit that a student who declares two Majors for which a Joint Major exists would follow the program regulations for that Joint Major, whereas if no such Joint Major exists then they would be expected to complete the requirements for each of the respective Majors (that is, a Double Major).
- The current regulations stipulate that the General Degree should include 36 to 45 credit hours in the Major subject. No formal regulations exist in the case of a Joint Major program, although it would seem natural to simply apply the same requirements to each Major subject. However, there already exist programs which do not meet these requirements, particularly in highly interdisciplinary departments such as Biochemistry and Ocean Sciences. Furthermore, the Department of Mathematics and Statistics has asked for flexibility in requiring that its majors take more than 45 credit hours in courses from the Major subject, in recognition of the fact that - unlike most other units - its programs require very few courses outside of the Major department. Initial discussions made it clear that departments did not generally support a wholesale loosening of these regulations. However, the Faculty of Science Committee on Undergraduate Studies agreed that it would be appropriate to acknowledge these requirements as being subject to waiver when a suitable rationale is submitted by the department(s) proposing the program. The revised language therefore acknowledges this possibility, and now describes the 36 to 45 credit hour range as the "normal" parameters for a Program of Study.
- The regulations currently require that at least 12 credit hours in courses from each Major subject be completed at Memorial (although this is currently found only in a Note to Regulation 7.4, and is framed solely in the context of a student with a single Major). However, the Faculty of Science Committee on Undergraduate Studies has proposed that this regulation be strengthened to require the completion at Memorial of a minimum of 15 credit hours in courses from each Major subject at the 3000-level or above.


### 4.5 Program of Study for the Honours Degree of Bachelor of Science

The proposed Section 4.5 sets out the framework under which departmental regulations for a specific Honours program should operate. Of note:

- At present, the Calendar lists three routes to the achievement of an Honours Degree. Two of these are the standard Honours program (with a single Major) and the Joint Honours program. The third route, described in the current Calendar as being intended for "special circumstances," effectively allows an Honours program in two Majors to be uniquely created when no corresponding Joint Honours program exists. We have preserved these three options but have attempted to clarify this third route, which we refer to formally as a "sui generis Honours program" (that is, "in a class of its own").
- The minimum number of credit hours in the Major subject(s) required for the Honours and Joint Honours degree remain unchanged but, as with the General Degree, flexibility has been introduced to reflect circumstances in which an appropriate rationale may exist for a program to fall outside the normal minimum.
- For the sui generis Honours program, the total number of required credit hours is reduced from 90 credit hours (with no specific requirement for the distribution between the Major subjects) to 84 credit hours (with at least 36 credit hours in each Major subject) in order to make this type of Honours program consistent with the requirements for a regular Joint Honours program.


### 4.6 Electives

The proposed Section 4.6 collects the regulations relating to courses required to fill out the minimum of 120 credit hours for the Bachelor of Science.

### 4.7 Minor Programs in the Faculty of Science

The proposed Section 4.7 promotes regulations governing Minor programs to their own section. Currently, they appear only as part of the regulations for the General Degree, which might inadvertently give the appearance that they are available neither to students completing an Honours Degree of Bachelor of Science, nor to students from other faculties. Of note:

- Flexibility has been introduced to allow for the possibility that not all of the required 24 credit hours be from the Minor subject, when an appropriate rationale exists to warrant it.


### 4.8 Graduation Requirements

The proposed Section 4.8 collects regulations governing academic standing and classification of degrees. We have made explicit the longstanding ability of departments to designate additional courses, beyond courses from the Major subject(s), which will be included in the calculation of averages used to satisfy graduation requirements.

## Consultations Sought From

1. Grenfell Campus (Arts and Social Science)
2. Grenfell Campus (Science and the Environment)
3. Grenfell Campus (Fine Arts)
4. Marine Institute
5. Faculty of Humanities and Social Sciences
6. Faculty of Business Administration
7. Faculty of Education
8. Faculty of Engineering and Applied Science
9. Faculty of Medicine
10. School of Human Kinetics and Recreation
11. School of Music
12. School of Nursing
13. School of Pharmacy
14. School of Social Work
15. Department of Biochemistry
16. Department of Biology
17. Department of Chemistry
18. Department of Computer Science
19. Department of Earth Sciences
20. Department of Mathematics and Statistics
21. Department of Ocean Sciences
22. Department of Physics and Physical Oceanography
23. Department of Psychology

Library Report Received

## Comments Received

No
Yes
No
No
No
No
Yes
Yes
Yes
Yes
No
No
Yes
No
No
No
Yes
No
Yes
No
No
Yes
No

Signature: Dean, Associate Vice-President (Academic) or Vice-President Name

Chair:

Secretary:
Date:

## Calendar Changes (Track Change Version)

All page references are to the 2017-18 Calendar. Changes approved since the publication of the 2017-18 Calendar are not reflected, with the exception of proposed amendments to the Biochemistry section of the Calendar (the current Section 10.1). Due to the significant overhaul of this section which was approved at the Faculty Council of the Faculty of Science on October 16th, 2017, it is this amended version of the section which is reflected in the present proposal.

- Under the Faculty of Science, page 493, renumber and rename Section 4 Bachelor of Science in Nutrition (Dietetics Option), Memorandum of Understanding (MOU) between Memorial University of Newfoundland Acadia University as Section 5 Bachelor of Science in Nutrition (Dietetics Option).
- Under the Faculty of Science, page 495, renumber Section 5 Joint Degrees of Bachelor of Science and Bachelor of Arts as Section 6. Amend Regulation 2 as follows:
"1. Admission to the Major programs shall be governed by Faculty of Science Degree Regulations - Admission to the Department of Subject of Major and Faculty of Humanities and Social Sciences - Admission to the Bachelor of Arts General Degree Programs."

Delete Regulation 3 as follows:
"3. Where an admission requirement or program regulation for the Major program from the Faculty of Science includes English 1090 (or the former English 1080) and English 1110 (or equivalent), such requirements may instead be satisfied by the completion of 3 credit hours in any 1000-level Critical Reading and Writing (CRW) course offered by the Department of English, and an additional 3 credit hours in any Faculty of Humanities and Social Sciences course whose title begins with "Critical Reading and Writing" chosen from those listed under Core Requirements - Critical Reading and Writing (CRW) Requirement for the Bachelor of Arts."

- Under the Faculty of Science, page 496, renumber and rename Section 6 Joint Programs as Section 10 Joint Program Regulations. Within this section, exchange the order of the first two subsections, resulting in Section 10.1 Joint Majors and Section 10.2 Joint Honours. Amend the three paragraphs at the start of this section as follows:


## "Course descriptions are found at the end of the Faculty of Science section under Course Descriptions.

The following joint honours, majors and option Joint Major, Joint Honours and Joint Option programs which lead to the awarding of a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science are offered by Ddepartments in the Faculty of Science, and the regulations for each program are joint Departmental

Regulations. They are governed by Programs of Study for the General Degree of Bachelor of Science and Programs of Study for the Honours Degree of Bachelor of Science as appropriate. For convenience of reference the joint programs are listed below in alphabetical sequence: Joint Honours, Joint Majors, and Joint Options.

A joint degree program; which leads to the awarding of both the General Degree of Bachelor of Science Arts and the General Degree of Bachelor of Arts Science, can be found under the Faculty of Science at Joint Degrees of Bachelor of Science and Bachelor of Arts and under the Faculty of Humanities and Social Sciences at Joint Degrees of Bachelor of Arts and Bachelor of Science."

- Under the Faculty of Science, page 496, delete the paragraph which appears under 6.1 Joint Honours (now Section 10.2):
"A student who wishes to be admitted to any of the Honours programs must submit an
"Application for Admission to Honours Program Faculties of Humanities and Social Sciences or Science". This Application is available online from the Office of the Registrar at wawn.mun.ca/regoff/Application_Honours_Program.pdf."
- Under the Faculty of Science, page 496, rename 6.1.1 Applied Mathematics and Chemistry Joint Honours (B.Sc. Only) (now Section 10.2.1) as Applied Mathematics and Chemistry Joint Honours, and amend Regulation 1 as follows:
"1. English 1090 or the former English 1080 and English 1110 (or equivalent). Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."
- Under the Faculty of Science, page 496, 6.1.2 Applied Mathematics and Physics Joint Honours (now Section 10.2.2), amend Regulation 1 as follows:
"1. English 1090 or the former English 1080 and English 1110 (or equivalent). Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."

Insert a comma in the final paragraph as follows:
"The topic for the Honours project or thesis, Mathematics 419A/B or Physics 490A/B ${ }_{2}$ must be chosen with the prior approval of both departments."

- Under the Faculty of Science, page 496, 6.1.3 Biochemistry and Cell Biology Joint Honours (now Section 10.2.3), insert a prefatory sentence and a new Regulation 1, and amend the existing Regulation 1, as follows:
"The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. 3. Biology 1001, 1002, Chemistry 1050, 1051 (or 1200 and 1001), English 1090 of the former English 1080 and 1110 (or equivalent), Mathematics 1000, 1001, Physics 1020 or 1050, Physics 1021 or 1051, Statistics 2550;"

- Under the Faculty of Science, page 496, 6.1.4 Biochemistry and Chemistry Joint Honours (now Section 10.2.4), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

2. 3. Chemistry 1050 and 1051 (or Chemistry 1010, 1011 and the former 1031) (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051 (or 1021),-6credit hours in first year English courses. Biology 1001 and 1002 are highly recommended;"

- Under the Faculty of Science, page 496, 6.1.5 Biochemistry and Physics Joint Honours (now Section 10.2.5), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

2. 3. English 1090 or the former English 1080 and 1110 (or equivalent), Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031) (or 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051;"

In Regulation 7 (now Regulation 8), correct the erroneous semi-colon after "4211" to a comma as follows:
"8. 7. An additional 12 credit hours to be selected from Biochemistry 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211 $\frac{1}{2} 4230-4249 ; "$
-Under the Faculty of Science, page 497, 6.1.6 Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours (now Section 10.2.6), insert a new Regulation 1 and amend the existing Regulation 1 (including deleting the erroneous comma after "Physics 1050") as follows:

## "1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

2. 3. Chemistry 1050 and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000 and 1001, Physics 1050; (or 1020), 1051 (or 1021), English 1090 of the former English 1080 and 1110."

In Regulation 3 (now Regulation 4), correct "courses" to "course" as follows:
"4. 3. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, one further courses in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620,

3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870 ."

Amend Note 1 following the program regulations as follows:
"1. In accordance with Clause 6.a. of the Regulations As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " B " or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3. and 4. 3., 4. and 5. above, except those at the 1000 level."
-Under the Faculty of Science, page 497, 6.1.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours (now Section 10.2.7), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. 1. Chemistry 1010 and 1011 (or 1050, 1051) (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051), English 1090 or the former English 1080 and 1110."

Amend Note 1 following the program regulations as follows:
"1. In accordance with Clause 6.a. of the Regulations As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 2., 3. and 4. 3., 4. and 5. above, except those at the 1000 level."

- Under the Faculty of Science, page 497, 6.1.8 Biology and Earth Sciences Joint Honours (now Section 10.2.8), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

2. 3. English 1090 or the former English 1080 and 1110 (or equivalent), Mathematics 1000 and 1001, Biology 1001 and 1002, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1020 and 1021 (or 1050 and 1051)."

In Regulation 6 (now Regulation 7), replace the phrase "the prescribed" with the word "a" as follows:
"6. Other courses to complete the prescribed a minimum of 135 credit hours in courses for the Honours degree, with at least 84 credit hours in courses in Biology and Earth Sciences combined."

- Under the Faculty of Science, page 497, 6.1.9 Biology and Psychology Joint Honours (now Section 10.2.9), remove the word "forty" from the prefatory sentence as follows:
"The following forty courses (or equivalent) are required:"
Insert a new Regulation 4 and amend the existing Regulation 4 as follows:
"4. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

5. 4. English 1090 or the former English 1080 and 1110; Mathematics 1000; Chemistry 1010 and 1011 (or 1050 and 1051), and 2440; Physics 1020 (or 1050) and 1021 (or 1051); Biochemistry 2101 and 3106."
-Under the Faculty of Science, page 498, 6.1.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours (now Section 10.2.10), remove the word "forty" from the prefatory sentence as follows:
"The following forty courses (or equivalent) are required:"
Insert a new Region 5 and amend the existing Regulation 5 as follows:

## " 5 . Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

6. 5.-English 1090 or the former English 1080 and 1110; Mathematics 1000 and 1001; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1010 and 1011 (or 1050 and 1051), and 2440 (or 2400 and 2401)."

Amend the Note following the program regulations as follows:
"1. In accordance with Clause 6.a. of the Regulations As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, or an average of 75\% or higher in all the required courses listed in Clauses 1, 2, 3, and 4 above, except those at the 1000 level."

- Under the Faculty of Science, page 498, rename 6.1.11 Biology and Statistics Joint Honours (B.Sc. Only) (now Section 10.2.11) as Biology and Statistics Joint Honours and amend the prefatory paragraph as follows:
"See Regulations for the Honours-Degree of Bachelor of Science. Students As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:"

Insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. 1. Mathematics 1000 and 1001, Biology 1001 and 1002, English 1090 or the former English 1080 and 1110, Chemistry 1010 and 1011 (or 1050 and 1051), Physics 1020 and 1021, or equivalent;"

In Regulation 2 (now Regulation 3), delete the erroneous comma after " 2501 " as follows:
"3. 2. Mathematics 2000, 2050, 2051, Statistics 2500, 2501- or 2560, 3520, 3521, 4530, and 4581;"

In Regulation 3 (now Regulation 4), delete the phrase "(excluding those with second digit 0)" as follows:
"4. 3. 9 further credit hours in Statistics courses (excluding those with second digit 0) including at least 6 credit hours in courses at the 4000 level or higher but not including Statistics 459A/B;"

- Under the Faculty of Science, page 498, 6.1.12 Chemistry and Earth Sciences Joint Honours (now Section 10.2.12), insert a new Regulation 1 and amend the existing Regulation 1 as follows:


## "1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.

2. 3. English 1090 or the former English 1080 and 1110 (or equivalents), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) or their equivalents, Physics 1050 (or 1020) and 1051 (or 1021)."

- Under the Faculty of Science, page 498, 6.1.13 Chemistry and Physics Joint Honours (now Section 10.2.13), insert a new Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."

Delete the existing Regulation 7 as follows:
"7. English 1090 or the former English 1080 and English 1110 (or equivalent)."

- Under the Faculty of Science, page 499, rename 6.1.14 Computer Science and Geography Joint Honours (B.Sc. Only) (now Section 10.2.14) as Computer Science and Geography Joint Honours, and amend the prefatory paragraph as follows:

[^1]- Under the Faculty of Science, page 499, 6.1.15 Computer Science and Physics Joint Honours (now Section 10.2.15), in Regulation 4 delete the erroneous period after "4780" as follows:
"4. Physics 490A and Physics 490B or Computer Science 4780- and 3 additional credit hours in Computer Science at the 4000 level."

Amend Regulation 6 as follows:
"6. English 1090 or the former English 1080 and 1110 (or equivalent). Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."

- Under the Faculty of Science, page 499, rename 6.1.16 Computer Science and Pure Mathematics Joint Honours (B.Sc. Only) (now Section 10.2.16) as Computer Science and Pure Mathematics Joint Honours, and amend the prefatory paragraph as follows:
"See Regulations for the Honours Degree of Bachelor of Science. Students As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following:"
- Under the Faculty of Science, page 499, rename 6.1.17 Computer Science and Statistics Joint Honours (B.Sc. Only) (now Section 10.2.17) as Computer Science and Statistics Joint Honours, and amend the prefatory paragraph as follows:
"See Regulations for the Honours Degree of Bachelor of Science. The As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 499, rename 6.1.18 Earth Sciences and Geography Joint Honours (B.Sc.Only) (now Section 10.2.18) as Earth Sciences and Geography Joint Honours. Insert a new Regulation 1 and amend the existing Regulation 1 as follows:


## "1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.

2. 3. English 1090 or the former English 1080 or equivalent, English 1110 or equivalent, Geography 1050, Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 (or equivalent) and 1051 (or equivalent), Physics 1050 and 1051, or Physics 1020 and 1021."

Amend Regulation 6 (now Regulation 7) as follows:
"‥ 6. Additional credit hours selected to conform to the Degree Regulations for the Honours Degree of Bachelor of Science so as to achieve a total of 120 credit hours."

Amend the third Note following the program regulations as follows:
"3. The number of specified courses means that English 1110 the second CRW course will be taken normally in the second or third year of the program."

Amend the fourth Note following the program regulations as follows:
"4. Students who do not satisfy the Regulations Graduation Requirements for the Honours Degree of Bachelor of Science - Academic Standing, but who successfully complete all the courses, with the exception of the Honours dissertation, and who satisfy all other requirements for the Bachelor of Science, will be eligible for consideration to receive a General Degree of Bachelor of Science with a juoint mMajor in Earth Sciences and Geography and Earth Science."

- Under the Faculty of Science, page 500, 6.1.19 Earth Sciences and Physics Joint Honours (now Section 10.2.19), amend the prefatory paragraph as follows:
"This program was formerly in the Earth Sciences section of the $\in$ Calendar as an Honours B.Sc. Degree of Bachelor of Science in Geophysics. The following courses will be required:"

Insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. 1. English 1090 or the former English 1080 and 1110 (or equivalent), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1050 (or 1020) and 1051."

- Under the Faculty of Science, page 500, 6.1.20 Geophysics and Physical Oceanography Joint Honours (now Section 10.2.20), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;

2. 3. English 1090 -or the former English 1080 and 1110 (or equivatent), Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Physics 1050 (or 1020) and 1051."

- Under the Faculty of Science, page 500, 6.1.21 Pure Mathematics and Statistics Joint Honours (now Section 10.2.21), amend the prefatory paragraph as follows:
"See Regulations for the Honours Degree of Bachelor of Science. The As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"

Correct the capitalisation of Regulation 3 as follows:
"3. eEither Mathematics 439A/B or Statistics 459A/B;"

Correct the capitalisation and remove the extraneous colon from Regulation 4 as follows:
"4. өO्ne of: Mathematics 3331 or 3340 ;"
-Under the Faculty of Science, page 500, rename 6.2.1 Applied Mathematics and Computer Science Joint Major (B.Sc. Only) (now Section 10.1.1) as Applied Mathematics and Computer Science Joint Major, and amend the prefatory sentence as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, $\mp$ the following courses are required:"

- Under the Faculty of Science, page 500, rename 6.2.2 Applied Mathematics and Economics Joint Major (B.Sc. Only) (now Section 10.1.2) as Applied Mathematics and Economics Joint Major, and add the following prefatory sentence:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 501, rename 6.2.3 Applied Mathematics and Physics Joint Major (B.Sc. Only) (now Section 10.1.3) as Applied Mathematics and Physics Joint Major, and amend Regulation 1 as follows:
"1. English 1090 or the former English 1080 and English 1110 (or equivalent). Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."
- Under the Faculty of Science, page 501, rename 6.2.4 Computer Science and Economics Joint Major (B.Sc. Only) (now Section 10.1.4) as Computer Science and Economics Joint Major, and add the following prefatory sentence:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 501, rename 6.2.5 Computer Science and Geography Joint Major (B.Sc. Only) (now Section 10.1.5) as Computer Science and Geography Joint Major, and add the following prefatory sentence:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 501, 6.2.6 Computer Science and Physics Joint Major (now Section 10.1.6), add the following prefatory sentence:
> "As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 501, rename 6.2.7 Computer Science and Pure Mathematics Joint Major (B.Sc. Only) (now Section 10.1.7) as Computer Science and Pure Mathematics Joint Major. Amend the prefatory sentence as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science In addition to Mathematics 1000, 1001, and Computer Science 1000, 1001, the following courses numbered 2000 or higher are required:"

Amend Regulation 1 as follows:
"1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008."

- Under the Faculty of Science, page 501, rename 6.2.8 Computer Science and Statistics Joint Major (B.Sc. Only) (now Section 10.1.8) to Computer Science and Statistics Joint Major and amend the prefatory sentence as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, $\mp \underline{\text { the }}$ following courses are required:"
-Under the Faculty of Science, page 502, 6.2.9 Earth Sciences and Physics Joint Major (now Section 10.1.9), amend the prefatory paragraph as follows:
"This program was formerly in the Earth Sciences section of the $\underline{C}$ ealendar as a General B.SC. Degree of Bachelor of Science in Geophysics. The following courses will be required:"

Insert a new Regulation 1 and amend the existing Regulation 1 as follows:

## "1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least

 three credit hours in English courses.2. 3. English 1090 or the former English 1080 and 1110 (or equivalent), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1050 (or 1020) and 1051."

Correct the capitalisation of Regulation 3 (now Regulation 4) as follows:
"4. 3. Aat least 30 credit hours in Physics courses at the 2000 level or higher, including Physics 2055, 2056 or $2750,2820,3220,3500 . "$

- Under the Faculty of Science, page 502, rename 6.2.10 Economics and Pure Mathematics Joint Major (B.Sc. Only) (now Section 10.1.10) as Economics and Pure Mathematics Joint Major, and add the following prefatory sentence:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 502, rename 6.2.11 Economics and Statistics Joint Major (B.Sc. Only) (now Section 10.1.11) as Economics and Statistics Joint Major, and add the following prefatory sentence:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"
- Under the Faculty of Science, page 502, rename 6.2.12 Economics (Co-operative) and Statistics Joint Major (B.Sc. Only) (now Section 10.1.12) as Economics (Cooperative) and Statistics Joint Major. Amend the first prefatory paragraph as follows:
"The Joint Major in Economics (Co-operative) and Statistics Option is available exclusively to full-time Economics and Statistics majors (B. Sc.) only). The program is available under the Economics Co-operative Education Option (ECEO)."

Amend Regulation 2(c) as follows:
"c. Courses shall normally be taken in academic terms or "blocks" in the sequenced course load and order set out in the Academic Course Program - Economics (Cooperative) and Statistics Joint Major (B.Sc. Only) Table. Unspecified credits may be used to fulfill elective requirements only."

Amend the title of the accompanying Table as follows:

## "Academic Course Program - Economics (Co-operative) and Statistics Joint Major (B.Sc. Only) Table"

Amend the second Note as follows:
"2. Elective courses should be chosen with reference to the Degree Regulations for the General Degree of Bachelor of Science, since courses specified for admission to and completion of the program only partially satisfy these regulations. In particular note that in addition to the 78 credit hours ( 26 courses) in Science subjects required, at least 3 credit hours in a Science subject other than Mathematics $t$ and Statistics, Economics and Computer Science must be completed."

- Under the Faculty of Science, page 503, rename 6.2.13 Marine Biology (now Section 10.1.13) as Marine Biology Joint Major. Amend Regulation 1(d) as follows:
"d. English 1090 and 1110 (or equivalent); Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;"

Amend Regulation 2(a) as follows:
"a. English 1090 and 1110 (or equivalent); Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;"
-Under the Faculty of Science, page 504, rename 6.3 Option Programs (now Section 10.3) as Joint Options. Rename 6.3.1 Physics and Chemistry Option Programs
(now Section 10.3.1) as Chemistry and Physics Option Programs. Amend the first paragraph as follows:
"Students who follow the Physics/Chemistry Joint Honours Program of courses outlined above complete all program requirements for the Chemistry and Physics Joint Honours program, either as Honours students or otherwise, and who-satisfy all relevant course regulations except those on Academic Standing for the Honours Degree of Bachelor of Science $_{2}$ shall receive on their University records a notation that they followed the "Physics/Chemistry" Option Programs."

- Under the Faculty of Science, page 504, renumber Section 7 Degree Regulations as Section 4 and amend the second paragraph as follows:
"Upon meeting the qualifications for any of the programs of the Faculty of Science, a student must apply to graduate, by the appropriate deadline date, to graduate on the prescribed "Application for Graduation-" form. This form may be obtained on-line at the via Memorial Self Service at www3.mun.ca/admit/twbkwbis.P_WWWLogin. Additional information is available from the Office of the Registrar."
- Under the Faculty of Science, page 504, introduce a new Section 4.1 Programs in the Faculty of Science as follows:


## "4.1 Programs in the Faculty of Science

1. The Faculty of Science offers a variety of programs which lead to a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science. These programs consist of a minimum of 120 credit hours in courses which include the following:
a. the Core Requirements, as described under Core Requirements and Academic Advising,
b. a Program of Study, as described under Programs of Study for the General Degree of Bachelor of Science and Programs of Study for the Honours Degree of Bachelor of Science, as part of which one or more Major programs shall be completed, and
c. a number of additional courses, as described under Electives.
2. In conjunction with the Faculty of Humanities and Social Sciences, the Faculty of Science offers the Joint Degrees of Bachelor of Arts and Bachelor of Science, which simultaneously leads to both a General Degree of Bachelor of Science and a General Degree of Bachelor of Arts.
3. The Faculty of Science also offers a number of Minor programs, as described under Minor Programs in the Faculty of Science. These are available to students completing a General Degree of Bachelor of Science or an Honours

Degree of Bachelor of Science, but may also be undertaken by students in other degree programs should the regulations of those programs permit it.
4. A Major or a Minor consists, in part, of an approved concentration of courses in a single subject area, known respectively as the Major subject or Minor subject. These subject areas may include: Biochemistry, Biology, Chemistry, Computer Science, Earth Sciences, Economics, Geography, Mathematics and Statistics, Ocean Sciences, Physics, or Psychology.
5. For the purposes of a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science, a student may complete at most one Major program from each department which offers more than one, and may not complete a Minor program from the department of any of the student's Major programs.

When a Major program may be completed both as part of the Degree of Bachelor of Science and the Degree of Bachelor of Arts, students are free to choose the degree program they wish to follow and may change from one to the other; however, they may not obtain both degrees in the same Major program at this University."

## - Under the Faculty of Science, page 504, amend 7.1 Admission to the Department of Subject of Major (now Section 4.2) as follows:

## "4.2 7.1 Admission to the Department of Subject of Major

Admission to certain major programs within the Faculty is limited and competitive.
Admission to all major programs within the Faculty is upon formal application to the department of the subject of major after completion of the admission requirements.

Unless otherwise indicated by the Departmental Admission Regulations as published in the University Calendar under departmental regulations, students upon formal application by Change of Academic Program Form, are normally admitted to the department of major program upon successful completion of 30 credit hours which must include:

1. 6 credit hours in English courses
2. 6 credit hours in Mathematics courses
3. 6 credit hours in courses from each of two Sciences other than Mathematics

Students seeking admission to departments with Departmental Admission Regulations as indicated above must apply for admission on the appropriate Departmental Application for Admission Form upon completion of the specified admission requirements.

### 4.2.1 Admission to the General Degree of Bachelor of Science

1. Declaration of the General Degree of Bachelor of Science may be made as part of a student's application for admission to the University, subject to the general undergraduate requirements for admission or readmission, or by current students by means of the Declaration/Change of Academic Program form, which is available at www.mun.ca/regoff/registration/DeclarationChange AcadProg ArtsSci.pdf.
2. A student who intends to complete the General Degree of Bachelor of Science must declare one or more Majors. This declaration is made by formal application to each department which administers one of the intended Major subjects, known as the Major department(s).
a. Declaration of one or more Majors may normally be made upon the successful completion of 30 credit hours in courses, which must include those courses set forth under Core Requirements. However, additional requirements for the declaration of certain Majors may be imposed by the corresponding Program Regulations.
b. Declaration of a Major may be made using the Declaration/Change of Academic Program form as described above. Certain Majors may additionally or alternatively require the submission of an appropriate Departmental Application for Admission form.
C. Admission to certain Major programs is limited and competitive.
d. Before declaring a Major, a student is strongly encouraged to consult with each Major department and/or the Senior Faculty Adviser of the Faculty of Science.
e. A student may change Majors or add an additional Major, provided acceptance has first been received to the new Major program to which application is being made.

### 4.2.2 Admission to the Honours Degree of Bachelor of Science

1. A student who wishes to be admitted to an Honours program must submit an Application for Admission to Honours Program form, which is available at www.mun.ca/regoff/Application Honours Program.pdf.
a. This form shall be submitted to each Major department, and to the Office of the Registrar, not earlier than the first semester following the completion of 60 credit hours, and not later than the final date set for the application to graduate with the Honours Degree.
b. A student must complete all of the Core Requirements before seeking admission to an Honours program.
2. Otherwise qualified students who fail to declare their intention to obtain an Honours Degree of Bachelor of Science on or before the last day of the period outlined above shall be awarded a General Degree of Bachelor of Science even if they fulfil all other requirements for an Honours Degree. The University cannot undertake to notify students of their eligibility for an Honours Degree.
3. A student who has been awarded a General Degree of Bachelor of Science may convert it to an Honours Degree of Bachelor of Science by submitting an Application for Admission to Honours Program form as described above, and by completing all of the requirements for the Honours Degree as outlined in these regulations.

### 4.2.3 Admission to a Minor Program in the Faculty of Science

1. Declaration of a Minor program in the Faculty of Science may be made by means of the Declaration/Change of Academic Program form, which is available at www.mun.ca/regoff/registration/DeclarationChange AcadProg ArtsSci.pdf. The department which administers the intended Minor subject is known as the Minor department."

- Under the Faculty of Science, page 504, renumber 7.2 Limited Enrolment Courses as Section 7 and amend it as follows:
"Certain course offerings in the Faculty of Science will be identified as being Limited Enrolment Courses and will be clearly identified as such in the University Timetable list of course offerings. Students who have registered for a Limited Enrolment Course must confirm their registration either (1) by attending at least one of the first three hours of lecture in the course and the first meeting of any laboratory section of the course; or (2) by notifying the department in writing within the first five university working days of the semester. Students who do not confirm their registration may be dropped from the course on the recommendation of the Head of Department."
-Under the Faculty of Science, page 504, renumber and rename 7.3 Regulations to Govern Supplementary Examinations in the Departments of Biochemistry, Computer Science, and Mathematics and Statistics as Section 8 Supplementary Examinations. Amend Regulation 1 as follows:
"1. Supplementary examinations will be allowed in certain of the courses offered by the Department of Biochemistry, the Department of Computer Science, and the Department of Mathematics and Statistics courses which have written final examinations. In each course, students will be informed as to the possibility of a supplementary examination during the first week of classes. This information will be provided in writing, as part of the evaluation scheme for the course Course Syllabus."

Amend Regulation 2 as follows:
"2. Supplementary examinations will be of similar in length and degree of difficulty as the original final examination."

Amend Regulation 3 as follows:
"3. Students who wish to write a supplementary examinations must apply in writing to the appropriate department within one week of the official release of grades by the University."

Amend Regulation 4 as follows:
"4. A student who has Students who have clear or conditional standing may write a supplementary examination in a course if they obtained a final grade ebtained is of 45$49 F$ and if their grade in the course excluding the original final examination term mark is at least 50\%."

Amend Regulation 5 as follows:
" 5 . In order to pass the course, the student, a student who has been approved to write a supplementary examination must pass the supplementary examination. If the student passes the supplementary examination, then a new grade will be calculated using the same weighting evaluation scheme as used in the course, but with the result of the supplementary examination replacing that of the original final examination. Any additional course requirements, including a requirement to pass the laboratory component of a course, will continue to apply."

Amend Regulation 6 as follows:
"6. If the new course final grade is higher than the original, it will replace the original grade on the student's transcript, subject to the condition that the new final mark grade will not exceed the student's term mark grade which the students had obtained in the course excluding the original final examination. The student's transcript will indicate that the course result was earned as the result of a supplementary examination."

Amend Regulation 7 as follows:
"7. Supplementary examinations will be written no later than the first week of the semester immediately following the one in which the course was failed, and will normally-Normally they will coincide with the writing of deferred examinations. Grades for supplementary examinations will be submitted to the Office of the Registrar within one week following the commencement of classes for that semester."

Amend Regulation 8 as follows:
"8. A student may write a only one supplementary examination for any one registration in a course only once; if the course result a failing grade is obtained in the course following the supplementary examination is a fail then the course must be repeated in order to obtain credit."

## - Under the Faculty of Science, page 504, insert a new Section 4.3 Core Requirements and Academic Advising as follows:

## "4.3 Core Requirements and Academic Advising

1. A candidate for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science shall complete the Core Requirements, which consist of the following:
a. six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses,
b. six credit hours in Mathematics and Statistics courses, and
c. six credit hours in courses from each of two subject areas listed under Programs in the Faculty of Science other than Mathematics and Statistics.
2. Candidates for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science, as well as students enrolled in a Minor program in the Faculty of Science, are strongly encouraged to consult regularly with the Head (or delegate) of each Major department and Minor department to discuss course registrations, to ensure compliance with all relevant academic regulations, and to seek advice regarding programs suitable for a student's particular needs."

- Under the Faculty of Science, page 505, amend 7.4 Regulations for the General Degree of Bachelor of Science (now Section 4.4) as follows:


## "4.4 7.4 Programs of Study Regulations for the General Degree of Bachelor of Science

1. For the General Degree of Bachelor of Science a candidate will be required to complete, subject to the following Regulations, 120 credit hours applicable to the degree which shall include:
a. Six credit hours in English courses
b. Six credit hours in Mathematics courses
c. Six credit hours in courses from each of two Sciences other than

Mathematics
2. a. Courses shall be chosen so that a candidate shall have completed an approved concentration of courses in one subject to be known as the candidate's Major. For the purposes of these regulations, candidates may complete only one major from departments which offer more than one. In selecting courses in their Major, candidates must comply with the Departmental Regulations approved by the Senate and printed in the Galendar. The Departmental Regulations shall require not fewer than 36 nor more than 45 credit hours in courses from the subject of the Major (including the courses in that subject completed at the first
year level). (See also Notes 1. and 2.).
b. The subject of the candidate's major shall be that declared by the candidate on the appropriate admission form and approved by the department at the time of admission.
c. The 36 or more credit hours in courses from one subject referred to in a. above, may be chosen from the following subjects, and may include courses in that subject which were completed at first-year level: Biology (see Note-4.), Biochemistry (see Note 6.), Chemistry, Computer Science, Earth Sciences, Economics, Geography, Mathematics (except the former 1150 and 1151) and Statistics, Physics, Psychology.
d. A candidate may change the subject of the Major during any Regular

Registration Period provided he or she has first applied for and received acceptance by the department to which application is being made.
e. In those Departments which offer programs leading to both a degree of Bachelor of Arts and a degree of Bachelor of Science, students are free to choose the degree program they wish to follow and may change from one to the other; however, they may not obtain both degrees in the same Major subject at this University.
3. Further courses may be chosen from any of the subjects listed in Clause 2. above, or from other courses approved by the Committee on Undergraduate Studies of the Faculty of Science (see Note 5.), provided that, of the 120 credit hours required:
a. candidate shall have completed at least 78 credit hours in courses from the subjects listed in Clause 2. above, including the Major courses and the courses required for admission; See Notes 3. and 5.
b. there shall be not fewer than five subjects in which a candidate shall have completed courses. At least four of these subjects shall be chosen from the subjects listed in Clause 2. above. In the case of unspecified transfer credits awarded in a subject area not taught at Memorial University of Newfoundland any number of such transfer credits in the aggregate shall count as one subject area.
c. not more than 15 unspecified transfer credit hours awarded in a subject area not taught at Memorial University of Newfoundland shall be used to satisfy the requirements of the degree.
4. Before a candidate registers, the Head of the Department of his or her Major, or delegate, shall approve a candidate's program which is in accordance with the above regulations. The Head of the Department or delegate shall advise each candidate of programs suitable for his or her particular needs.
5. To obtain a general degree of Bachelor of Science a candidate shall have:
a. satisfied the conditions of UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation - Application for Graduation - Degrees, Diplomas and-Certificates;
b. obtained an average of at least 2.0 points per credit hour in the 78 credit hours in Science required for the degree;
c. obtained an average of at least 2.0 points per credit hour in the minimum number of credit hours in the major subject (or, in the case of joint majors, subjects) required for the major program (or, in the case of joint majors, programs).
6. Where a student satisfies the separate departmental regulations for a major in two or more subjects for which a specific joint program does not exist, such subjects shall be recognized as the major subjects for the general degree of Bachelor of Science.
7. A candidate may complete a minor of at least 24 credit hours in courses from at subject area other than that of the Major chosen from Clause 2. c. above or from minors available in the Faculty of Humanities and Social Sciences, the Faculty of Business Administration, and the School of Music. (It should be noted that because of departmental regulations for the Major, not every candidate may be able to fit a minor into his or her 120 credit hour program).
a. The subject of the candidate's minor shall be that declared by the candidate on the Change of Academic Program Form which must then be signed by the Head of the Department of the Minor.
b. A candidate must follow the departmental regulations for the Minor as set forth in the appropriate section of the Calendar.
c. The Head of the Department of the Minor will advise the candidate on the selection of courses in the Minor.
d. Students who have taken courses appropriate to their Minor at another university are required to complete at least 6 credit hours in courses from that subject at this University. These courses must be chosen in consultation with the Head of the Department of the Minor program.
e. A candidate must obtain a grade point average of at least 2.0 in the credit hours prescribed for the minor program.

Notes: 1. Departmental regulations are not intended to debar students from taking more than the required courses in the subject of their Major.
2. Students who have taken courses in the subject of their Major at another university are required to complete at least 12 credit hours in courses from that subject at this University.
3. The former Science 2010/2011 may be used to fulfil in part the requirement of 78 credit hours in Science.
4. Biology 2120 may not be used for credit by Biology Majors.
5. When Science course equivalents have been established by Department Heads for Engineering courses, credit may not be obtained for both the Engineering course and the established equivalent course offered by the Faculty of Science.
6. In the case of Biochemistry the courses for the Biochemistry program shall include Chemistry 2400 and 2401.

1. The Program of Study for the General Degree of Bachelor of Science is determined by the student's declared Major(s).
a. When a student has declared a single Major, that student's Program of Study shall consist of the requirements for the corresponding Major program, as set forth in the Program Regulations.
b. When a student has declared more than one Major in a combination for which a Joint Major program exists, as set forth in the Joint Program Regulations, that student's Program of Study shall consist of the requirements for the Joint Major program.
c. When a student has declared more than one Major in a combination for which no corresponding Joint Major program exists, that student's Program of Study shall consist of the requirements for each of the respective Major programs, called a Double Major program.
2. The Program of Study for a General Degree shall normally require the student to complete not fewer than 36 credit hours nor more than 45 credit hours in courses from each of the Major subjects, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of an extraordinary number of credit hours.
3. A Program of Study may require the student to complete additional courses from subject areas other than the Major subject(s).
4. A student's Program of Study shall also include such additional requirements of each Major department as are approved by the Senate and printed in the Calendar.
5. At least 15 credit hours in courses from each Major subject at the 3000-level or above must be completed at this University."

- Under the Faculty of Science, page 505, amend 7.5 Regulations for the Honours Degree of Bachelor of Science (now Section 4.5) as follows:


## "4.5 7.5 Programs of Study Regulations for the Honours Degree of Bachelor of Science

A program is offered leading to the Honours Degree of Bachelor of Science. An Honours dDegree of Bachelor of Science offers greater specialization in a given field of knowledge than a General dDegree, and requires higher than average academic achievement. Possession of this degree will would be of great advantage to all students planning more advanced work in their chosen field. In many cases, an Honours degree is a prerequisite for admission to a graduate program. The Program of Study for an Honours Degree consists of two components: the Course Requirements and one of a Comprehensive Examination and Dissertation. In addition, specific Departmental Regulations may apply.

### 7.5.1 Admission and Registration

1. A student who wishes to be admitted to any of the Honours programs must submit an "Application for Admission to Honours Program Faculties of Humanities and Social Sciences or Science". This Application is available online from the Office of the Registrar at
Waw.mun.ca/regoff/Application_Honours_Program.pdf. This form shall be submitted to the Department(s) of specialization and to the Registrar not earlier than the beginning of his (her) fifth semester, or the equivalent, at University, and not later than the final date set for the application for a degree. A candidate for an Honours degree must have completed all courses listed under Admission to the Department of Subject of Major before declaring his (her) intent to pursue an Honours degree, regardless of whether these courses had been completed at the time of admission to his (her) Department of specialization.

Note: An otherwise qualified student who fails to declare the intention to obtain an Honours degree on or before the last day of the period outlined above shall be awarded a General degree even if the student fulfils all other requirements for an Honours degree. The University cannot undertake to notify him (her) that he (she) may be eligible for an Honours degree.
2. At the beginning of each registration period the Head(s), or delegate(s), of the Department(s) in which a candidate is taking Honours, shall approve a candidate's program. The Head(s) of Department(s), or delegate(s), shall advise each candidate of programs suitable for his or her particular needs.
3. Students who have been awarded a Bachelor of Science (General) degree may convert it to a Bachelor of Science (Honours) degree by declaring their intention and by completing the requirements for the Honours degree as outlined in these regulations.
4. To graduate, a candidate for an Honours degree must have completed all courses listed under Admission to the Department of Subject of Major in addition to those courses required by individual departmental regulations.

### 4.5.1 7.5.2 Course Requirements

1. a. For the Honours Degree of Bachelor of Science with a single subject major a candidate will be required to have completed 120 prescribed credit hours in courses. For the Joint Honours Degree of Bachelor of Science a candidate will be required to have completed either 120 or 135 credit hours as prescribed by the specific program. In either case, those courses must include the courses specified in Clause 1. of the Regulations for the General Degree of Bachelor of Science.
b. Clause 1.a. notwithstanding, certain Departmental regulations preclude the possibility of completing a single subject Honours degree in 120 credit hours and may require the completion of 123,126 or 129 credit hours in courses. (See Note below). In such cases all courses required to satisfy requirements of the degree will be used to determine Academic Standing, 2. below.

Note: The requirements for an Honours Degree of Bachelor of Science cannot be completed in 120 credit hours if any of the following three statements is true: (1) the student is a major in Chemistry, or Physics and has completed the former Aathematics 1080; (2) the student is a major in Chemistry or Physics and has completed the former Chemistry 1800; (3) the student is a candidate for the Honours B.Sc degree in Chemistry or Physics and has completed Physics 1021. Such students will only meet the degree requirements after completing 123, 126 or 129 credit hours in courses.
2. Courses shall be chosen so that a candidate shall have completed:

Either, (1) at least 60 credit hours from courses in one of the following subjects, including the courses in that subject completed at the first year level: Biology, Biochemistry, Chemistry, Computer Science, Earth Sciences, Economics, Geography, Mathematics and Statistics, Physics and Psychology.

Notes: 1. For options in the Biochemistry and Nutrition programs the courses shall be those specified in the respective programs. 2. For the Behavioural Neuroscience Program, the courses shall be those specified in the program.
3. For the Environmental Physics Program, the courses shall be those specified in the program.
or, (2) at least 84 credit hours in courses from two subjects listed in (1.) above, including the courses in these subjects completed at the first year level, with no fewer than 36 credit hours in either subject approved by the Committee on Undergraduate Studies of the Faculty of Science on the recommendation of the
respective Heads of Departments.
or, (3) in special circumstances, a program of at least 90 credit hours in courses from two or more subjects, including the courses in these subjects completed at the first year level, one of which need not be taken from those listed in 1. above, as recommended by the Heads of the Departments concerned and approved by the Committee on Undergraduate Studies of the Faculty of Science.
3. Further courses may be chosen from any of the subjects listed in Clause 2. above, or from other courses recognized for this purpose by the Committee on Undergraduate Studies of the Faculty of Science (see Note 5 of the Bachelor of Science General Degree) provided that, of the 120 or more credit hours required:
a. a candidate shall have completed at least 90 credit hours in courses from the subjects listed in Clause 2. above, including those completed at the first-year level, and
b. there shall be no fewer than four subjects in which a candidate shall have completed courses. In the case of unspecified transfer credits awarded in a subject area not taught at Memorial University of Newfoundland, any number of such transfer credits in the aggregate shall count as one subject area.
c. Not more than 15 unspecified transfer credit hours in courses awarded from a subject area not taught at Memorial University of Newfoundland shall be used to satisfy the requirements of the degree.

1. The Program of Study for the Honours Degree of Bachelor of Science is determined by the student's declared Major(s).
a. When a student has declared a single Major, that student's Program of Study shall consist of the requirements for the corresponding Honours program, as set forth in the Program Regulations.
b. When a student has declared more than one Major in a combination for which a Joint Honours program exists, as set forth in Joint Program Regulations, that student's Program of Study shall consist of the requirements for the Joint Honours program.
c. When a student has declared more than one Major in a combination for which no corresponding Joint Honours program exists, that student may obtain permission to complete a sui generis Honours program, on the recommendation of the Head of each Major department. The sui generis Honours program must be approved by the Committee on Undergraduate Studies of the Faculty of Science.
2. The Program of Study for the Honours Degree shall normally require the student to complete courses from the Major subject(s) as follows, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of an extraordinary number of credit hours:
a. in the case of an Honours program, not fewer than 60 credit hours in the Major subject;
b. in the case of a Joint Honours or sui generis Honours program, not fewer than 84 credit hours in the Major subjects, including not fewer than 36 credit hours in each of the Major subjects.
3. A Program of Study may require the student to complete additional courses from subject areas other than the Major subject(s).
4. When a student is compelled to complete more than 120 credit hours in order to satisfy the prerequisites of courses required for a Program of Study, all of the courses which a student was required to complete in order to satisfy the requirements of the Honours Degree shall be used in the determination of the student's Academic Standing.

### 4.5.2 7.5.3 Comprehensive Examination and Dissertation

1. In addition to the regular examinations, a candidate in an Honours program shall pass a general comprehensive examination in his (her) Major subject or subjects. Alternatively, a candidate may be required to submit a dissertation, which at the discretion of the Head(s) of the Department(s) of specialization may be followed by an oral examination thereon.
2. If a candidate is required to submit a dissertation, such dissertation must be submitted to the University Library before the degree is conferred. All Honours dissertations in the University Library shall be available for unrestricted consultation by students and faculty except under very exceptional circumstances which must be approved by the head of the academic unit of the student's program. Copyright remains with the author. A release form, signed by both the student and the head of the academic unit of the student's program, must accompany an essay or a dissertation when it is submitted to the University Library.
3. The deadline for the submission of Honours dissertations shall be no later than three weeks before the end of the final semester of the candidate's program.
4. The Honours dissertation shall be equivalent to either a 3 credit hour course of a 6 credit hour linked course as specified in the course offerings of each Department.
5. A candidate for the Honours Degree of Bachelor of Science shall complete one of the following options, at the discretion of the Head of each Major department:
a. the student shall pass a general comprehensive examination in the Major subject(s), or
b. the student shall submit a dissertation of a standard acceptable to the Head of each Major department, who shall also have the option of requiring the student to pass an oral examination thereon. The Honours dissertation shall be equivalent to either a 3 credit hour course or a 6 credit hour linked course, as specified in the course offerings of the Major department(s).
6. If a student is required to submit a dissertation, this dissertation must be submitted to the University Library before the Honours Degree is conferred. The deadline for the submission of Honours dissertations shall be no later than three weeks before the end of the final semester of the student's program.
7. All Honours dissertations in the University Library shall be available for unrestricted consultation by students and faculty except under very exceptional circumstances which must be approved by the Head of each Major department. Copyright remains with the author. A release form, signed by both the author and the Head of each Major department, must accompany a dissertation when it is submitted to the University Library.

### 4.5.3 7.5.4 Departmental Regulations

Gandidates A candidate for the Honours Degrees of Bachelor of Science shall also comply with such additional requirements of each Major the appropriate dDepartment(s) as are approved by the Senate and printed in the Calendar.

### 4.5.4 7.5.5 Residence Requirements

1. To qualify for an Honours Degree in Science, a candidate shall attend a recognized university or an equivalent institution for at least seven semesters as a full-time student. Honours candidates transferring credits to Memorial University of Newfoundland from other universities or equivalent institutions shall either spend a minimum of four of the seven semesters as full-time students at Memorial University of Newfoundland, and take a minimum of 24 credit hours in courses from their Honours discipline or take a minimum of 36 credit hours in courses from their Honours discipline as full-time students at Memorial University of Newfoundland (whichever is to their advantage), provided that the total number of semesters spent as full-time students at this and other recognized universities or equivalent institutions will not be less than seven.
2. To qualify for an Honours Degree in Science and additionally a second degree, a candidate shall attend this University for at least ten semesters as a full-time student, except with the special permission of the Faculty Committee on Undergraduate Studies.

To qualify for an Honours Degree of Bachelor of Science, a student shall attend a recognized university or an equivalent institution for at least seven semesters as a fulltime student. Students transferring credits to Memorial University of Newfoundland from other universities or equivalent institutions shall either:

1. spend a minimum of four of the seven semesters as full-time students at Memorial University of Newfoundland and take a minimum of 24 credit hours in courses from their Major subject(s) from this University, or
2. $\quad$ spend fewer than four of the seven semesters as full-time students at Memorial University of Newfoundland and take a minimum of 36 credit hours in courses from their Major subject(s) from this University.

### 7.5.6 Academic Standing

In order to graduate with an Honours degree, a candidate shall obtain:

1. a grade of "B" or better, OR an average of $75 \%$ or higher (whichever is to the candidate's advantage) in the minimum number of courses in the Honours subject (or subjects) prescribed by the Department (or, in the case of joint Honours, Departments) concerned, excluding the 1000 -level courses, and
2. an average of at least 2.75 points on the total number of courses required for the degree (see UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Grading for explanation of the point system).

Note: A student may, with the approval of the Head of the Department and the Gommittee on Undergraduate-Studies, repeat or substitute up to three courses in order to meet the requirements of Clause 1. above. In counting repeats, each attempt at the same course will count as one course towards the maximum. That is, the same course, repeated three times, would place a student at the maximum and no additional repeats or substitutions would be allowed.

### 7.5.7 Classification of Degrees

1. If the candidate's general average is 3.25 or better per required course, and his (her) average for the courses in his (her) Honours subject (excluding 1000-level courses) is 3.50 or better, he (she) shall be awarded an Honours degree with First Class standing.
2. If the candidate fulfils the conditions outlined under Academic Standing but not of Clause 1. above., he (she) shall be awarded an Honours degree with Second Class standing.
3. No classification will be given to the degree awarded a candidate who has completed (1) fewer than one half of the courses required for the degree at this University, or (2) who has completed fewer than one half of the courses required for the degree at this University since 1959. All candidates for such degrees shall, however, fulfil the conditions outlined under Academic Standing on the courses taken at the University since September, 1959, in order to qualify for the degree.
4. A declared candidate for an Honours degree who fails to attain the academic standing specified under Academic Standing but fulfills the academic requirements for a General Degree shall be awarded a General Degree, the elassification of which shall be determined in accordance with the UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation."

- Under the Faculty of Science, page 507, insert a new Section 4.6 Electives as follows:


## "4.6 Electives

In addition to the Core Requirements and the Program of Study, a candidate for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science shall complete additional courses to satisfy the requirement of 120 credit hours, subject to the following:

1. Including the courses which comprise the Core Requirements and the Program of Study, the student shall complete courses from subject areas listed under Programs in the Faculty of Science with a total number of credit hours as follows:
a. at least 78 credit hours in the case of a candidate for the General Degree of Bachelor of Science, or
b. at least 90 credit hours in the case of a candidate for the Honours Degree of Bachelor of Science.
2. There shall be not fewer than five subjects in which the student shall have completed courses. At least four of these subjects shall be chosen from the subject areas listed under Programs in the Faculty of Science.
3. Not more than 15 unspecified transfer credit hours awarded in subject areas not taught at Memorial University of Newfoundland shall be used to satisfy the requirements of the degree.
4. The student may choose to take additional courses in a Major subject beyond those specified in the Program of Study.
5. The student may choose to complete a Minor program available in the Faculty of Science, the Faculty of Business Administration, the Faculty of Engineering and Applied Science, the Faculty of Humanities and Social Sciences, or the School of Music, in accordance with the regulations for the Minor program as set forth in the appropriate section of the Calendar."

- Under the Faculty of Science, page 507, insert a new Section 4.7 Minor Programs in the Faculty of Science as follows:
"4.7 Minor Programs in the Faculty of Science

1. A Minor program shall be as set forth in the Program Regulations.
2. A Minor program shall consist of at least 24 credit hours in courses. These courses shall normally be from the Minor subject, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of courses from subject areas other than the Minor subject.
3. Students who have taken courses appropriate to their Minor at another university are required to complete at least 6 credit hours in courses from the Minor subject at this University. These courses must be chosen in consultation with the Head of the Minor department."

- Under the Faculty of Science, page 507, insert a new Section 4.8 Graduation Requirements as follows:
"4.8 Graduation Requirements


### 4.8.1 Academic Standing

1. To obtain a General Degree of Bachelor of Science, in addition to meeting all of the requirements set forth under Programs in the Faculty of Science, a student shall have:
a. satisfied the conditions of UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation - Application for Graduation - Degrees, Diplomas and Certificates;
b. obtained an average of at least 2.0 points in the minimum number of prescribed courses in the Major subject(s) and any additional courses identified for this purpose in the Departmental Regulations; and
c. obtained an average of at least 2.0 points in the 78 credit hours in courses from subject areas listed under Programs in the Faculty of Science required for the degree, as set forth under Electives.
2. To obtain an Honours Degree of Bachelor of Science, in addition to meeting all of the requirements set forth under Programs in the Faculty of Science, a student shall have:
a. satisfied the conditions of UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation - Application for Graduation - Degrees, Diplomas and Certificates;
b. obtained a grade of "B" or better in each of the prescribed courses in the Major subject(s) excluding any 1000-level courses, and any additional courses identified for this purpose in the Departmental Regulations, OR an overall average of $75 \%$ or higher in those courses (whichever is to the candidate's advantage); and
c. an average of at least 2.75 points in the total number of courses required for the degree. If a student was required to complete more than 120 credit hours in order to satisfy the prerequisites of courses required for the Program of Study, as provided for under Programs of Study for the Honours Degree of Bachelor of Science, then all such courses shall be included in this calculation.
d. A student may, with the approval of the Head of each Major department and the Committee on Undergraduate Studies of the Faculty of Science, repeat or substitute up to three courses in order to meet the requirements of b. above. In counting repeats, each attempt at the same course will count as one course towards the maximum; that is, the same course, repeated three times, would place a student at the maximum and no additional repeats or substitutions would be allowed.
e. A candidate for an Honours Degree of Bachelor of Science who fails to meet the requirements of $b$. or $c$. above but who fulfils the academic requirements for a General Degree of Bachelor of Science shall be awarded a General Degree.
3. To be awarded a Minor, in addition to meeting all of the requirements set forth under Minor Programs in the Faculty of Science, a student shall have obtained an average of at least 2.0 points on the total number of courses required for the Minor program.

### 4.8.2 Classification of Degrees

1. The classification of the General Degree of Bachelor of Science shall be determined in accordance with the UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation.
2. The classification of the Honours Degree of Bachelor of Science shall be determined as follows:
a. Students shall be awarded an Honours degree with First Class standing if they fulfil the conditions outlined under Academic Standing; obtain an average of at least 3.25 points in the courses prescribed for their Program of Study; and obtain an average of at least 3.5 points in the minimum number of prescribed courses in their Major subject(s), excluding any 1000-level courses, and any additional courses identified for this purpose in the Departmental Regulations.
b. Students shall be awarded an Honours Degree with Second Class standing if they fulfil the conditions outlined under Academic Standing but not of a. above.
c. No classification will be given to the degree awarded to students who have completed fewer than one-half of the courses required for the Honours Degree at this University."

- Under the Faculty of Science, page 507, renumber 8 Waiver of Regulations for Undergraduate Students as Section 9 and amend it as follows:
"Where circumstances warrant, any prerequisite or prerequisites listed in Departmental Regulations may be waived by the Head of the Department. Any Department Regulations may be waived by the appropriate Committee on Undergraduate Studies upon request of the Head of the Department concerned.

Students wishing waiver of University academic regulations should refer to UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate) Waiver of Regulations.

Where circumstances so warrant, students may seek a waiver of course prerequisites and co-requisites, program and other departmental regulations, faculty regulations, and general academic regulations. Requests for such waivers should be directed according to UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Waiver of Regulations.

The procedures for appealing unfavourable decisions are outlined in UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Appeal of Decisions."

- Under the Faculty of Science, page 507, delete 9 Appeal of Decisions as follows:
"9-Appeal of Decisions
Any student whose request for waiver of Faculty regulations has been denied has the right to appeal. For further information refer to UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate) - Appeal of Decisions."
- Under the Faculty of Science, page 507, renumber 10 Program Regulations as Section 11.
- Under the Faculty of Science, page 507, 10.1 Biochemistry (now Section 11.1), amend the third paragraph after the list of programs as follows:
"Candidates for a Mminor in Biochemistry should refer to the Regulations for the General Degree of Bachelor of Science, Clause 7 Minor Programs in the Faculty of Science."

Amend the eighth paragraph as follows:
"Supplementary examinations will be allowed in certain Biochemistry courses which have written final examinations. Students should refer to the Faculty of Science Degree Regulations Supplementary Examinations in the Faculty of Science section for details."

- Under the Faculty of Science, page 508, 10.1.1.1 Admission to the Major in Biochemistry (now Section 11.1.1.1), amend Regulation 1(a) as follows:
"a. English 1090 or the former English 1080, 1110(or equivalent) Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses"

Correct the capitalisation of Note 3 as follows:
"3. It is Is recommended that students who wish to pursue future studies in biophysics or related fields or who are considering postgraduate health professional programs take Physics 1050 as their first Physics course."

- Under the Faculty of Science, page 508, amend 10.1.1.2 Admission to the Honours Degree in Biochemistry (now Section 11.1.1.2) as follows:
"Students normally should apply for an Honours program at the completion of their third year of studies. To be eligible for admission, students must be in Honours standing as per Academic Standing 6.5.6.1 of in the Degree Regulations for the Honours Degree of Bachelor of Science. To be considered for early admission to an Honours program in Biochemistry at the end of second year, students must have achieved at least $70 \%$ in each of Biochemistry 2100 and 2101 and Chemistry 2400, 2401."
- Under the Faculty of Science, page 508, 10.1.1.3 Admission to the Major in Nutrition (now Section 11.1.1.3), amend Regulation 1(a) as follows:
"a. English 1090 or the former English 1080, 1110 (or equivalent) Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses"
- Under the Faculty of Science, page 508, amend 10.1.1.4 Admission to the Honours Degree in Biochemistry (Nutrition) (now Section 11.1.1.4) as follows:
"Students normally should apply for an Honours program at the completion of their third year of studies. To be eligible for admission to the Hhonours program, students must be in Honours standing as per Academic Standing 6.5.6.1 of in the Degree Regulations for the Honours Degree of Bachelor of Science. To be considered for early admission to an Honours program in Nutrition at the end of second year, students must have achieved at least $70 \%$ in each of their required 2000 level Biochemistry and Chemistry courses."
- Under the Faculty of Science, page 508, 10.1.2.1 Major in Biochemistry (now Section 11.1.2.1), insert a new Regulation 1(a) and amend the existing Regulation 1(a) as follows:
"a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000, 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200, 1001)."
-Under the Faculty of Science, page 508, 10.1.2.2 Honours Degree in Biochemistry (now Section 11.1.2.2), insert a new Regulation 1(a) and amend the existing Regulation 1(a) as follows:
"a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. a. English 1090 or the former 1080 (or 1000), 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200, 1001)."

Amend Regulation 2 as follows:
"2. Those courses in which a grade of "B" or an average of 75\% or higher are required, as specified under Academic Standing 7.5.6.1 of in the Degree Regulations for the Honours Degree of Bachelor of Science, are those listed in clauses 1 (b), (c), and (d) above and Chemistry 2400 and 2401."

- Under the Faculty of Science, page 509, 10.1.2.4 Major in Nutrition (now Section 11.1.2.4), insert a new Regulation 1(a) and amend the existing Regulation 1(a) as follows:


## "a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least

 three credit hours in English courses.b. a. English 1090 or the former 1080 (or 1000), and 1110 (or equivalent); Biology 1001 and 1002; Mathematics 1000; Physics 1020 and 1021 (or Physics 1050 and 1051); Chemistry 1050, 1051 (or Chemistry 1200, 1001)."

- Under the Faculty of Science, page 509, 10.1.2.5 Honours Degree in Nutrition (now Section 11.1.2.5), insert a new Regulation 1(a) and amend the existing Regulation 1(a) as follows:
"a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. a. English 1090 or the former 1080 (or 1000), 1110; Biology 1001 and 1002;

Mathematics 1000; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1050, 1051 (or Chemistry 1200, 1001)."

Amend Regulation 2 as follows:
"2. Those courses in which the grades a grade of "B" or an average of $75 \%$ or higher are required, as specified under Academic Standing 7.5.6.1 of in the Degree Regulations for the Honours Degree of Bachelor of Science are 60 credit hours chosen from Biochemistry courses, Med 310A/B, and Biology 3050."

- Under the Faculty of Science, page 510, 10.2 Biology (now Section 11.2), amend the first paragraph after the list of programs as follows:
"Details of joint programs are given in Joint Program Regulations after the Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Science, page 510, 10.2.1 Entrance Requirements (now Section 11.2.1), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080, 1110 of equivalent"
- Under the Faculty of Science, page 510, 10.2.3.1 Major in Biology (now Section 11.2.3.1), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080, 1110-or equivalent"

Amend Regulation 7 as follows:
"7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in Clause 3.a. of the Degree Regulations for the General Degree of Bachelor of Science."

- Under the Faculty of Science, page 510, 10.2.3.2 Major in Biology (Cell and Molecular) (now Section 11.2.3.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080, 1110 or equivalent"

Amend Regulation 7 as follows:
"7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in Clause 3.a. of the Degree Regulations for the General Degree of Bachelor of Science."

- Under the Faculty of Science, page 511, 10.2.3.3 Major in Biology (Ecology and Conservation) (now Section 11.2.3.3), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080, 1110 of equivalent"

Amend Regulation 7 as follows:
"7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in Glause 3.a. of the Degree Regulations for the General Degree of Bachelor of Science."

- Under the Faculty of Science, page 512, 10.2.4 Honours Degrees (now Section 11.2.4), amend the first and second paragraphs as follows:
"The attention of students wishing to take Honours is called to those sections of the Calendar dealing with the Degree Regulations for the Honours Degree of Bachelor of Science (Honours).

Sixty-nine credit hours in courses, including the 6 first year credit hours and the 15 required core credit hours outlined in the regulations for the General Degree, and the Honours Dissertation (Biology 499A/499B), shall be taken from the Department of Biology offering. Students may elect to complete an Honours Program in Biology or in one of the Jjoint Honours Programs listed at the start of the Biology section of the Calendar under the heading "Programs in Biology". Programs of students taking Honours shall be drawn up in consultation with the student's supervisor, and must be approved by the Head of the Department (or his/her delegate) in accordance with Admission and Registration, clause 2. of the Regulations for the Honours Degree of Bachelor of Science."

- Under the Faculty of Science, page 513, 10.2.5.2 Core Course Requirements (now Section 11.2.5.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and 1110 (or equivalent)"
- Under the Faculty of Science, page 513, 10.2.6.2 Core Course Requirements (now Section 11.2.6.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and 1110 (or equivalent)"
- Under the Faculty of Science, page 514, 10.2.7.2 Core Course Requirements (now Section 11.2.7.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and 1110 (or equivalent)"
- Under the Faculty of Science, page 514, 10.2.8.2 Core Course Requirements (now Section 11.2.8.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and 1110 (or equivalent)"
- Under the Faculty of Science, page 515, 10.3.4 General Degree - Major in Chemistry (now Section 11.3.4), amend the prefatory paragraph as follows:
"Students wishing to take a Major in Chemistry should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science. The courses required for a Major in Chemistry are:"
- Under the Faculty of Science, page 515, amend 10.3.5 Honours Degree in Chemistry (now Section 11.3.5), as follows:
"Students wishing to take Honours should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Science, page 516, 10.3.5.2 Other Information (now Section 11.3.5.2), amend Regulation 1 as follows:
"1. Those courses in which a grade of B or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, Academic Standing, clause a., are the courses beyond first year used to satisfy clause 1. under Required Courses above."

Amend Regulation 6(a) as follows:
"a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses Six credit hours in English."

In Regulation 13, correct the spelling of the word "of" as follows:
"13. Details of the Environmental Science (Chemistry Stream) Major or Honours are outlined under the Grenfell Campus section off the Calendar."

- Under the Faculty of Science, page 516, amend 10.3.6 General Degree - Major in Computational Chemistry (now Section 11.3.6) as follows:
"Students wishing to take a Major in Computational Chemistry should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science."
- Under the Faculty of Science, page 516, 10.3.6.1 Required Courses (now Section 11.3.6.1), amend Regulation 7 as follows:
"7. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090-or the former English 1080-and English 1110 or equivalent."
- Under the Faculty of Science, page 516, 10.3.6.2 Suggested Program of Study (now Section 11.3.6.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090-or the former English 1080-and English 1110 or equivalent."
- Under the Faculty of Science, page 516, amend 10.3.7 Honours Degree in Computational Chemistry (now Section 11.3.7) as follows:
"Students wishing to take Honours in Computational Chemistry should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Science, page 516, 10.3.7.1 Required Courses (now Section 11.3.7.1), amend Regulation 8 as follows:
"8. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090-or the former English 1080-and English 1110 or equivalent."
- Under the Faculty of Science, page 517, 10.3.7.2 Suggested Program of Study (now Section 11.3.7.2), amend Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and English 1110 or equivalent."
- Under the Faculty of Science, page 517, 10.3.7.3 Other Information (now Section 11.3.7.3), amend Regulation 1 as follows:
"1. Those courses in which a grade of B or an average of 75\% or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, Academic Standing, clause a., are the courses beyond first year used to satisfy the required course list."
- Under the Faculty of Science, page 517, amend 10.3.8 General Degree in Chemistry (Biological) (now Section 11.3.8) as follows:
"Students wishing to pursue a General Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible, and should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science."
- Under the Faculty of Science, page 517, 10.3.8.1 Required Courses (now Section 11.3.8.1), amend Regulation 7 as follows:
"7. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."
- Under the Faculty of Science, page 517, 10.3.8.2 Other Information (now Section 11.3.8.2), insert a new Regulation 1 and amend the existing Regulation 1 as follows:


## "1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least

 three credit hours in English courses.2. 3. Six credit hours in English, Chemistry 1050 and 1051, Biology 1001 and 1002, Physics 1050 (or 1020) and Physics 1051 (or 1021), and Mathematics 1000 and 1001."

- Under the Faculty of Science, page 517, amend 10.3.9 Honours Degree in Chemistry (Biological) (now Section 11.3.9) as follows:
"Students wishing to take Honours should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science. Students wishing to pursue an Honours Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible."
- Under the Faculty of Science, page 517, 10.3.9.1 Required Courses (now Section 11.3.9.1), amend Regulation 8 as follows:
"8. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses."
- Under the Faculty of Science, page 518, 10.3.9.2 Other Information (now Section 11.3.9.2), insert a new Regulation 1 and amend the existing Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.

2. 3. Six credit hours in English, Chemistry 1050 and 1051, Biology 1001 and 1002, Physics 1050 (or 1020) and Physics 1051 (or 1021), and Mathematics 1000 and 1001."

Amend Regulation 2 (now Regulation 3) as follows:
"Those courses in which a grade of B or an average of $75 \%$ or higher are required as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, Academic Standing, clause a., are the courses beyond first year used to satisfy clauses 1.-5. under Required Courses above."

- Under the Faculty of Science, page 518, 10.4 Computer Science (now Section 11.4) amend the seventh item in the program list as follows:
"7. Computer Science and Physics Joint Honours (B.Sc. only)"
Amend the eighth item in the program list as follows:


## "8. Computer Science and Physics Joint Major (B.Sc. only)"

Amend the eleventh item in the program list as follows:
"11. Computer Science and Statistics Joint Honours (B.Sc. only)"
Amend the seventeenth item in the program list as follows:
"17. Minor in Computer Science (B.A., B.Sc.)"
Amend the first paragraph after the program list as follows:
"Details of joint program offerings in the Faculties of Humanities and Social Sciences and Science may be found in the Faculty of Science section under the heading Joint Programs Regulations following the heading-Regulations for the Honours Degree of Bachelor of Science."

- Under the Faculty of Science, page 518, 10.4.1 Major in Computer Science (now Section 11.4.1), add the following prefatory paragraph:
"As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, a student must complete the following courses."
- Under the Faculty of Science, page 519, 10.4.2 Major in Computer Science (Smart Systems) (B.Sc. only) (now Section 11.4.2), add the following prefatory paragraph:
"As a component of the Degree Regulations for the General Degree of Bachelor of Science, a student must complete the following courses."
- Under the Faculty of Science, page 519, 10.4.3 Major in Computer Science (Visual Computing and Games) (B.Sc. only) (now Section 11.4.3), add the following prefatory paragraph:
"As a component of the Degree Regulations for the General Degree of Bachelor of Science, a student must complete the following courses."
- Under the Faculty of Science, page 519, 10.4.4 Honours in Computer Science (now Section 11.4.4), amend Regulation 1 as follows:
"1. See Regulations for the Honours-Degree of Bachelor of Arts (Honours) Degree Regulations or Degree Regulations for the Honours Degree of Bachelor of Science (as appropriate)."
- Under the Faculty of Science, page 519, 10.4.5 Honours in Computer Science (Software Engineering) (B.Sc. Only) (now Section 11.4.5), amend Regulation 1 as follows:
"1. See Degree Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Science, page 520, amend 10.4.8 Supplementary Examinations (now Section 11.4.8) as follows:
"Supplementary examinations will be allowed in certain Computer Science courses which have written final examinations. Students should refer to Supplementary Examinations in the Faculty of Science section the Faculty of Science-Degree Regulations for details."
- Under the Faculty of Science, page 521, 10.5.4.1 Common Block of Required Courses (now Section 11.5.4.1), amend the first paragraph of Regulation 1 as follows:
"1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and 1110 (or equivalent), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 or Chemistry 1200 and 1001, Physics 1050 and 1051 or Physics 1020 and 1021. Students are advised to consult the Department of Physics Course Descriptions section for credit restrictions."
- Under the Faculty of Science, page 521, 10.5.5 Honours B.Sc. Degree in Earth Sciences (now Section 11.5.5), amend Regulation 4 as follows:
"4. Additional credit hours selected to conform with regulations for the Honours Degree of Bachelor of Science so as to achieve a total of 120 credit hours. Students are encouraged to complete a minor in another department."
- Under the Faculty of Science, page 522, 10.5.6 General B.Sc. Degree in Earth Sciences (now Section 11.5.6), amend Regulation 3 as follows:
"3. Additional credit hours selected to conform with regulations for the General Degree of Bachelor of Science so as to achieve a total of 120 credit hours. Students are encouraged to complete a minor in another department."
- Under the Faculty of Science, page 523, 10.8 Mathematics and Statistics (now Section 11.8), amend the twenty-second item in the program list as follows:
"22. Pure Mathematics and Statistics Joint Honours (B.Sc. only)"
Amend the first paragraph after the program list as follows:
"Details of Joint Major and Joint Honours these programs are given under Joint Program Regulations after the Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Science, page 524, 10.8.4 Major in Applied Mathematics (B.Sc. Only) (now Section 11.8.4), amend the prefatory paragraph as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, sStudents shall complete the following requirements:"
- Under the Faculty of Science, page 524, 10.8.5 Major in Pure Mathematics (now Section 11.8.5), amend the prefatory paragraph as follows:
"As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, sStudents shall complete the following requirements:"
- Under the Faculty of Science, page 524, 10.8.6 Major in Statistics (now Section 11.8.6), amend the prefatory paragraph as follows:
"As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, sStudents shall complete the following requirements:"
-Under the Faculty of Science, page 524, 10.8.7 Honours in Applied Mathematics (B.Sc. Only) (now Section 11.8.7), amend the prefatory paragraph as follows:
"See Degree Regulations for the Honours Degree of Bachelor of Science. Students shall complete the following:"
- Under the Faculty of Science, page 525, 10.8.8 Honours in Pure Mathematics (now Section 11.8.8), amend the prefatory paragraph as follows:
"See Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations (as appropriate). Students shall complete the following requirements:"
- Under the Faculty of Science, page 525, 10.8.9 Honours in Statistics (now Section 11.8.9), amend the prefatory paragraph as follows:
"See Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations (as appropriate). Students shall complete the following requirements:"
- Under the Faculty of Science, page 526, 10.9.3 Major in Ocean Sciences and Major in Ocean Sciences (Environmental Systems) (now Section 11.9.3), amend the third paragraph as follows:
"Students wishing to take one of these major programs are encouraged to carefully consult the Degree Regulations,-Regulations for the General Degree of Bachelor of Science."
- Under the Faculty of Science, page 526, 10.9.3.1 Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems) (now Section 11.9.3.1), amend Regulation 4 as follows:


## "4. English 1090 and 1110 (or equivalent) Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;"

- Under the Faculty of Science, page 526, 10.9.3.2 Program Regulations for the Bachelor of Science with Major in Ocean Sciences (now Section 11.9.3.2), amend Regulation 5 as follows:
"extra Science courses as necessary to fulfil the minimum requirement for 78 credit hours in Science as stipulated under Electives in Clause 3.a. of the Degree
Regulations,-Regulations for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level; and"
- Under the Faculty of Science, page 527, 10.10 Physics and Physical Oceanography (now Section 11.10), amend the first paragraph after the program list as follows:
"Details of Joint Major and Joint Honours these joint programs are given under Joint Program Regulations after the Regulations for the Honours Degree of Bachelor of
Science. Other joint programs may be arranged in consultation with the departments concerned."
- Under the Faculty of Science, page 527, 10.10.2 Major in Physics (now Section 11.10.2), insert a new prefatory paragraph and amend Regulation 1 as follows:


## "As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and English 1110 (or equivalent)."

- Under the Faculty of Science, page 527, 10.10.3 Honours in Physics (now Section 11.10.3), insert a new prefatory paragraph and amend Regulation 1 as follows:
"As a component of the Degree Requirements for the Honours Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and English 1110 (or equivalent)."

- Under the Faculty of Science, page 528, 10.10.4 Major in Environmental Physics (now Section 11.10.4), insert a new prefatory paragraph and amend Regulation 1 as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080 and English 1110 (or equivalent)"

- Under the Faculty of Science, page 528, 10.10.5 Honours in Environmental Physics (now Section 11.10.5), insert a new prefatory paragraph and amend Regulation 1 as follows:
"As a component of the Degree Requirements for the Honours Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090-or the former English 1080 and English 1110 (or equivalent)"

Amend the third paragraph following the program regulations as follows:
"Those courses in which a grade of "B" or better or an average of $75 \%$ or higher are required, as specified under Academic Standing,clause 1 of in the Degree
Regulations for the Honours Degree of Bachelor of Science, are 45 credit hours in Physics courses, and 15 credit hours in other courses (beyond the 1000 level) selected from the specified program courses in Earth Sciences, Geography and Biology."
-Under the Faculty of Science, page 530, 10.11 Psychology (now Section 11.11), amend the first item in the program list as follows:
"1. Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. Hons. only)"

Amend the second item in the program list as follows:
"2. Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. Hons. only)"

Amend the third item in the program list as follows:
"3. Biology and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. Hons. only)"

Amend the fourth item in the program list as follows:
"4. Biology and Psychology Joint Honours (B.Sc. Hons. only)"
Amend the sixth item in the program list as follows:
"6. Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. Hons. only)"
Amend the first paragraph after the program list as follows:
"Details of the Jjoint Hhonours programs are given under Joint Program Regulations the Degree-Regulations of the Faculty of Science."

- Under the Faculty of Science, page 530, 10.11.1 Admission to Major Programs (now Section 11.11.1), amend the first paragraph as follows:
"Admission to the Major programs in the Department of Psychology is competitive and selective. Students who wish to enter these programs must submit a completed application form to the Psychology Department by June 1 for Fall semester registration. To be eligible for admission, students must have completed the 24 credit hours as listed below with an average of at least 65\% in Psychology 1000/1001 and an overall average of at least 60\% in Psychology, Critical Reading and Writing English, and Mathematics:"

Amend Regulation 2 as follows:
"2. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080-and one of 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110, or equivalent."

- Under the Faculty of Science, page 530, 10.11.2 Admission to Honours Programs (now Section 11.11.2), amend the Note as follows:
"Note: Students are advised to consult the Bachelor of Arts (Honours) Degree Regulations or Degree Regulations for the Honours Degree of Bachelor of Science general regulations for Honours in the Faculty of Humanities and Social Sciences or the Faculty of Science, as appropriate."
- Under the Faculty of Science, page 530, 10.11.3 Requirements for a Major in Psychology (now Section 11.11.3), amend Regulation 1 as follows:
"Students may Major in Psychology as part of either a B.A. or a B.Sc. program, and should consult the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate.
All Majors are required to complete a minimum of 42 credit hours of Psychology as listed below:"
- Under the Faculty of Science, page 530, 10.11.4 Requirements for Honours in Psychology (now Section 11.11.4), amend Regulation 1 as follows:
"Honours students in Psychology should consult Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations, as appropriate. All Honours students are required to complete the 60 credit hours of Psychology as listed below:"
- Under the Faculty of Science, page 531, 10.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only) (now Section 11.11.5), amend the third prefatory paragraph as follows:
"As a component of the Degree Requirements for the General Degree of Bachelor of Science, t t he program for a Major in Behavioural Neuroscience shall include:"

Amend Regulation 2(e) as follows:
"e. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses English 1090 or the former English 1080-and one of 1191 or the former 1101,1192 or the former 1102,1193 or the former 1103, or 1110, or equivalent."

- Under the Faculty of Science, page 532, 10.11.6 Requirements for Honours in Behavioural Neuroscience (B.Sc. Only) (now Section 11.11.6), amend the prefatory paragraph as follows:
"Students in Behavioural Neuroscience should consult Degree Regulations for the Honours Degree of Bachelor of Science. Students completing this program cannot receive credit for Psychology 2920."

Amend Regulation 3 as follows:
"In accordance with Academic Standing,clause 1 of under the Degree Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of " B " or better, OR an average of $75 \%$ or higher in all the required courses listed in Clauses 1. and 3. of the requirements for a major in Behavioural Neuroscience and Clause 1 of the requirements for honours in Behavioural Neuroscience, except those at the 1000 level."

- Under the Faculty of Science, page 533, 10.11.9 Suggested Course Sequences (now Section 11.11.9), amend the third line of the Fall Semester 1 entry of Table 1 as follows:
"Critical Reading and Writing requirement English 1090-or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 1 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103 , or 1110 "

Amend the third line of the Fall Semester 1 entry of Table 2 as follows:
"Critical Reading and Writing requirement English 1090 or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 2 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110"

Amend the third line of the Fall Semester 1 entry of Table 3 as follows:
"Critical Reading and Writing requirement English 1090 or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 3 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103 , or 1110 "

Amend the third line of the Fall Semester 1 entry of Table 4 as follows:
"Critical Reading and Writing requirement English 1090 or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 4 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110 "

Amend the third line of the Fall Semester 1 entry of Table 5 as follows:
"Critical Reading and Writing requirement English 1090 or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 5 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103, or 1110"

Amend the third line of the Fall Semester 1 entry of Table 6 as follows:
"Critical Reading and Writing requirement English 1090 or the former English 1080"
Amend the third line of the Winter Semester 2 entry of Table 6 as follows:
"Critical Reading and Writing requirement English 1191 or the former 1101, 1192 or the former 1102, 1193 or the former 1103 , or 1110 "

## Secondary Calendar Changes (Track Change Version)

- Under the Faculty of Humanities and Social Sciences, page 291, 6.8 Joint Degrees of Bachelor of Arts and Bachelor of Science, amend Regulation 2 as follows:
"2. Admission to the Major programs shall be governed by Faculty of Humanities and Social Sciences - Admission to the Bachelor of Arts General Degree Programs and Faculty of Science - Degree-Regulations - Admission to the Department of Subject of Major."

Delete Regulation 3:
"3. Where an admission requirement or program regulation for the Major program from the Faculty of Science includes English 1090 (or the former English 1080) and English 1110 (or equivalent), such requirements may instead be satisfied by the completion of 3 credit hours in any 1000 -level Critical Reading and Writing (CRW) course offered by the Department of English, and an additional 3credit hours in any Faculty of Humanities and Social Sciences course whose title begins with "Critical Reading and Writing" chosen from those listed under Core-Requirements - Critical Reading and Writing (CRW) Requirement for the Bachelor of Arts."

- Under the Faculty of Humanities and Social Sciences, page 316, 13.4 Computer Science remove the unnecessary forward slash from the fourth item in the program list:
"4. Computer Science $\downarrow$ and Geography Joint Major (B.Sc. only)"
Amend the fifth item in the program list as follows:
"5. Computer Science and Physics Joint Honours (B.Sc. only)"
Amend the sixth item in the program list as follows:
"6. Computer Science and Physics Joint Major (B.Sc. only)"
Amend the ninth item in the program list as follows:
"9. Computer Science and Statistics Joint Honours (B.Sc. only)"
Amend the eleventh item in the program list as follows:
"11. Honours in Computer Science Honours (B.A., B.Sc.)"
Insert new thirteenth and fourteen items in the program list as follows:
"13. Major in Computer Science (Smart Systems) (B.Sc. only)

14. Major in Computer Science (Visual Computing and Games) (B.Sc. only)"

Amend the seventeenth (now nineteenth) item in the program list as follows:
"19. 17. Minor in Computer Science (B.A., B.Sc.)"

- Under the Faculty of Humanities and Social Sciences, page 317, 13.5.3 Admission Regulations (B.Sc.) amend Regulation 1 as follows:
" 1.6 credit hours in Critical Reading and Writing (CRW) courses, including at least 3 credit hours in English courses; and"
- Under the Faculty of Humanities and Social Sciences, page 317, 13.5.4 Major in Economics (B.A. or B.Sc.) amend Regulation 1 as follows:
"1. Students may Major in Economics as part of either a B.A. or a B.Sc program. See the Regulations for the General Degree of Bachelor of Arts and the Degree Regulations for the General Degree of Bachelor of Science B.Sc. Degrees as appropriate."
- Under the Faculty of Humanities and Social Sciences, page 317, 13.5.5 Honours in Economics (B.A. or B.Sc.) amend Regulation 1 as follows:
"1. See the General Regulations for the B.A. and B.Sc. (Honours) Degrees and the Degree Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Humanities and Social Sciences, page 317, 13.5.7 Joint Programs amend the first paragraph as follows:
"Programs for Joint Majors in Economics and Computer Science, Pure Mathematics, Applied Mathematics or Statistics, and a Joint Major in Statistics and Economics (Cooperative) are found under the heading Joint Program Regulations in the entry for the Faculty of Science."
- Under the Faculty of Humanities and Social Sciences, page 317, 13.5.9.2 Programs of Study amend Regulation 1 as follows:
"1. See the General Regulations for the B.A. and B.Sc. (Honours) Degrees and the Degree Regulations for the Honours Degree of Bachelor of Science."
- Under the Faculty of Humanities and Social Sciences, page 320, amend the first Note following Table 2 Major in Economics (Co-operative Option) B.Sc. - Academic Course Program as follows:
"1. Elective courses should be chosen with reference to the Degree Regulations for the General Degree of Bachelor of Science, since courses specified for admission to and completion of the ECEO only partially satisfy these regulations. In particular note that (1) at least 78 credit hours (26 courses) in Science subjects are required and that (2) at least 3 credit hours in an additional Science subject other than Mathematics/Statistics, Economics and Computer Science must be included in these Science courses."
- Under the Faculty of Humanities and Social Sciences, page 321, amend the second Note following Table 4 Honours in Economics (Co-operative Option) B.Sc. Academic Course Program as follows:
"2. Elective courses should be chosen with reference to the Degree Regulations for the Honours Degree of Bachelor of Science, since courses specified for admission to and completion of the ECEO only partially satisfy these regulations. In particular note that (1) at least 90 credit hours in Science subjects are required and that (2) at least 3 credit hours in an additional Science subject other than Mathematics/Statistics, Economics and Computer Science must be included in these Science courses."

Correct the capitalisation of the fourth Note as follows:
"4. Tthe Statistics and Computer Science elective courses may both be taken in either Term 4 or 5."
-Under the Faculty of Humanities and Social Sciences, page 329, 13.10.3 Major in Geography (B.A. or B.Sc.) amend Regulation 1 as follows:
"Students may complete a Major in Geography as part of either a B.A. or B.Sc. program. See the Regulations for the General Degree of Bachelor of Arts and Degree Regulations for the General Degree of Bachelor of Science degrees as appropriate."

- Under the Faculty of Humanities and Social Sciences, page 330, 13.10.4 Honours in Geography (B.A. or B.Sc.) amend Regulation 2(a) as follows:
"a. comply with the Regulations for the Honours Degree of Bachelor of Arts or Degree Regulations for the Honours Degree of Bachelor of Science as appropriate; and"
- Under the Faculty of Humanities and Social Sciences, page 330, 13.10.6 Joint Programs amend the first paragraph as follows:
"Regulations for the Joint Honours in Computer Science and Geography, Joint Honours in Geography/Earth Sciences, and Joint Major in Computer Science and Geography are found under the heading Joint Program Regulations in the entry for the Faculty of Science."
- Under the Faculty of Humanities and Social Sciences, page 334, 13.13 Mathematics and Statistics, amend the nineteenth item the program list as follows:
"19. Pure Mathematics and Statistics Joint Honours (B.Sc. only)"
- Under the Faculty of Humanities and Social Sciences, page 355, 13.17 Psychology, amend the first item in the program list as follows:
"1. Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc.
Hons. only)"
Amend the second item in the program list as follows:
"2. Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. Hons. only)"

Amend the third item in the program list as follows:
"3. Biology and Psychology Joint Honours (B.Sc. Hons. only)"
Amend the fourth item in the program list as follows:
"4. Biology and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. Hons. only)"

Insert a new sixth item in the program list as follows:
"6. Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)"
Insert a new eighth item in the program list as follows:
"8. Major and Honours in Psychology (Co-operative) (B.Sc. only)"
Amend the sixth (now ninth) item in the program list as follows:
"9. 6. Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. Hons. only)"

## Calendar Changes (Clean Version)

## Faculty of Science

Personnel

[No change]

## 1 The Memorial University of Newfoundland Code

[No change]
2 Student Code of Conduct
[No change]

## 3 Faculty Description

[No change]

## 4 Degree Regulations

Students must meet all regulations of the Faculty of Science in addition to those stated in the general regulations. For information concerning fees and charges, admission/readmission to the University, and general academic regulations (undergraduate), refer to UNIVERSITY REGULATIONS.

Upon meeting the qualifications for any of the programs offered by the Faculty of Science, a student must apply to graduate, by the appropriate deadline date, on the prescribed "Application for Graduation" form. This form may be obtained on-line via Memorial Self Service at www3.mun.ca/admit/twbkwbis.P_WWWLogin. Additional information is available from the Office of the Registrar.

### 4.1 Programs in the Faculty of Science

1. The Faculty of Science offers a variety of programs which lead to a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science. These programs consist of a minimum of 120 credit hours in courses which include the following:
a. the Core Requirements, as described under Core Requirements and Academic Advising,
b. a Program of Study, as described under Programs of Study for the General Degree of Bachelor of Science and Programs of Study for the Honours Degree of Bachelor of Science, as part of which one or more Major programs shall be completed, and
c. a number of additional courses, as described under Electives.
2. In conjunction with the Faculty of Humanities and Social Sciences, the Faculty of Science offers the Joint Degrees of Bachelor of Arts and Bachelor of Science, which simultaneously leads to both a General Degree of Bachelor of Science and a General Degree of Bachelor of Arts.
3. The Faculty of Science also offers a number of Minor programs, as described under Minor Programs in the Faculty of Science. These are available to students completing a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science, but may also be undertaken by students in other degree programs should the regulations of those programs permit it.
4. A Major or a Minor consists, in part, of an approved concentration of courses in a single subject area, known respectively as the Major subject or Minor subject. These subject areas may include: Biochemistry, Biology, Chemistry, Computer Science, Earth Sciences, Economics, Geography, Mathematics and Statistics, Ocean Sciences, Physics, or Psychology.
5. For the purposes of a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science, a student may complete at most one Major program from each department which offers more than one, and may not complete a Minor program from the department of any of the student's Major programs.
6. When a Major program may be completed both as part of the Degree of Bachelor of Science and the Degree of Bachelor of Arts, students are free to choose the degree program they wish to follow and may change from one to the other; however, they may not obtain both degrees in the same Major program at this University.

### 4.2 Admission

### 4.2.1 Admission to the General Degree of Bachelor of Science

1. Declaration of the General Degree of Bachelor of Science may be made as part of a student's application for admission to the University, subject to the general undergraduate requirements for admission or readmission, or by current students by means of the Declaration/Change of Academic Program form, which is available at www.mun.ca/regoff/registration/DeclarationChange_AcadProg_ArtsSci.pdf.
2. A student who intends to complete the General Degree of Bachelor of Science must declare one or more Majors. This declaration is made by formal application to each department which administers one of the intended Major subjects, known as the Major department(s).
a. Declaration of one or more Majors may normally be made upon the successful completion of 30 credit hours in courses, which must include those courses set forth under Core Requirements. However, additional requirements for the declaration of certain Majors may be imposed by the corresponding Program Regulations.
b. Declaration of a Major may be made using the Declaration/Change of Academic Program form as described above. Certain Majors may additionally or alternatively require the submission of an appropriate Departmental Application for Admission form.
c. Admission to certain Major programs is limited and competitive.
d. Before declaring a Major, a student is strongly encouraged to consult with each Major department and/or the Senior Faculty Adviser of the Faculty of Science.
e. A student may change Majors or add an additional Major, provided acceptance has first been received to the new Major program to which application is being made.

### 4.2.2 Admission to the Honours Degree of Bachelor of Science

1. A student who wishes to be admitted to an Honours program must submit an Application for Admission to Honours Program form, which is available at www.mun.ca/regoff/Application_Honours_Program.pdf.
a. This form shall be submitted to each Major department, and to the Office of the Registrar, not earlier than the first semester following the completion of 60 credit hours, and not later than the final date set for the application to graduate with the Honours Degree.
b. A student must complete all of the Core Requirements before seeking admission to an Honours program.
2. Otherwise qualified students who fail to declare their intention to obtain an Honours Degree of Bachelor of Science on or before the last day of the period outlined above shall be awarded a General Degree of Bachelor of Science even if they fulfil all other requirements for an Honours Degree. The University cannot undertake to notify students of their eligibility for an Honours Degree.
3. A student who has been awarded a General Degree of Bachelor of Science may convert it to an Honours Degree of Bachelor of Science by submitting an Application for Admission to Honours Program form as described above, and by completing all of the requirements for the Honours Degree as outlined in these regulations.

### 4.2.3 Admission to a Minor Program in the Faculty of Science

1. Declaration of a Minor program in the Faculty of Science may be made by means of the Declaration/Change of Academic Program form, which is available at www.mun.ca/regoff/registration/DeclarationChange_AcadProg_ArtsSci.pdf. The department which administers the intended Minor subject is known as the Minor department.

### 4.3 Core Requirements and Academic Advising

1. A candidate for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science shall complete the Core Requirements, which consist of the following:
a. six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses,
b. six credit hours in Mathematics and Statistics courses, and
c. six credit hours in courses from each of two subject areas listed under Programs in the Faculty of Science other than Mathematics and Statistics.
2. Candidates for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science, as well as students enrolled in a Minor program in the Faculty of Science, are strongly encouraged to consult regularly with the Head (or delegate) of each Major department and Minor department to discuss course registrations, to ensure compliance with all relevant academic regulations, and to seek advice regarding programs suitable for a student's particular needs.

### 4.4 Programs of Study for the General Degree of Bachelor of Science

1. The Program of Study for the General Degree of Bachelor of Science is determined by the student's declared Major(s).
a. When a student has declared a single Major, that student's Program of Study shall consist of the requirements for the corresponding Major program, as set forth in the Program Regulations.
b. When a student has declared more than one Major in a combination for which a Joint Major program exists, as set forth in the Joint Program Regulations, that student's Program of Study shall consist of the requirements for the Joint Major program.
c. When a student has declared more than one Major in a combination for which no corresponding Joint Major program exists, that student's Program of Study shall consist of the requirements for each of the respective Major programs, called a Double Major program.
2. The Program of Study for a General Degree shall normally require the student to complete not fewer than 36 credit hours nor more than 45 credit hours in courses from each of the Major subjects, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of an extraordinary number of credit hours.
3. A Program of Study may require the student to complete additional courses from subject areas other than the Major subject(s).
4. A student's Program of Study shall also include such additional requirements of each Major department as are approved by the Senate and printed in the Calendar.
5. At least 15 credit hours in courses from each Major subject at the 3000 -level or above must be completed at this University.

### 4.5 Programs of Study for the Honours Degree of Bachelor of Science

An Honours Degree of Bachelor of Science offers greater specialization in a given field of knowledge than a General Degree, and requires higher than average academic achievement. Possession of this degree would be of great advantage to all students planning more advanced work in their chosen field. In many cases, an Honours Degree is a prerequisite for admission to a graduate program. The Program of Study for an Honours Degree consists of two components: the Course Requirements and one of a Comprehensive Examination and Dissertation. In addition, specific Departmental Regulations may apply.

### 4.5.1 Course Requirements

1. The Program of Study for the Honours Degree of Bachelor of Science is determined by the student's declared Major(s).
a. When a student has declared a single Major, that student's Program of Study shall consist of the requirements for the corresponding Honours program, as set forth in the Program Regulations.
b. When a student has declared more than one Major in a combination for which a Joint Honours program exists, as set forth in Joint Program Regulations, that student's Program of Study shall consist of the requirements for the Joint Honours program.
c. When a student has declared more than one Major in a combination for which no corresponding Joint Honours program exists, that student may obtain permission to complete a sui generis Honours program, on the recommendation of the Head of each Major department. The sui generis Honours program must be approved by the Committee on Undergraduate Studies of the Faculty of Science.
2. The Program of Study for the Honours Degree shall normally require the student to complete courses from the Major subject(s) as follows, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of an extraordinary number of credit hours:
a. in the case of an Honours program, not fewer than 60 credit hours in the Major subject;
b. in the case of a Joint Honours or sui generis Honours program, not fewer than 84 credit hours in the Major subjects, including not fewer than 36 credit hours in each of the Major subjects.
3. A Program of Study may require the student to complete additional courses from subject areas other than the Major subject(s).
4. When a student is compelled to complete more than 120 credit hours in order to satisfy the prerequisites of courses required for a Program of Study, all of the courses which a student was required to complete in order to satisfy the requirements of the Honours Degree shall be used in the determination of the student's Academic Standing.

### 4.5.2 Comprehensive Examination and Dissertation

1. A candidate for the Honours Degree of Bachelor of Science shall complete one of the following options, at the discretion of the Head of each Major department:
a. the student shall pass a general comprehensive examination in the Major subject(s), or
b. the student shall submit a dissertation of a standard acceptable to the Head of each Major department, who shall also have the option of requiring the student to pass an oral examination thereon. The Honours dissertation shall be equivalent to either a 3 credit hour course or a 6 credit hour linked course, as specified in the course offerings of the Major department(s).
2. If a student is required to submit a dissertation, this dissertation must be submitted to the University Library before the Honours Degree is conferred. The deadline for the submission of Honours dissertations shall be no later than three weeks before the end of the final semester of the student's program.
3. All Honours dissertations in the University Library shall be available for unrestricted consultation by students and faculty except under very exceptional circumstances which must be approved by the Head of each Major department. Copyright remains with the author. A release form, signed by both
the author and the Head of each Major department, must accompany a dissertation when it is submitted to the University Library.

### 4.5.3 Departmental Regulations

A candidate for the Honours Degree of Bachelor of Science shall also comply with such additional requirements of each Major department as are approved by the Senate and printed in the Calendar.

### 4.5.4 Residence Requirements

To qualify for an Honours Degree of Bachelor of Science, a student shall attend a recognized university or an equivalent institution for at least seven semesters as a full-time student. Students transferring credits to Memorial University of Newfoundland from other universities or equivalent institutions shall either:

1. spend a minimum of four of the seven semesters as full-time students at Memorial University of Newfoundland and take a minimum of 24 credit hours in courses from their Major subject(s) from this University, or
2. spend fewer than four of the seven semesters as full-time students at Memorial University of Newfoundland and take a minimum of 36 credit hours in courses from their Major subject(s) from this University.

### 4.6 Electives

In addition to the Core Requirements and the Program of Study, a candidate for the General Degree of Bachelor of Science or the Honours Degree of Bachelor of Science shall complete additional courses to satisfy the requirement of 120 credit hours, subject to the following:

1. Including the courses which comprise the Core Requirements and the Program of Study, the student shall complete courses from subject areas listed under Programs in the Faculty of Science with a total number of credit hours as follows:
a. at least 78 credit hours in the case of a candidate for the General Degree of Bachelor of Science, or
b. at least 90 credit hours in the case of a candidate for the Honours Degree of Bachelor of Science.
2. There shall be not fewer than five subjects in which the student shall have completed courses. At least four of these subjects shall be chosen from the subject areas listed under Programs in the Faculty of Science.
3. Not more than 15 unspecified transfer credit hours awarded in subject areas not taught at Memorial University of Newfoundland shall be used to satisfy the requirements of the degree.
4. The student may choose to take additional courses in a Major subject beyond those specified in the Program of Study.
5. The student may choose to complete a Minor program available in the Faculty of Science, the Faculty of Business Administration, the Faculty of Engineering and Applied Science, the Faculty of Humanities and Social Sciences, or the School of Music, in accordance with the regulations for the Minor program as set forth in the appropriate section of the Calendar.

### 4.7 Minor Programs in the Faculty of Science

1. A Minor program shall be as set forth in the Program Regulations.
2. A Minor program shall consist of at least 24 credit hours in courses. These courses shall normally be from the Minor subject, except in cases where it has been deemed that an appropriate rationale exists to warrant the requirement of courses from subject areas other than the Minor subject.
3. Students who have taken courses appropriate to their Minor at another university are required to complete at least 6 credit hours in courses from the Minor subject at this University. These courses must be chosen in consultation with the Head of the Minor department.

### 4.8 Graduation Requirements

### 4.8.1 Academic Standing

1. To obtain a General Degree of Bachelor of Science, in addition to meeting all of the requirements set forth under Programs in the Faculty of Science, a student shall have:
a. satisfied the conditions of UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation - Application for Graduation - Degrees, Diplomas and Certificates;
b. obtained an average of at least 2.0 points in the minimum number of prescribed courses in the Major subject(s) and any additional courses identified for this purpose in the Departmental Regulations; and
c. obtained an average of at least 2.0 points in the 78 credit hours in courses from subject areas listed under Programs in the Faculty of Science required for the degree, as set forth under Electives.
2. To obtain an Honours Degree of Bachelor of Science, in addition to meeting all of the requirements set forth under Programs in the Faculty of Science, a student shall have:
a. satisfied the conditions of UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation - Application for Graduation - Degrees, Diplomas and Certificates;
b. obtained a grade of "B" or better in each of the prescribed courses in the Major subject(s) excluding any 1000-level courses, and any additional courses identified for this purpose in the Departmental Regulations, OR an overall average of 75\% or higher in those courses (whichever is to the candidate's advantage); and
c. an average of at least 2.75 points in the total number of courses required for the degree. If a student was required to complete more than 120 credit hours in order to satisfy the prerequisites of courses required for the Program of Study, as provided for under Programs of Study for the Honours Degree of Bachelor of Science, then all such courses shall be included in this calculation.
d. A student may, with the approval of the Head of each Major department and the Committee on Undergraduate Studies of the Faculty of Science, repeat or substitute up to three courses in order to meet the requirements of b. above. In counting repeats, each attempt at the same course will count as one course towards the maximum; that is, the same course, repeated three times, would place a student at the maximum and no additional repeats or substitutions would be allowed.
e. A candidate for an Honours Degree of Bachelor of Science who fails to meet the requirements of $b$. or $c$. above but who fulfils the academic requirements for a General Degree of Bachelor of Science shall be awarded a General Degree.
3. To be awarded a Minor, in addition to meeting all of the requirements set forth under Minor Programs in the Faculty of Science, a student shall have obtained an average of at least 2.0 points on the total number of courses required for the Minor program.

### 4.8.2 Classification of Degrees

1. The classification of the General Degree of Bachelor of Science shall be determined in accordance with the UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Graduation.
2. The classification of the Honours Degree of Bachelor of Science shall be determined as follows:
a. Students shall be awarded an Honours degree with First Class standing if they fulfil the conditions outlined under Academic Standing; obtain an average of at least 3.25 points in
the courses prescribed for their Program of Study; and obtain an average of at least 3.5 points in the minimum number of prescribed courses in their Major subject(s), excluding any 1000-level courses, and any additional courses identified for this purpose in the Departmental Regulations.
b. Students shall be awarded an Honours Degree with Second Class standing if they fulfil the conditions outlined under Academic Standing but not of a. above.
c. No classification will be given to the degree awarded to students who have completed fewer than one-half of the courses required for the Honours Degree at this University.

## 5 Bachelor of Science in Nutrition (Dietetics Option)

[No change]

## 6 Joint Degrees of Bachelor of Science and Bachelor of Arts

Students who wish to simultaneously pursue a Bachelor of Science program and a Bachelor of Arts program may do so by completing a minimum of 135 credit hours in courses, rather than the minimum of 150 credit hours required under General Academic Regulations (Undergraduate) - Residence Requirements Second Degree.

Students who complete the Joint Degrees of Bachelor of Science and Bachelor of Arts are not required to complete a minor. Students may complete the requirements for a minor, or an additional (third) major, in accordance with General Academic Regulations (Undergraduate) - Degree and Departmental Regulations - Further Credentials.

Credit hours earned in Computer Science, Economics, Geography, Mathematics and Statistics, and Psychology may be eligible to simultaneously satisfy a requirement for credit hours in the Faculty of Science and a requirement for credit hours in the Faculty of Humanities and Social Sciences.

Careful planning of courses is crucial to ensure timely completion of the Joint Degrees of Bachelor of Science and Bachelor of Arts. Students enrolled in this program, or who plan to enroll in this program, are strongly encouraged to consult regularly with appropriate academic advisors in both the Faculty of Science and the Faculty of Humanities and Social Sciences. It may not be possible to complete the requirements for the Joint Degrees in the normal time if the decision to embark on the program is delayed.

Students who have enrolled in the Joint Degrees of Bachelor of Science and Bachelor of Arts must satisfy all program requirements before they may be granted either the degree of Bachelor of Science or the degree of Bachelor of Arts, and must graduate with both degrees at the same convocation.

1. The minimum of 135 credit hours for the Joint Degrees of Bachelor of Science and Bachelor of Arts shall include:
a. a Major program chosen from those majors offered by departments within the Faculty of Science, with the exception of majors offered by the Department of Economics and the Department of Geography;
b. a Major program chosen from those majors offered by departments within the Faculty of Humanities and Social Sciences and the interdisciplinary Arts majors, with the exception of majors offered by the Department of Computer Science, the Department of Mathematics and Statistics, and the Department of Psychology;
c. the Core Requirements for the Faculty of Humanities and Social Sciences (including the Breadth of Knowledge Requirement, the Critical Reading and Writing Requirement, the Language Study Requirement, and the Quantitative Reasoning Requirement), for which the Quantitative Reasoning Requirement shall be satisfied by six credit hours in Mathematics courses;
d. six credit hours in courses from each of two Sciences other than Mathematics;
e. a total of at least 78 credit hours in courses offered by departments within the Faculty of Science, and a total of at least 78 credit hours offered by departments within the Faculty of Humanities and Social Sciences;
f. no more than six credit hours in courses offered by a Faculty or School other than the Faculty of Science or the Faculty of Humanities and Social Sciences.
While the Joint Degrees of Bachelor of Science and Bachelor of Arts is available to all Major programs offered by the Faculty of Science and the Faculty of Humanities and Social Sciences, students pursuing a major outside of Computer Science, Economics, Geography, Psychology, Pure Mathematics or Statistics should pay special attention to course planning and selection to ensure that this requirement is met within the required 135 credit hours.
2. Admission to the Major programs shall be governed by Faculty of Science - Degree Regulations - Admission and Faculty of Humanities and Social Sciences - Admission to the Bachelor of Arts General Degree Programs.
3. Students who have already completed a bachelor's degree are not eligible to complete the Joint Degrees of Bachelor of Science and Bachelor of Arts, but may separately complete a Bachelor of Science or a Bachelor of Arts in accordance with General Academic Regulations (Undergraduate) - Residence Requirements - Second Degree.

## 7 Limited Enrolment Courses

Certain course offerings in the Faculty of Science will be identified as being Limited Enrolment Courses and will be clearly identified as such in the list of course offerings. Students who have registered for a Limited Enrolment Course must confirm their registration either (1) by attending at least one of the first three hours of lecture in the course and the first meeting of any laboratory section of the course; or (2) by notifying the department in writing within the first five university working days of the semester. Students who do not confirm their registration may be dropped from the course on the recommendation of the Head of Department.

## 8 Supplementary Examinations

1. Supplementary examinations will be allowed in certain courses offered by the Department of Biochemistry, the Department of Computer Science, and the Department of Mathematics and Statistics which have written final examinations. In each course, students will be informed as to the possibility of a supplementary examination during the first week of classes. This information will be provided in writing, as part of the Course Syllabus.
2. Supplementary examinations will be of similar length and degree of difficulty as the original final examination.
3. Students who wish to write a supplementary examination must apply in writing to the appropriate department within one week of the official release of grades by the University.
4. Students who have clear or conditional standing may write a supplementary examination in a course if they obtained a final grade of $45-49 \mathrm{~F}$ and if their grade in the course excluding the original final examination is at least $50 \%$.
5. In order to pass the course, a student who has been approved to write a supplementary examination must pass the supplementary examination. If the student passes the supplementary examination, then a new final grade will be calculated using the same evaluation scheme as used in the course, but with the result of the supplementary examination replacing that of the original final examination. Any additional course requirements, including a requirement to pass the laboratory component of a course, will continue to apply.
6. If the new final grade is higher than the original, it will replace the original grade on the student's transcript, subject to the condition that the new final grade will not exceed the grade which the student had obtained in the course excluding the original final examination. The student's transcript will indicate that the course result was earned as the result of a supplementary examination.
7. Supplementary examinations will be written no later than the first week of the semester immediately following the one in which the course was failed, and will normally coincide with the writing of deferred examinations. Grades for supplementary examinations will be submitted to the Office of the Registrar within one week following the commencement of classes for that semester.
8. A student may write only one supplementary examination for any one registration in a course; if a failing grade is obtained in the course following the supplementary examination then the course must be repeated in order to obtain credit.

## 9 Waiver of Regulations for Undergraduate Students

Where circumstances so warrant, students may seek a waiver of course prerequisites and co-requisites, program and other departmental regulations, faculty regulations, and general academic regulations. Requests for such waivers should be directed according to UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Waiver of Regulations.

The procedures for appealing unfavourable decisions are outlined in UNIVERSITY REGULATIONS General Academic Regulations (Undergraduate), Appeal of Decisions.

## 10 Joint Program Regulations

The following Joint Major, Joint Honours and Joint Option programs which lead to the awarding of a General Degree of Bachelor of Science or an Honours Degree of Bachelor of Science are offered by departments in the Faculty of Science. They are governed by Programs of Study for the General Degree of Bachelor of Science and Programs of Study for the Honours Degree of Bachelor of Science as appropriate.

A joint degree program which leads to the awarding of both the General Degree of Bachelor of Science and the General Degree of Bachelor of Arts can be found under the Faculty of Science at Joint Degrees of Bachelor of Science and Bachelor of Arts and under the Faculty of Humanities and Social Sciences at Joint Degrees of Bachelor of Arts and Bachelor of Science.

### 10.1 Joint Majors

### 10.1.1 Applied Mathematics and Computer Science Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, plus 18 further credit hours in Computer Science courses numbered 3000 or higher.
2. Mathematics $1000,1001,2000,2050,2051,2130,2260,2320,3000,3100,3132,3161,3202$, 4160,4190 , plus one of Mathematics 3210, 4131, 4132, 4162.

In addition, Statistics 2550 is highly recommended.

### 10.1.2 Applied Mathematics and Economics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3100, 3202, 4132, Statistics 2550.
2. Either Mathematics 3132 and 4131 or 3161 and 4160 .
3. A computing course early in the program is required. Computer Science 1510 is highly recommended.
4. Economics: 1010 (or the former 2010), 1020 (or the former 2020), 2550, 3000, 3001, 3010, 4550, 4551.
5. Eighteen further credit hours chosen from among the various Economics courses in consultation with the Head of the Department or delegate, including at least 9 credit hours at the 4000 level.

### 10.1.3 Applied Mathematics and Physics Joint Major

Required course for this degree are:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. A computing course. Computer Science 1510 is recommended.
3. Six credit hours in science other than Mathematics or Physics (if Computer Science is chosen then Computer Science 1510 may be counted as 3 of these hours).
4. Mathematics $1000,1001,2000,2050,2051,2260,3000,3001,3132,3202$.
5. At least one of Mathematics 2130 or Mathematics 2320.
6. Physics 1050 (or 1020), 1051, 2053, 2055, 2750 (or 2056), 2820, 3220, 3400, 3500, 3750.
7. Mathematics 3161 or Physics 3820.
8. At least 15 additional credit hours chosen from Applied Mathematics and Physics courses numbered 3000 or above. At least 3 credit hours are required from Applied Mathematics and 6 credit hours are required from Physics.
9. A writing course. Any one of Mathematics 2130, Physics 3900, Mathematics 419A/B, or Physics 490A/B is acceptable.

The last requirement does not have to be met independently of the other regulations. For example, it can be satisfied either by choosing Mathematics 2130 from clause 5. above or choosing Physics 3900 as a 3000+ elective in clause 8. above.

### 10.1.4 Computer Science and Economics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

## 1. Computer Science Requirements

Forty-two credit hours in Computer Science courses are required: 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2500, 3731, 3753 plus 6 further credit hours in Computer Science courses numbered 3000 or higher.
2. Economics requirements

A total of 42 credit hours in Economics courses are required: 1010 (or the former 2010), 1020 (or the former 2020), 2550, 3000, 3001, 3010, and 6 credit hours from either 3550 and 3551 , or 4550 and 4551 are obligatory.
The remaining 18 credit hours shall be chosen from among the various Economics courses in consultation with the Head of the Department or delegate, and will include at least 9 credit hours in courses at the 4000 level.
3. Additional Requirements: Mathematics 1000, 1001, 2000, 2050, and Statistics 2550.

### 10.1.5 Computer Science and Geography Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

## 1. Computer Science Requirements

Thirty-nine credit hours in Computer Science courses are required: 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2500, 4751 plus 6 further credit hours in Computer Science courses numbered 3000 or higher.
2. Geography Requirements

Thirty-nine credit hours in Geography courses are required: 1050, 2001, 2102, 2195, 2302, 2425, 3202, 3222, 3250, 3260, 4202, 4250, 4261.
3. Additional Requirements: Mathematics 1000, 1001, 2000, 2050, and Statistics 2550.

### 10.1.6 Computer Science and Physics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031).
2. Thirty-nine credit hours in Computer Science: 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 3731 plus 9 further credit hours in Computer Science courses numbered 3000 or higher, including at least 3 credit hours at the 4000 level.
3. Physics 1050 (or 1020) and 1051 plus at least 30 additional credit hours in Physics including 2053, 2055, 2750, 2820, 3220, 3400, 3500, 3750, 3800.
4. a. Mathematics 1000 and 1001.
b. Mathematics 2000, 2050, 2260, 3202.
c. Additional electives to bring the credit hours to 120. Computer Science 2500 and Statistics 2550 are recommended.

### 10.1.7 Computer Science and Pure Mathematics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008.
2. Eighteen additional credit hours in Computer Science courses numbered 3000 or higher.
3. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3202, 3320, 3340, and Statistics 2550.
4. Nine additional credit hours in courses numbered 3000 or higher offered by the Department of Mathematics and Statistics, excluding the former Mathematics 3330.

### 10.1.8 Computer Science and Statistics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2500, 4734, plus 15 further credit hours in Computer Science courses numbered 3000 or higher.
2. Statistics 1510 or 2500 or 2550 , and 2501 or 2560.
3. Mathematics $1000,1001,2000,2050,2051,2320,3340$, Statistics $3410,3411,3520,3521,3540$, 4590.
4. Nine further credit hours in Statistics courses numbered 3000 or higher including at least a 3 credit hour course numbered 4000 or higher excluding Statistics 4581.

### 10.1.9 Earth Sciences and Physics Joint Major

This program was formerly in the Earth Sciences section of the Calendar as a General Degree of Bachelor of Science in Geophysics. The following courses will be required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1050 (or 1020) and 1051.
3. Earth Sciences $2030,2401,2502,2702,2905,3170,3172,3420,3905$; plus a 3 credit hour course in Earth Sciences 4100 series.
4. At least 30 credit hours in Physics courses at the 2000 level or higher, including Physics 2055, 2056 or 2750, 2820, 3220, 3500.
5. Mathematics 2000, 2050 and 3202 .
6. Other courses to complete at least a minimum requirement of 120 credit hours in courses for the General Degree.

Any change in the program of study must have the prior approval of the Heads of the two Departments concerned.

### 10.1.10 Economics and Pure Mathematics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Mathematics $1000,1001,2000,2050,2130,2260,2320,3000,3100,3202,3320$, Statistics 2550 and one 4000 level Mathematics course.
2. A computing course early in the program is required. Computer Science 1510 is highly recommended.
3. Economics: 1010 (or the former 2010), 1020 (or the former 2020), 2550, 3000, 3001, 3010, and 6 credit hours from either 3550 and 3551 , or 4550 and 4551.
4. Eighteen further credit hours chosen from among the various Economics courses in consultation with the Head of the Department or delegate, including at least 9 credit hours at the 4000 level.

### 10.1.11 Economics and Statistics Joint Major

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Mathematics $1000,1001,2000,2050,2051$, Statistics $2550,2560,3410,3411,3520,3540,4590$.
2. Six further credit hours in Statistics courses numbered 3000 or higher, at least 3 credit hours of which must be numbered 4000 or higher, excluding Statistics 3521 and 4581.
3. Economics: 1010 (or the former 2010), 1020 (or the former 2020), 2550, 3000, 3001, 3010, 4550, 4551.
4. Eighteen further credit hours chosen from among the various Economics courses in consultation with the Head of the Department or delegate, including at least 9 credit hours at the 4000 level.

### 10.1.12 Economics (Co-operative) and Statistics Joint Major

The Joint Major in Economics (Co-operative) and Statistics is available exclusively to full-time Economics and Statistics majors (B. Sc. only). The program is available under the Economics Co-operative Education Option (ECEO).

The ECEO provides an excellent mutual opportunity for students and employers. Qualified students will obtain rewarding employment experience in fields related to Economics for several months of continuous duration. Students will learn valuable practical skills in an employment situation during their course of study. Furthermore, paid employment will help to defray the cost of their education. The timing of the Work Terms and the structure of the ECEO generally are such that employers stand to gain from the acquired employable skills of economists and statisticians in training. The objectives of the Work Term component of the ECEO are embodied in the Work Term descriptions below. The descriptions serve to guide the student and the employer toward achieving these objectives.

## 1. Admission Requirements

a. Admission is competitive and selective. Therefore, prospective students are encouraged to consider an alternate degree program in the event that they are not accepted into the Joint Co-operative program.
b. Applicants should note that it is possible to enter Term 1 only in the Fall semester commencing in September of each academic year. Application forms are available in the

Department of Economics and the Department of Mathematics and Statistics. The deadline for applications for admission to Term 1 is March 1.
c. The primary criterion used in reaching decisions on applications for admission is overall academic achievement. Students with weak overall academic records are unlikely to be admitted.
d. To be eligible for admission to Term 1 an applicant must have successfully completed a minimum of 30 credit hours with an overall average of at least $65 \%$ as follows: All applicants must have completed Economics 1010 (or the former 2010) and 1020 (or the former 2020); at least 6 credit hours in English; Mathematics 1000 and 1001; and 12 credit hours chosen from courses in the Faculties of Humanities and Social Sciences or Science. It is recommended that students complete English 1110 as one of these English courses.
e. Students may apply for admission to Advanced Standing.
f. Transfer students from other universities will be placed in that term of the program judged to be appropriate considering equivalent credits, as determined by the Departments.

## 2. Program of Study

a. Promotion from each of Terms 1 through 6 requires a passing grade in all specified required courses and an overall average of at least $60 \%$ in all courses including electives. A student who fails a required course or fails to maintain an overall average of $60 \%$ will not be promoted to the next term and will be required to withdraw from the program. The student in question may apply for readmission in a subsequent year after passing the specified required course(s) previously failed, or re-establishing the $60 \%$ average.
b. In addition to the 30 credit hours required for admission, students are required to complete the six academic terms in the ECEO program for a total of 120 credit hours. Students must complete three Work Terms which follow Academic Terms 2, 4, and 5.
c. Courses shall normally be taken in academic terms or "blocks" in the sequenced course load and order set out in the Academic Course Program - Economics (Co-operative) and Statistics Joint Major Table. Unspecified credits may be used to fulfill elective requirements only.
d. UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate) Classification of Students notwithstanding, students do not require special permission to register for courses while on work terms if the courses are in addition to the prescribed program.
3. Work Term Placement

See Regulations in Economics for the Major in Economics (Co-operative), in the Faculty of Humanities and Social Sciences section of the Calendar.
4. Registration and Evaluation of Performance

See Regulations in Economics for the Major in Economics (Co-operative), in the Faculty of Humanities and Social Sciences section of the Calendar.

## Academic Course Program - Economics (Co-operative) and Statistics Joint Major Table

| Term 1 (Fall) | Term 3 (FalI) | Term 5 (Fall) |
| :--- | :--- | :--- |
| Economics 3000 | Economics 4550 | Statistics 3520 |
| Economics 3550 | Mathematics 2051 | Statistics 4590 |
| Statistics 2550 | Statistics 3410 | Six further credit hours in |
| Mathematics 2000 | Three further credit hours in | Economics courses |
| Computer Science | Statistics courses | Three further credit hours in |
| 1700 | Three credit hours in elective | Statistics courses |
|  | courses [see Note 2] |  |
| Term 2 (Winter) | Term 4 (Winter) | Work Term III (Winter) |
| Economics 2550 | Economics 3011 | Economics 499W |
| Economics 3001 | Economics 4120 |  |


| Economics 3010 <br> Mathematics 2050 <br> Statistics 2560 | Economics 4551 <br> Statistics 3411 <br> Statistics 3540 |  |
| :--- | :--- | :--- |
| Work Term I <br> (Spring) | Work Term II (Spring) | Term 6 (Spring) |
| Economics 299W | Economics 399W | Three further credit hours in <br> Economics courses |
|  |  | Three credit hours in Science <br> courses [see Note 2] |
|  |  | Nine credit hours in elective courses <br> [see Note 2] |

Notes: 1. Another 1000-level Computer Science course may be substituted for Computer Science 1700 with the Heads' approvals.
2. Elective courses should be chosen with reference to the Degree Regulations for the General Degree of Bachelor of Science, since courses specified for admission to and completion of the program only partially satisfy these regulations. In particular note that in addition to the 78 credit hours (26 courses) in Science subjects required, at least 3 credit hours in a Science subject other than Mathematics and Statistics, Economics and Computer Science must be completed.

### 10.1.13 Marine Biology Joint Major

The Joint Major in Marine Biology is jointly administered by the Department of Ocean Sciences and the Department of Biology. It consists of core courses in oceanography and biology, and additional courses in various Science subjects. More information on recommended courses and time tables can be found in the Handbook of Undergraduate Studies available on both departmental websites.

Students who wish to enroll in the program should seek academic advising well in advance to ensure they have completed the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department of Ocean Sciences or the Department of Biology at the earliest opportunity. Each student registered in the program will be assigned a faculty advisor who should be consulted on academic issues, including course selection.

## 1. Admission Requirements

Admission to the program is based on academic standing. To be considered for admission to the program, students must normally have completed 33 credit hours with an overall average of at least $60 \%$. The following courses must normally have been completed:
a. Biology 1001 and 1002 with an average grade of 65\%;
b. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001);
c. Earth Sciences 1000;
d. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
e. Mathematics 1000;
f. Ocean Sciences 1000 with a minimum grade of $65 \%$; and
g. Physics 1020 and 1021 (or 1050 and 1051.

Chemistry 1050 and 1051 (or 1010 and 1011) should be taken in the first year, as it is a prerequisite for other required courses in the programs, and delaying chemistry until second year may make it difficult to complete the program in the normal four years.

## 2. Program of Study

Students pursuing a Joint Major in Marine Biology are required to complete a minimum of 33 credit hours in Biology and 33 credit hours in Ocean Sciences as follows:
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
b. Mathematics 1000;
c. Earth Sciences 1000;
d. Statistics 2550 (or equivalent);
e. Physics 1020 and 1021 (or equivalent);
f. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001), and 2440 (or 2400 and 2401);
g. Biochemistry 2101 and 3106;
h. Biology 1001, 1002, 2060, 2122, 2250, 2600, 2900, 3710 (or Ocean Sciences 2000) and 3711;
i. additional courses required to complete 33 credit hours in Biology, except Biology 2040, $2041,2120,3053$, and 3820 , making sure the program includes an overall minimum of 6 credit hours in Biology at the 3000/4000 level;
j. Ocean Sciences 1000, 2000 (or Biology 3710), 2001, 2100, 2500; and at least one of Ocean Sciences 2200 or 2300;
k. additional courses required to complete 33 credit hours in Ocean Sciences, including a minimum of 12 credit hours at the 3000/4000 level; and
I. other courses as necessary to complete the minimum of 120 credit hours required for the General Degree of Bachelor of Science.

Notes: 1. Courses cross listed between Biology and Ocean Sciences can only count for one subject or the other.
2. A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.
3. Students currently enrolled in the former Major in Biology (Marine) have the option of continuing the program as listed previously, or switch to the new Joint Major in Marine Biology outlined above.

### 10.2 Joint Honours

### 10.2.1 Applied Mathematics and Chemistry Joint Honours

The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. A computing course. Computer Science 1510 is recommended.
3. Biochemistry 2101.
4. Physics 1050 (or 1020) and 1051 (or 1021).
5. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3001, 3132, 3161, 3202, 3210, 4160.
6. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.
7. Six additional credit hours chosen from courses numbered 3000 or higher that are offered by the Department of Chemistry.
8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
9. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours.

### 10.2.2 Applied Mathematics and Physics Joint Honours

The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. A computing course. Computer Science 1510 is recommended.
3. Six credit hours in a science other than Mathematics or Physics (if Computer Science is chosen then Computer Science 1510 may be counted as three of these hours).
4. Mathematics $1000,1001,2000,2050,2051,2260,3000,3001,3132,3202,3210$.
5. At least one of Mathematics 2130 or Mathematics 2320.
6. Physics 1050 (or 1020), 1051, 2053, 2055, 2750 (or 2056), 2820, 3220, 3230, 3400, 3500, 3750.
7. Three additional credit hours chosen from courses numbered 3000 or higher that are offered by the Department of Physics and Physical Oceanography.
8. Mathematics 3161 and Mathematics 4160, or Physics 3820 and Physics 4820.
9. Physics 490A/B or Mathematics 419A/B.
10. Twelve additional credit hours chosen from courses numbered 4000 or higher that are offered by the Department of Mathematics and Statistics or the Department of Physics and Physical Oceanography. At least 3 credit hours must be selected in each of Applied Mathematics and Physics.
11. A sufficient number of elective courses to bring the degree to a total of 120 credit hours.

The topic for the Honours project or thesis, Mathematics 419A/B or Physics 490A/B, must be chosen with the prior approval of both departments.

### 10.2.3 Biochemistry and Cell Biology Joint Honours

The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. Biology 1001, 1002, Chemistry 1050, 1051 (or 1200 and 1001), Mathematics 1000, 1001, Physics 1020 or 1050, Physics 1021 or 1051, Statistics 2550;
3. Biochemistry 2101, 3105, 3106, Chemistry 2301, 2400, 2401;
4. Either Biochemistry 3107 and 3108 or Medicine 310A/B;
5. An additional 12 credit hours to be selected from Biochemistry 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210 or 4211, 4230-4249;
6. Biology 2060, 2250, 2600, 2900, 3530, 4241, plus one of Biology 3401, 3402, 4245 or 4404;
7. 12 credit hours from the following: Biology 3050, 3052 (or Biochemistry 3052), 3401, 3402, 3500, 3620, 3950, 3951, 4010, 4040, 4050, 4200 (or Biochemistry 4105), 4245, 4250, 4251, 4255, 4404, 4550, 4605, 4607;
8. Biochemistry 499A/B or Biology 499A/B; and
9. Electives to make up 120 credit hours.

Note: Students may count only one of the two courses, Biochemistry 4105 or Biology 4200, for credit in this program.

Seventy-five credit hours in Biology, Biochemistry and Chemistry courses beyond the first-year level from those listed in the program shall contribute to those in which a grade of "B" or an average of 75 or higher is required. Medicine 310A/B counts as Biochemistry for these 75 credit hours.

### 10.2.4 Biochemistry and Chemistry Joint Honours

The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011 and the former 1031) (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051 (or 1021). Biology 1001 and 1002 are highly recommended;
3. Mathematics 2000;
4. Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410;
5. Nine further credit hours in Chemistry courses numbered 3000 or higher, at least 6 credit hours of which must be in courses numbered 4000 or higher;
6. Biochemistry $2100,2101,3105,3106$, and either 3107,3108 , or Medicine $310 \mathrm{~A} / \mathrm{B}$;
7. 12 credit hours chosen from Biochemistry 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4210, 4211, 4230-4249;
8. Either Chemistry 490A/B or Biochemistry 499A/B; and
9. A sufficient number of elective courses to bring the degree to a total of 120 credit hours.

Note: Students should check prerequisites for 4000 level courses before making decisions about their 3000 level courses and seek academic advice if necessary.

### 10.2.5 Biochemistry and Physics Joint Honours

The following courses are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031) (or 1200 and 1001), Mathematics 1000 and 1001, Physics 1050 (or 1020) and 1051;
3. Chemistry 2400, 2401;
4. Chemistry 2301 or Physics 2053;
5. Mathematics 2000, 2050, 2260, either Mathematics 3202 or Physics 3810;
6. Biochemistry 2100, 2101, 3105, 3106;
7. Either Biochemistry 3107 and 3108 or Medicine 310A/B;
8. An additional 12 credit hours to be selected from Biochemistry $4002,4101,4102,4103,4104$, 4105, 4200, 4201, 4210 or 4211, 4230-4249;
9. Physics 2055, 2750 or $2056,2820,3220,3400,3500,3750,3820,3900$, plus one 4000 level Physics course;
10. Either Physics 490A/B or Biochemistry 499A/B; and
11. Other courses to complete the prescribed minimum of 120 credit hours in courses for the Joint Honours degree.

### 10.2.6 Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required to complete the 120 credit hours in courses required for the degree:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000 and 1001, Physics 1050, (or 1020), 1051 (or 1021).
3. Biochemistry $2100,2101,3105,3106,3107,3108$, Medicine $310 \mathrm{~A} / \mathrm{B}$, either 4210 or 4211,9 credit hours chosen from Biochemistry 4002, 4101, 4102, 4103, 4104, 4105, 4200, 4201, 4230-4249, Chemistry 4701.
4. Psychology $1000,1001,2520,2910,2911,2930,3250,3800,3820,3900$, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research
experience course and one of Psychology 4250, 4251, 4850 or 4851; or, any selected topics course and one of Psychology 4270 or 4870.
5. Either Biochemistry 499A/B or Psychology 499A/B.
6. Chemistry 2301, 2400, 2401.

Notes: 1. As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 3., 4. and 5. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 10.2.7 Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1010 and 1011 (or 1050, 1051) (or 1200 and 1001), Biology 1001 and 1002, Mathematics 1000, Physics 1020 or 1050, and 1021 (or 1051).
3. Biochemistry 2100, 2101, 2600, 3106, 3203, 4002, 4300, 4301, 4502, Medicine 310A/B; one course chosen from: Biochemistry 3105, 3107, 3108, 3202, 3402, 3600, 4101, 4103, 4104, 4105, 4200, 4201, 4210, 4211, 4230-4249, Biology 3050, Chemistry 4701.
4. Psychology $1000,1001,2520,2910,2911,2930,3250,3800,3820,3900$, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
5. Either Biochemistry 499A/B or Psychology 499A/B.
6. Chemistry 2400,2401 or Chemistry 2440.
7. Other courses to complete at least the prescribed minimum of 120 credit hours in courses for the Joint Honours Degree.

Notes: 1. As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, or an average of $75 \%$ or higher in all the required courses listed in Clauses 3., 4., and 5. above, except those at the 1000 level.
2. Students in first year intending to follow this program should note the regulations as outlined for admission to Major programs in Psychology and that the deadline for submission of a completed application form to the Department of Psychology is June 1 for the Fall semester.

### 10.2.8 Biology and Earth Sciences Joint Honours

The following courses, including prerequisites where applicable, will be required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Mathematics 1000 and 1001, Biology 1001 and 1002, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1020 and 1021 (or 1050 and 1051).
3. Chemistry 2440, Biochemistry 2101, Biochemistry 3106, one of Statistics 2550 or 2560.
4. Biology 2060, 2250, 2600, 2900, one of $3401,3402,4245$ or 4404 ; plus Biology 3710,3711 , and 4505. In addition, further Biology courses at the 2000, 3000, or 4000 level must be selected by the
student in consultation with the supervisor to make up a minimum of 42 credit hours in Biology not including Biology 499A or 499B.
5. Earth Sciences 2030, 2031, 2502, 2905; plus a minimum of 24 credit hours in other Earth Science courses from 2000 to 4000 level, at least 3 credit hours of which must be at 4000 level. Earth Sciences 2150, 2914, 2915, 2916, 2917, 2918, 4310, and 4950 cannot be used to fulfill this requirement. Career-related streams outlined in the departmental Student Handbook should be used as a guide to course selection so as to achieve a concentration in one facet of Earth Sciences.
6. An Honours dissertation (Biology 499A/B or Earth Sciences 499A/B). The topic of the Honours dissertation must be chosen with the approval of both Department Heads. A faculty member of either Department may act as supervisor.
7. Other courses to complete a minimum of 135 credit hours in courses for the Honours degree, with at least 84 credit hours in courses in Biology and Earth Sciences combined.

Any change in the program of study must have the prior approval of the Heads of the two Departments concerned.

### 10.2.9 Biology and Psychology Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required:

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of 3401, 3402, 4245, 4404; four Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology $1000,1001,2520,2910,2911,2930,3250,3800 ; 3900,4910 ;$ one of the following: 3050, 3100, 3350, 3450, 3620, 3650; one further 4000 level Psychology research experience course.
3. Biology or Psychology 3750, 4701, 499A/B.
4. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
5. Mathematics 1000; Chemistry 1010 and 1011 (or 1050 and 1051), and 2440; Physics 1020 (or 1050) and 1021 (or 1051); Biochemistry 2101 and 3106.
6. Other courses, if necessary, to complete at least 120 credit hours of courses.

### 10.2.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

Note: Students completing this program cannot receive credit for Psychology 2920.
The following courses (or equivalent) are required:

1. Biology $1001,1002,2060,2250,2600,2900$; one of $3401,3402,4245,4404$; five Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.
2. Psychology $1000,1001,2520,2910,2911,2930,3250,3800,3820,3900$; one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
3. Biology or Psychology 499A/B.
4. Biochemistry 2101, 3106.
5. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
6. Mathematics 1000 and 1001; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1010 and 1011 (or 1050 and 1051), and 2440 (or 2400 and 2401).
7. Other courses, if necessary, to complete at least 120 credit hours of courses.

Note: As provided for under the Graduation Requirements for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, OR average of $75 \%$ or higher in all the required courses listed in Clauses 1, 2, 3, and 4 above, except those at the 1000 level.

### 10.2.11 Biology and Statistics Joint Honours

As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
2. Mathematics 1000 and 1001, Biology 1001 and 1002, Chemistry 1010 and 1011 (or 1050 and 1051), Physics 1020 and 1021, or equivalent;
3. Mathematics $2000,2050,2051$, Statistics 2500,2501 or $2560,3520,3521,4530$, and 4581 ;
4. 9 further credit hours in Statistics courses including at least 6 credit hours in courses at the 4000 level or higher but not including Statistics 459A/B;
5. Chemistry 2440 (or 2400 and 2401), Biochemistry 2101 and 3106;
6. Biology 2060, 2250, 2600, 2900, one of $3401,3402,4245$, or 4404. In addition, further Biology courses at the 2000, 3000 or 4000 level must be selected by the student in consultation with the supervisor to make up a minimum of 42 credit hours in Biology but not including Biology 499A or 499B;
7. Either Biology 499A/B or Statistics 459A/B; and
8. A computing course. Computer Science 1510 is recommended.

### 10.2.12 Chemistry and Earth Sciences Joint Honours

The following courses, including prerequisites, where applicable, will be required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) or their equivalents, Physics 1050 (or 1020) and 1051 (or 1021).
3. Earth Sciences 2030, 2031, 2401, 2502, 2702, 2905, 3420, 3600; plus 6 additional credit hours in 3000-level Earth Sciences courses, and 9 additional credit hours in 4000-level Earth Sciences courses.
4. Chemistry $2100,2210,2301,2302,2400,2401$ and 3110 ; and at least 6 additional credit hours in 3000-level and 6 credit hours in 4000-level Chemistry courses.
5. Mathematics 2000 and 2050.
6. Biology 2120 and Biochemistry 2101.1
7. An Honours Dissertation (Earth Sciences 499A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
8. Other courses to complete the prescribed minimum of 120 credit hours.

Any change in the program of study must have the prior approval of the Heads of the two Departments concerned.

### 10.2.13 Chemistry and Physics Joint Honours

The following courses are prescribed:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Mathematics $1000,1001,2000,2050,3202$, and 2260.
3. Physics 1050 (or 1020) and $1051,2055,2750$ or $2056,2820,3220,3500,3750,3820,3900,4820$, 3 additional credit hours in a Physics course numbered 3000 or higher and 6 additional credit hours in Physics courses numbered 4000 or higher.
4. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211,3303 , and 6 additional credit hours in Chemistry courses numbered 3000 or higher.
5. Biochemistry 2101.
6. An Honours Dissertation (Chemistry 490A/B or Physics 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
7. A sufficient number of elective courses to bring the degree total to 120 credit hours.

### 10.2.14 Computer Science and Geography Joint Honours

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Computer Science Requirements

Forty-eight credit hours in Computer Science courses are required for the Joint Honours:
a. $1000,1001,1002,2001,2002,2003,2004,2005,2006,2007,2008,4751$.
b. Six additional credit hours in courses at the 4000 level not including 4780.
c. Twelve additional credit hours in courses at the 3000 level or beyond.
2. Geography Requirements

Forty-eight credit hours in Geography courses are required for the Joint Honours: 1050, 2001, $2102,2195,2226,2302,2425,3202,3222,3226,3250,3260,3303,4202,4250,4261$, and the former 4291.
3. Additional Requirements
e. Mathematics 1000, 1001, 2000, and 2050.
f. An Honours Dissertation (either Computer Science 4780 or Geography 4999). The topic for dissertation must be chosen with the prior approval of the Heads of both Departments.

### 10.2.15 Computer Science and Physics Joint Honours

The following courses are prescribed:

1. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031) (or 1200 and 1001).
2. a. Computer Science 1000, 1001,1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 3731.
b. Nine additional credit hours in Computer Science courses numbered 3000 or higher, including at least 3 credit hours in courses at the 4000 level.
3. a. Physics 1050 (or 1020) and 1051.
b. Physics 2053, 2055, 2750, 2820, 3220, 3400, 3500, 3750, 3800, and 3820.
c. Three additional credit hours in Physics at the 4000 level.
4. Physics 490A and Physics 490B or Computer Science 4780 and 3 additional credit hours in Computer Science at the 4000 level.
5. a. Mathematics 1000 and 1001.
b. Mathematics 2000, 2050, 2260, and 3202.
6. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
7. Two electives to bring the total credit hours to 120 . Computer Science 2500 and Statistics 2550 are recommended.

### 10.2.16 Computer Science and Pure Mathematics Joint Honours

As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following:

At least 51 credit hours in Computer Science courses are required including the following:

1. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008.
2. Excluding 4780, 24 additional credit hours from courses numbered 3000 or higher, at least 9 credit hours of which must be in courses at the 4000 level.

The following courses in Mathematics and Statistics are required:

1. Mathematics $1000,1001,2000,2050,2051,2130,2260,2320,3000,3001,3202,3210,3320$, 3340, Statistics 2550.
2. Either Mathematics 4000 or 4001.
3. Excluding the former Mathematics 3330, the former 4399, and 439A/B, 15 additional credit hours in courses offered by the Department of Mathematics and Statistics numbered 3000 or higher including at least 9 credit hours from courses numbered 4000 or higher and at least 9 credit hours in Pure Mathematics courses.
4. An Honours Dissertation in one of the departments, with the topic chosen in consultation with both departments.

Note: There is an Undergraduate Advisor in each Department. These advisors should be consulted on all academic matters.

### 10.2.17 Computer Science and Statistics Joint Honours

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2320, 3340, Statistics 1510 or 2500 or 2550,2501 or 2560, 3410, 3411, 3520, 3521, 3540, 4530, 4590.
2. Eighteen further credit hours in Statistics courses including at least 12 credit hours in courses numbered 4000 or higher, but not including Statistics 4581 and 459A/B.
3. Computer Science 1000, 1001, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 4734.
4. Twenty-one additional credit hours in Computer Science courses at the 3000 level or higher, not including 4780.
5. Either Computer Science 4780 or Statistics 459A/B.

### 10.2.18 Earth Sciences and Geography Joint Honours

The following courses will be required. A few prerequisites are not met by this list of courses, and students are advised to obtain advice from instructors in such cases to be sure that they are prepared for course material. Both departmental Heads can advise students on a workable sequencing of courses to complete the degree in a timely manner, and students should view a student handbook that describes thematic streams within the program and offers specific guidance about course selection.

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Geography 1050, Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 (or equivalent) and 1051 (or equivalent), Physics 1050 and 1051, or Physics 1020 and 1021.
3. Geography 2001 or 2302 , and Geography 2102, 2195, 2226, 2425 and 3226, Earth Sciences 2401 or 2502, and Earth Sciences 2030, 2031, 2702 and 2905.
4. Mathematics 2000 or Statistics 2550 or Geography 3222, Biology 1001 and 1002, or Biology 2120 or Physics 2055.
5. Either Earth Sciences 499A and 499B, or Geography 4990 and Geography 4999.
6. At least an additional 40 credit hours from Earth Sciences and Geography, with a minimum of 16 credit hours from Earth Sciences and 18 credit hours from Geography; and a minimum of 9 credit hours at the 4000-level in each discipline. Earth Sciences 2150, 2914, 2915, 2916, 2917, 2918,

4310 , and 4950 cannot be used to fulfill this requirement. Geography $2105,2290,2405,2460$ and 2495 cannot be used to fulfill this requirement.
7. Additional credit hours selected to conform to the Degree Regulations for the Honours Degree of Bachelor of Science so as to achieve a total of 120 credit hours.

Notes: 1. The topic of the Honours dissertation must be chosen with the approval of both Departments. A faculty member of either Department may act as supervisor.
2. Any change in the program of study must have the prior approval of the Heads of both Departments concerned.
3. The number of specified courses means that the second CRW course will be taken normally in the second or third year of the program.
4. Students who do not satisfy the Graduation Requirements for the Honours Degree of Bachelor of Science, but who successfully complete all the courses, with the exception of the Honours dissertation, and who satisfy all other requirements for the Bachelor of Science, will be eligible for consideration to receive a General Degree of Bachelor of Science with a Joint Major in Earth Sciences and Geography.

### 10.2.19 Earth Sciences and Physics Joint Honours

This program was formerly in the Earth Sciences section of the Calendar as an Honours Degree of Bachelor of Science in Geophysics. The following courses will be required:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 (or 1200 and 1001), Physics 1050 (or 1020) and 1051.
3. Earth Sciences 2030, 2401, 2502, 2702, 2905, 3170, 3172, 3420, 3905, 4171, 4173, 4179.
4. Physics 2055,2750 or $2056,2820,3220,3230,3500,3820,4820$; plus 9 other credit hours in Physics courses at 3000 level or higher.
5. Mathematics 2000, 2050, 2260, and 3202.
6. Either Earth Sciences 499A/B or Physics 490A/B.
7. Other courses to complete at least a minimum of 120 credit hours.

Any change in the program of study must have the prior approval of the Heads of the two Departments concerned.

### 10.2.20 Geophysics and Physical Oceanography Joint Honours

The program requires the following courses:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Physics 1050 (or 1020) and 1051.
3. Earth Sciences $2905,3170,3172,4105,4171,4173,4179$ and 10 credit hours at the 2000 level or higher with at least 3 credit hours at the 3000 level.
4. Physics 2053, 2055, 2820, 3220, 3300, 3500, 3820, 4205, 4300, 4330, 4820 plus one of Physics $3600,3150,3400,3550$ or 3900.
5. Mathematics 2000, 2050, 2051, 2260, and 3202.
6. Either Earth Sciences 499A and 499B or Physics 490A and 490B.
7. Other courses to complete the prescribed minimum of 120 credit hours.

### 10.2.21 Pure Mathematics and Statistics Joint Honours

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 4000, Statistics 1510 or 2500 or 2550,2501 or $2560,3410,3411,3520,3521,4402,4410,4530$;
2. A computing course early in the program is required. Computer Science 1510 is highly recommended;
3. Either Mathematics 439A/B or Statistics 459A/B;
4. One of Mathematics 3331 or 3340 ;
5. Eighteen further credit hours in Pure Mathematics and/or Statistics courses numbered 3000 or higher, excluding the former Mathematics 3330, of which at least 12 credit hours must be from courses numbered 4000 or higher excluding Statistics 4581.

### 10.3 Joint Options

### 10.3.1 Chemistry and Physics Option Programs

Students who complete all program requirements for the Chemistry and Physics Joint Honours program, either as Honours students or otherwise, except those on Academic Standing for the Honours Degree of Bachelor of Science, shall receive on their University records a notation that they followed the "Physics/Chemistry" Option Programs.

## 11 Program Regulations

### 11.1 Biochemistry

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www.mun.ca/biochem
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The following undergraduate programs are available in the Department:

1. Biochemistry and Cell Biology Joint Honours
2. Biochemistry and Chemistry Joint Honours
3. Biochemistry and Physics Joint Honours
4. Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours
5. Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours
6. Major or Honours in Biochemistry
7. Major or Honours in Nutrition
8. Minor in Biochemistry

Students who wish to enrol in any of these programs should plan their program well in advance so that they will have taken the appropriate prerequisites. Entry to a number of required courses is limited and will be determined by academic performance. Required courses should be taken in the year indicated by the course numbers so as to avoid timetable clashes and missing prerequisites which could prolong the time necessary to complete the program. Students are advised to consult with the Department at the earliest opportunity.

Candidates for the general and honours degrees in the programs above should refer to the Faculty of Science Degree Regulations for the General and Honours degrees of Bachelor of Science.

Candidates for a minor in Biochemistry should refer to Minor Programs in the Faculty of Science.
Students who intend to pursue graduate studies should take the courses leading to the honours degree.

Biochemistry course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Biochemistry.

Students are encouraged to choose a minor.
For the purposes of a Major, Honours or Minor degree in Biochemistry, Medicine 310A/B and Chemistry 2400, 2401 count as Biochemistry courses. For the purposes of a Major or Honours degree in Biochemistry (Nutrition), Medicine 310A/B count as Biochemistry courses.

Supplementary examinations will be allowed in certain Biochemistry courses which have written final examinations. Students should refer to Supplementary Examinations in the Faculty of Science section for details.

### 11.1.1 Admission to Programs

Students who wish to declare a Major in Biochemistry or Biochemistry (Nutrition) or who wish to apply for Honours standing in any of our programs are strongly recommended to do so by May 31 in any year. Failure to apply by the recommended date may result in your application not being processed before your registration time. In addition, students who do not declare by this date might escape consideration for departmental scholarships or other awards.

### 11.1.1.1 Admission to the Major in Biochemistry

Entry to the Major in Biochemistry program is based on academic standing.

1. To be considered for admission to the program students must have at least 30 credit hours in courses and have successfully completed the following courses (or their equivalents) with a minimum overall average of $60 \%$. In addition, students must be eligible for entry to Chemistry 2400.
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
b. Chemistry 1050 and 1051 (or 1200 and 1001)
c. Mathematics 1000, 1001 (or Mathematics 1090, 1000, or Mathematics 109A/B, 1000)
d. Physics 1050 (or 1020), 1051 (or 1021), or Biology 1001, 1002

Notes: 1. Students are required to complete at least 78 credit hours in Science courses for the General Degree.
2. Students taking Mathematics 1000 should take Physics 1050 as their first Physics course.
3. It is recommended that students who wish to pursue future studies in biophysics or related fields or who are considering postgraduate health professional programs take Physics 1050 as their first Physics course.

### 11.1.1.2 Admission to the Honours Degree in Biochemistry

Students normally should apply for an Honours program at the completion of their third year of studies. To be eligible for admission, students must be in Honours standing as per Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science. To be considered for early admission to an Honours program in Biochemistry at the end of second year, students must have achieved at least $70 \%$ in each of Biochemistry 2100 and 2101 and Chemistry 2400, 2401.

### 11.1.1.3 Admission to the Major in Nutrition

Entry to the Major in Nutrition program is based on academic standing.

1. To be considered for admission to the program students must have at least 30 credit hours in courses and have successfully completed the following courses (or their equivalents) with a minimum overall average of $60 \%$.
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
b. Chemistry 1050,1051 (or Chemistry 1010,1011 or 1200,1001 )
c. Mathematics 1090, 1000 (or Mathematics 109A/B, 1000, or Mathematics 1000 and one elective)
d. Biology 1001, 1002 or Physics 1020, 1021 (or equivalent)

### 11.1.1.4 Admission to the Honours Degree in Biochemistry (Nutrition)

Students normally should apply for an Honours program at the completion of their third year of studies. To be eligible for admission to the honours program, students must be in Honours standing as per Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science. To be considered for early admission to an Honours program in Nutrition at the end of second year, students must have achieved at least $70 \%$ in each of their required 2000 level Biochemistry and Chemistry courses.

### 11.1.2.1 Major in Biochemistry

1. Required courses to complete the major:
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. Biology 1001 and 1002; Mathematics 1000, 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200, 1001).
c. Biochemistry $2100,2101,3105,3106,3107,3108$.
d. At least 12 credit hours in courses from Biochemistry 2600, 3203, 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
e. Six additional credit hours chosen from: Medicine 310A/B, Biochemistry 2600, Biology 2060, 3050, Chemistry 4201, 4701 or Biochemistry courses at the 3000 or 4000 level.
f. Chemistry 2301 or Physics 2053; Chemistry 2400, 2401.
g. One of Chemistry 2100, Environmental Sciences 3210.
h. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the degree total up to 120 credit hours.

### 11.1.2.2 Honours Degree in Biochemistry

1. Required courses:
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. Biology 1001 and 1002; Mathematics 1001; Physics 1050 (or 1020), 1051 (or 1021); Chemistry 1050, 1051 (or Chemistry 1200, 1001).
c. Biochemistry 2100, 2101, 3105, 3106, 3107, 3108, 4102, 499A, 499B, Medicine 310A/B and either Biochemistry 4210 or 4211.
d. Twelve credit hours in courses from Biochemistry 4002, 4101, 4103, 4104, 4105, 4200, 4201, 4230, 4231-4239.
e. At least 6 credit hours chosen from Biochemistry 2600, Biology 3050, Chemistry 4201, 4701 , or Biochemistry courses at the 3000 or 4000 level.
f. Chemistry 2301 or Physics 2053, Chemistry 2400, 2401, one of Chemistry 3411 or 4410.
g. One of Chemistry 2100, Environmental Sciences 3210.
h. Statistics 2550 or equivalent.
i. A sufficient number of elective courses to bring the total for the degree up to 120 credit hours.
2. Those courses in which a grade of "B" or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, are those listed in clauses 1 (b), (c), and (d) above and Chemistry 2400 and 2401.

### 11.1.2.3 Minor in Biochemistry

[No change]

### 11.1.2.4 Major in Nutrition

1. Required courses to complete the major:
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. Biology 1001 and 1002; Mathematics 1000; Physics 1020 and 1021 (or Physics 1050 and 1051); Chemistry 1050, 1051 (or Chemistry 1200 and 1001).
c. Biochemistry 2005, 2100, 2101, 2600, 3106, 3203, 3402, 4300, 4301, Medicine 310A/B
d. Six credit hours in courses from Biochemistry 3052, 3107, 3108, 3202, 3600, 4002, 4101, $4103,4104,4105,4200,4201,4230,4231-4239,4240,4241-4249$, Biology 3050.
e. Chemistry 2400
f. Statistics 2550 or equivalent
g. A sufficient number of elective courses to bring the total Science courses up to at least 78 credit hours and the total for the degree up to 120 credit hours.

### 11.1.2.5 Honours Degree in Nutrition

1. Required courses:
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. English 1090 or the former 1080 (or 1000), 1110; Biology 1001 and 1002; Mathematics 1000; Physics 1020 (or 1050) and 1021 (or 1051); Chemistry 1050, 1051 (or Chemistry 1200, 1001).
b. Biochemistry 2005, 2100, 2101, 2600, 3106, 3107, 3203, 3402, 3600, 4002, 4300, 4301, 4502, 499A, 499B, Medicine 310A/B.
c. Twelve additional credit hours chosen from Biochemistry 3052, 3105, 3108, 3202, 4101, 4103, 4104, 4105, 4200, 4201, 4210, 4211, 4230, 4231-4239, 4240, 4241-4249, Biology 3050, Chemistry 4701.
d. Chemistry 2400.
e. Statistics 2550.
f. A sufficient number of elective courses to bring the total for the degree up to 120 credit hours.
2. Those courses in which a grade of " $B$ " or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science are 60 credit hours chosen from Biochemistry courses, Med 310A/B, and Biology 3050.

### 11.2 Biology

www.mun.ca/biology
The following undergraduate programs are available in the Department:

1. Biochemistry and Cell Biology Joint Honours
2. Biology and Earth Sciences (Geology) Joint Honours
3. Biology and Psychology Joint Honours
4. Biology and Psychology (Behavioural Neuroscience) Joint Honours
5. Biology and Statistics Joint Honours
6. Joint Major in Marine Biology
7. Major or Honours in Biology
8. Major or Honours, or Major (Co-operative) or Honours (Co-operative), in Biology (Cell and Molecular)
9. Major or Honours, or Major (Co-operative) or Honours (Co-operative), in Biology (Ecology and Conservation)
10. Honours, or Honours (Co-operative), in Biology (Marine)
11. Minor in Biology

Details of joint programs are given in Joint Program Regulations.
Biology course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Biology.

### 11.2.1 Entrance Requirements

Entry to the Biology Majors Program is competitive and based on academic standing.
To be considered for admission to the program students must have completed Biology 1001/1002 with an average of at least $65 \%$. In addition, applicants will normally have completed the following courses (or their equivalents) and must have a minimum overall average of $60 \%$ in these courses.

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Mathematics 1090 and Mathematics 1000 (or Mathematics 109A/B and Mathematics 1000, or Mathematics 1000 only)
3. Chemistry 1010/1011 (or equivalent) or Physics 1020/1021 (or equivalent)
4. If Mathematics 1000 taken, any one other first year course.

Chemistry 1010/1011 (or 1050/1051) should be taken in the first year, as it is a prerequisite for other required courses in the programs, and delaying chemistry until second year may make it difficult to complete the program in the normal eight semesters.

### 11.2.2 Minor in Biology

[No change]

### 11.2.3 General Degrees

Each Major is assigned a faculty advisor who should be consulted on academic problems, including course selection.

### 11.2.3.1 Major in Biology

All students majoring in Biology are required to complete a minimum of 45 credit hours in courses from the Department of Biology offering. Those 45 credit hours must include: Biology 1001 and 1002 or their equivalents; the 15 credit hours in core courses listed below; and 24 credit hours in Biology electives at the 2000, 3000 or 4000 level except Biology 2040, 2041, 2120, 3053, and 3820.

Biology Core (15 credit hours): Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404.

A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.
All majors must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in the Degree Regulations for the General Degree of Bachelor of Science.

It is recommended, but not required, that a Computer Science course be included and the Department of Biology strongly recommends Computer Science 1000 or 1600.

Note: To minimize timetabling problems, students on the St. John's campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and 2060 and 2900 in their fourth semester (Winter).

### 11.2.3.2 Major in Biology (Cell and Molecular)

All students majoring in Biology (Cell and Molecular) are required to complete a minimum of 45 credit hours in courses from the Department of Biology offering. Those 45 credit hours must include: Biology 1001 and 1002 or their equivalents; the 15 credit hours in core courses listed below; Biology 3530 and 4241; 6 credit hours from the recommended Biology courses for Biology (Cell and Molecular) listed below; and 12 credit hours from Biology electives at the 2000, 3000 or 4000 level except Biology 2040, 2041, 2120, 3053, and 3820.

Biology Core (15 credit hours): Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404.

Recommended Biology courses for Biology (Cell and Molecular)) are 3050, 3052, 3401, 3402, 3500, 3620, $3950,3951,4010,4040,4050,4200,4245,4250,4251,4255,4404,4550,4605$, and 4607.

A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.
All majors must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in the Degree Regulations for the General Degree of Bachelor of Science.

It is recommended, but not required, that a Computer Science course be included and the Department of Biology strongly recommends Computer Science 1000 or 1600.

Note: To minimize timetabling problems, students on the St. John's campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and 2060 and 2900 in their fourth semester (Winter).

### 11.2.3.3 Major in Biology (Ecology and Conservation)

All students majoring in Biology (Ecology and Conservation) are required to complete a minimum of 45 credit hours in courses from the Department of Biology offering. Those 45 credit hours must include: Biology 1001 and 1002 or their equivalents; the 15 credit hours in core courses listed below; Biology 4650 and 4651; 6 credit hours from the recommended Biology courses for Biology (Ecology and Conservation) listed below; and 12 credit hours from Biology electives at the 2000, 3000 or 4000 level except Biology 2040, 2041, 2120, 3053, and 3820.

Biology Core (15 credit hours): Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404.

Recommended Biology courses for Biology (Ecology and Conservation) are 3041, 3050, 3295, 3300, 3610, $3620,3640,3709,3710,3711,3714,3715,3750,4040,4141,4180,4182,4250,4306,4307,4360,4405$, $4505,4605,4607,4620,4630,4701,4710,4750$, and 4820.

A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.
All majors must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Extra Science courses as necessary to fulfil the requirement for 78 credit hours in Science as stipulated under Electives in the Degree Regulations for the General Degree of Bachelor of Science.

It is recommended, but not required, that a Computer Science course be included and the Department of Biology strongly recommends Computer Science 1000 or 1600.

Note: To minimize timetabling problems, students on the St. John's campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and 2060 and 2900 in their fourth semester (Winter).

### 11.2.3.4 Major in Biology (Marine)

[No change]

### 11.2.3.5 Major in Biology (Co-operative)

[No change]

### 11.2.4 Honours Degrees

The attention of students wishing to take Honours is called to those sections of the Calendar dealing with the Degree Regulations for the Honours Degree of Bachelor of Science.

Sixty-nine credit hours in courses, including the 6 first year credit hours and the 15 required core credit hours outlined in the regulations for the General Degree, and the Honours Dissertation (Biology 499A/499B), shall be taken from the Department of Biology offering. Students may elect to complete an Honours Program in Biology or one of the Joint Honours Programs listed at the start of the Biology section of the Calendar. Programs of students taking Honours shall be drawn up in consultation with the student's supervisor, and must be approved by the Head of the Department (or his/her delegate).

Note: Some Graduate Courses may be taken in the final year of the Honours Program with the permission of the Head of the Department and the course instructor.

A dissertation (6 credit hours) is to be presented on some original piece of work undertaken by the candidate, under the guidance of a faculty member of the department, as appointed by the Head of Department. For students electing to take one of the Joint Honours Programs, the dissertation shall be on a topic representative of the selected program. The Department of Biology considers the dissertation to be an important part of the Honours Program.

The dissertation will be based on a 6 credit hours course (Biology 499A/499B). It will involve directed reading relevant to the dissertation topic, preparation of a dissertation outline, supervised research, data synthesis and interpretation, and preparation and defence of the dissertation.

Two typed copies of the dissertation, complete with figures and tables, are to be submitted not less than two weeks before the end of lectures in the semester in which the candidate is registered for Biology 499B. These copies must be submitted to the Head of Department, and must have met the prior approval of the candidate's Honours supervisor.

Before the last day for examinations in the semester, the candidate will be examined orally on the contents of the dissertation. The examining committee shall consist of the Head of the Department, or delegate, the candidate's supervisor, and an examiner appointed by the Head of the Department in consultation with the candidate's supervisor.

### 11.2.5 Honours in Biology

An Honours degree in Biology may comprise a broadly based selection of courses according to the student's interests, or it may be more narrowly focussed. An Honours student may focus on any area of Biology where an appropriate supervisor can be found. All Honours students should choose courses in consultation with their supervisors, but it is particularly important that students wishing to focus within the Honours degree should discuss course selection with an Honours supervisor within their area of interest.

### 11.2.5.1 Biology Course Requirements

Students seeking an honours degree in Biology are required to successfully complete a minimum of 69 credit hours in courses from the Department of Biology offering. Those 69 credit hours must include:

1. Biology 1001 and 1002 or their equivalents;
2. 15 credit hours in the following core courses: Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404; and
3. 42 credit hours from Biology electives at the 2000, 3000 or 4000 level (except Biology 2040, 2041, 2120, 3053, and 3820) and Biology 499A and 499B.
4. A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.

### 11.2.5.2 Core Course Requirements

All honours students must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Electives to make up 120 credit hours

To minimize timetabling problems, students on the St. John's Campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and Biology 2060 and 2900 in their fourth semester (Winter).

### 11.2.6 Honours in Cell and Molecular Biology

### 11.2.6.1 Cell and Molecular Biology Course Requirements

Students seeking an honours degree in Cell and Molecular Biology are required to complete a minimum of 69 credit hours in courses from the Department of Biology offering. Those 69 credit hours must include:

1. Biology 1001 and 1002 or their equivalents;
2. 15 credit hours in the following core courses: Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404;
3. Biology 3530 and Biology 4241;
4. 12 credit hours from the following recommended Biology courses for Cell and Molecular Biology: Biology 3050, 3052, 3401, 3402, 3500, 3620, 3950, 3951, 4010, 4040, 4050, 4200, 4245, 4250, 4251, 4255, 4404, 4550, 4605, 4607; and
5. 24 credit hours in Biology electives at the 2000, 3000 or 4000 level (except Biology 2040, 2041, 2120, 3053, and 3820) and Biology 499A and 499B.
6. A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.

### 11.2.6.2 Core Course Requirements

All honours students must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Electives to make up 120 credit hours

To minimize timetabling problems, students on the St. John's Campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and Biology 2060 and 2900 in their fourth semester (Winter).

### 11.2.7 Honours in Ecology and Conservation Biology

### 11.2.7.1 Ecology and Conservation Biology Course Requirements

Students seeking an honours degree in Ecology and Conservation Biology are required to complete a minimum of 69 credit hours in courses from the Department of Biology offering. Those 69 credit hours must include:

1. Biology 1001 and 1002 or their equivalents;
2. 15 credit hours in the following core courses: Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404;
3. Biology 4650 and 4651 ;
4. 12 credit hours from the following recommended biology courses for Ecology and Conservation Biology: Biology 3041, 3050, 3295, 3300, 3610, 3620, 3640, 3709, 3710, 3711, 3714, 3715, 3750, 4040, 4141, 4180, 4182, 4250, 4306, 4307, 4360, 4405, 4505, 4605, 4607, 4620, 4630, 4701, 4710, 4750, 4820; and
5. 24 credit hours in Biology electives at the 2000, 3000 or 4000 level (except Biology 2040, 2041, 2120, 3053, and 3820) and Biology 499A and 499B.
6. A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.

### 11.2.7.2 Core Course Requirements

All honours students must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Electives to make up 120 credit hours

To minimize timetabling problems, students on the St. John's Campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and Biology 2060 and 2900 in their fourth semester (Winter).

### 11.2.8 Honours in Marine Biology

### 11.2.8.1 Marine Biology Course Requirements

Students seeking an honours degree in Marine Biology are required to complete a minimum of 69 credit hours in courses from the Department of Biology offering. Those 69 credit hours must include:

1. Biology 1001 and 1002 or their equivalents;
2. 15 credit hours in the following core courses: Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, 4245 or 4404;
3. Biology 3710 and 3711 ;
4. 12 credit hours from the following recommended biology courses for Marine Biology: Biology $3014,3050,3295,3620,3640,3709,3712,3714,3715,3951,4122,4141,4182,4360,4601$, $4605,4607,4620,4630,4710,4750,4810,4912$; and
5. 24 credit hours in Biology electives at the 2000, 3000 or 4000 level (except Biology 2040, 2041, 2120, 3053, and 3820) and Biology 499A and 499B.
6. A maximum of 9 credit hours can be in Biology courses with no associated laboratory/seminar.

### 11.2.8.2 Core Course Requirements

All honours students must also successfully complete the following courses or their equivalents:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Physics 1020 and 1021 (or equivalent)
3. Mathematics 1000
4. Chemistry 1010 and 1011 (or equivalent), Chemistry 2440
5. Statistics 2550
6. Biochemistry 2101 and 3106
7. Electives to make up 120 credit hours

To minimize timetabling problems, students on the St. John's Campus are advised to take Biology 2250 and 2600 in their third semester (Fall), and Biology 2060 and 2900 in their fourth semester (Winter).

### 11.2.9 Honours in Biology (Co-operative)

[No change]

### 11.3 Chemistry

[No change]

### 11.3.1 Undergraduate Handbook

[No change]

### 11.3.2 Faculty Advisors

[No change]

### 11.3.3 Minor in Chemistry

[No change]

### 11.3.4 General Degree - Major in Chemistry

Students wishing to take a Major in Chemistry should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science. The courses required for a Major in Chemistry are:

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, $3210,3211,3303$, and 3411.
2. Physics 1050 (or 1020) and 1051 (or 1021).
3. Mathematics $1000,1001,2000$, and 2050.
4. Biochemistry 2101.

Recommended courses: Mathematics 2051, Physics 2820 and/or 2750.
Students considering declaring Chemistry as their Major are encouraged to contact either the Head of the Department or the Deputy Head (Undergraduate Studies).

Chemistry Majors may complete a minor in Applied Science - Process Engineering. The requirements for this minor are detailed under Faculty of Engineering and Applied Science, Minor in Applied Science Process Engineering.

### 11.3.5 Honours Degree in Chemistry

Students wishing to take Honours should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science.

### 11.3.5.1 Required Courses

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) (or 1200 and 1001), 2100, $2210,2301,2302,2400,2401,3110,3210,3211,3303,3411$, and 490A/B.
2. 12 credit hours selected from the 4000 level Chemistry courses chosen in consultation with the 490A/B supervisor for chemistry.
3. Physics 1050 (or 1020) and 1051 (or 1021).
4. Mathematics 1000, 1001, 2000, and 2050.
5. Biochemistry 2101.

Chemistry Honours students may complete a minor in Applied Science - Process Engineering. The requirements for this minor are detailed under Faculty of Engineering and Applied Science, Minor in Applied Science - Process Engineering.

### 11.3.5.2 Other Information

1. Those courses in which a grade of $B$ or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, are the courses beyond first year used to satisfy clause 1. under Required Courses above.
2. Recommended courses: Mathematics 2051, Physics 2820 and/or 2750.
3. A thesis based on a selected research topic carried out under the supervision of a member of the Department is to be submitted in the final year.
4. Chemistry 490A/B will normally require the equivalent of nine hours per week for two semesters. Registration in Chemistry 490A/B is restricted to those students who have honours standing. The Honours dissertation will be assessed by a committee comprising the supervisor and one other faculty member.
5. With approval of the Heads of the Chemistry and Biochemistry Departments prior to registration, a number of courses in Biochemistry may be substituted for a like number of Chemistry courses.
6. Prospective Honours students in Chemistry in their first year should take
a. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
b. Chemistry 1050 and 1051 (or 1200 and 1001),
c. Physics 1050 and 1051 or 1020 and 1021.
d. Mathematics 1000 and 1001.
e. Six credit hours in other courses.
7. Students should consult the Undergraduate Student Handbook for timetabling details.
8. Students completing first year requirements for either Chemistry or Mathematics via the three course options (i.e. Chemistry 1010, 1050, 1051, Mathematics 1090, 1000, 1001 (or 109A/B, 1000, 1001)) instead of the two course options (Chemistry 1050, 1051, Mathematics 1000, 1001) will require the corresponding number of extra credits to obtain an Honours degree.
9. Arrangements for subsequent years will depend on the other science subjects being studied and should be made in consultation with the Faculty Advisor.
10. Certain advanced courses may only be offered in alternate years. Candidates therefore should consult the Head of the Department before registration
11. Certain Graduate courses may be taken in the final year of the Honours Program with the permission of the Head of the Department.
12. Details of Joint Honours programs with Biochemistry, Earth Sciences, Mathematics and Physics are outlined under Joint Programs.
13. Details of the Environmental Science (Chemistry Stream) Major or Honours are outlined under the Grenfell Campus section of the Calendar.

### 11.3.6 General Degree - Major in Computational Chemistry

Students wishing to take a Major in Computational Chemistry should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science.

### 11.3.6.1 Required Courses

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, 4304, 4305.
2. Physics 1050 (or 1020) and 1051 (or 1021), and 2820.
3. Mathematics $1000,1001,2000,2050,2051,2260$ (or the former Mathematics 3260), and 3202.
4. Computer Science 1510 and 1001.
5. Computer Science 2500 and 2001.
6. Computer Science 3731 or Mathematics 3132.
7. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
8. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours must also be completed.

### 11.3.6.2 Suggested Program of Study

Given appropriate circumstances the Major in Computational Chemistry program can be completed in four years. While students should consult the Undergraduate Handbook for further timetabling details, to complete the program in four years generally will require that students take the following courses in their first year:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or 1200 and 1001).
3. Physics 1050 (or 1020) and 1051 (or 1021).
4. Mathematics 1000 and 1001.
5. Computer Science 1510 and 1001.

### 11.3.7 Honours Degree in Computational Chemistry

Students wishing to take Honours in Computational Chemistry should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science.

### 11.3.7.1 Required Courses

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or $3211,3303,4304$, and 4305.
2. Physics 1050 (or 1020) and 1051 (or 1021), and 2820.
3. Mathematics $1000,1001,2000,2050,2051,2260$ (or the former Mathematics 3260), and 3202.
4. Computer Science 1510 and 1001.
5. Computer Science 2500 and 2001.
6. Computer Science 3731 or Mathematics 3132.
7. Chemistry 490A/B.
8. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
9. 3 additional credit hours in Biochemistry, Chemistry, Computer Science, Mathematics, or Physics at the 2000 level or above.
10. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours must also be completed.

### 11.3.7.2 Suggested Program of Study

Given appropriate circumstances the Honours in Computational Chemistry program can be completed in four years. While students should consult the Undergraduate Handbook for further timetabling details, to complete the program in four years generally will require that students take the following courses in their first year:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or 1200 and 1001).
3. Physics 1050 (or 1020) and 1051 (or 1021).
4. Mathematics 1000 and 1001.
5. Computer Science 1510 and 1001.

### 11.3.7.3 Other Information

1. Those courses in which a grade of B or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, are the courses beyond first year used to satisfy the required course list.
2. A thesis based on a selected research topic carried out under the supervision of a member of the Department is to be submitted in the final year.
3. Chemistry 490A/B will normally require the equivalent of nine hours per week for two semesters. Registration in Chemistry 490A/B is restricted to those students who have honours standing. The Honours dissertation will be assessed by a committee comprising the supervisor and one other faculty member.
4. Students completing first year requirements for any of Chemistry, Mathematics or Physics via the three course options (i.e. Chemistry 1010, 1050, 1051, Mathematics 1090, 1000, 1001 or 109A/B, 1000, 1001, Physics 1020, 1021, 1051) instead of the two course options (Chemistry 1050, 1051, Chemistry 1200, 1001, Mathematics 1000, 1001, Physics 1050, 1051) will require the corresponding number of extra credits to obtain an Honours degree.
5. Arrangements for subsequent years will depend on the other science subjects being studied and should be made in consultation with the Faculty Advisor.
6. Certain advanced courses may only be offered in alternate years. Candidates therefore should consult the Head of the Department before registration.
7. Certain Graduate courses may be taken in the final year of the Honours Program with the permission of the Head of the Department.

### 11.3.8 General Degree in Chemistry (Biological)

Students wishing to pursue a General Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible, and should consult those regulations of the Calendar dealing with Degree Regulations for the General Degree of Bachelor of Science.

### 11.3.8.1 Required Courses

1. Chemistry 1050 and $1051,2100,2210,2301,2302,2400,2401,3110,3211$, and 4410.
2. At least 6 credit hours from Chemistry $3210,3303,3411$ or any 4000 -level Chemistry course.
3. Biology $1001,1002,2250,2060$, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
4. Biochemistry 2101 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
5. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
6. Physics 1050 (or 1020) and Physics 1051 (or 1021).
7. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.

### 11.3.8.2 Other Information

In first year, prospective students for the General Degree in Chemistry (Biological) should complete:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051, Biology 1001 and 1002, Physics 1050 (or 1020) and Physics 1051 (or 1021), and Mathematics 1000 and 1001.
3. This program fulfills the first and second teachable requirements for admission into the Bachelor of Education (Intermediate/Secondary) at this University with Chemistry and Biology as the first and second teachable subjects, respectively.
4. Students in the Chemistry (Biological) program are not able to also qualify for a minor in Biology.
5. Some courses listed under Required Courses above require one or more prerequisites that are not defined as part of the program.

### 11.3.9 Honours Degree in Chemistry (Biological)

Students wishing to take Honours should consult those sections of the Calendar dealing with Degree Regulations for the Honours Degree of Bachelor of Science. Students wishing to pursue an Honours Degree in Chemistry (Biological) are encouraged to contact the Department Head or the Deputy Head (Undergraduate Studies) as early as possible.

### 11.3.9.1 Required Courses

1. Chemistry 1050 and $1051,2100,2210,2301,2302,2400,2401,3110,3211,4410$ and 490A/B.
2. At least 3 credit hours from Chemistry 3210, 3303,3411 or any 4000 -level Chemistry course not used to fulfill clause 3 . below.
3. At least 3 credit hours from Chemistry $4151,4201,4206,4305$, or 4701.
4. Biology 1001, 1002, 2060, 2250, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4010, 4050, 4245, 4251, 4404.
5. Biochemistry 2101 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
6. Mathematics 1000 and 1001. Statistics 2550 is strongly recommended.
7. Physics 1050 (or 1020) and Physics 1051 (or 1021).
8. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.

### 10.3.9.2 Other Information

In first year, prospective students for the Honours Degree in Chemistry (Biological) should complete:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051, Biology 1001 and 1002, Physics 1050 (or 1020) and Physics 1051 (or 1021), and Mathematics 1000 and 1001.
3. Those courses in which a grade of B or an average of $75 \%$ or higher are required as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, are the courses beyond first year used to satisfy clauses 1.-5. under Required Courses above.
4. Chemistry 490A/B will normally require the equivalent of nine hours per week for two semesters. Registration in Chemistry 490A/B is restricted to those students who have honours standing. The Honours dissertation will be assessed by a committee comprising the supervisor and one other faculty member. Chemistry 490A/B Projects are to be approved by the Head of the Department or delegate.
5. The Honours in Chemistry (Biological) program can be completed in four years. Students should consult the Undergraduate Student Handbook for timetabling details.
6. Students completing first year requirements for any of Chemistry, Mathematics, or Physics via the three course options (i.e. Chemistry 1010, 1050, 1051 (or 1010, 1011, and the former 1031), Mathematics 1090, 1000, 1001, Physics $1020,1021,1051$ ) instead of the two course options (Chemistry 1050, 1051, Mathematics 1000, 1001, Physics 1050, 1051) will require the corresponding number of extra credits to obtain an Honours degree.
7. With the permission of the Head of the Department, 6000-level courses may be taken in the final year of the Honours Program.
8. This program fulfills the first and second teachable requirements for admission into the Bachelor of Education (Intermediate/Secondary) at this University with Chemistry and Biology as the first and second teachables, respectively.
9. Students in the Chemistry (Biological) program are not able to also qualify for a minor in Biology.
10. Some courses listed under Required Courses above require one or more prerequisites that are not defined as part of the program.

### 11.3.10 Course Restrictions

[No change]

### 11.4 Computer Science

## www.mun.ca/computerscience

The following undergraduate programs are available in the Department:

1. Applied Mathematics and Computer Science Joint Major (B.Sc. only)
2. Computer Internship Option (CIIO)
3. Computer Science Honours (B.A., B.Sc.)
4. Computer Science and Economics Joint Major (B.Sc. only)
5. Computer Science and Geography Joint Honours (B.Sc. only)
6. Computer Science and Geography Joint Major (B.Sc. only)
7. Computer Science and Physics Joint Honours (B.Sc. only)
8. Computer Science and Physics Joint Major (B.Sc. only)
9. Computer Science and Pure Mathematics Joint Honours (B.Sc. only)
10. Computer Science and Pure Mathematics Joint Major (B.Sc. only)
11. Computer Science and Statistics Joint Honours (B. Sc. only)
12. Computer Science and Statistics Joint Major (B.Sc. only)
13. Computer Science (Software Engineering) Honours (B.Sc. only)
14. Major in Computer Science (B.A., B.Sc.)
15. Major in Computer Science (Smart Systems) (B.Sc. only)
16. Major in Computer Science (Visual Computing and Games) (B.Sc. only)
17. Minor in Computer Science

Details of joint program offerings may be found in the Faculty of Science section under Joint Program Regulations.

Computer Science course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Computer Science.

### 11.4.1 Major in Computer Science

As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, a student must complete the following courses.

1. Forty-five credit hours in Computer Science courses are required for a major in Computer Science:
a. Computer Science 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008.
b. At least 6 additional credit hours in Computer Science at the 4000 level.
c. Twelve additional credit hours in Computer Science at the 3000 level or beyond.
2. Additional courses required are: Mathematics 1000, 1001, 2000, 2050, and Statistics 1510 or 2550.

Note: Students are encouraged to take Business 2000, Mathematics 3000, and Statistics 2560.

### 11.4.2 Major in Computer Science (Smart Systems) (B.Sc. only)

As a component of the Degree Regulations for the General Degree of Bachelor of Science, a student must complete the following courses.

1. Forty-five credit hours in Computer Science courses are required for a major in Computer Science (Smart Systems):
a. Computer Science 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008;
b. Computer Science 3200, 3201, 3202 and 3301; and
c. Six additional credit hours in Computer Science courses selected from Computer Science 3401, 3550, 4301, 4303, 4750, 4766.
2. Additional courses required are: Mathematics 1000, 1001, 2000, 2050, and Statistics 1510 or 2550.

### 11.4.3 Major in Computer Science (Visual Computing and Games) (B.Sc. only)

As a component of the Degree Regulations for the General Degree of Bachelor of Science, a student must complete the following courses.

1. Forty-five credit hours in Computer Science courses are required for a major in Computer Science (Visual Computing and Games):
a. Computer Science 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, and 2008;
b. Computer Science 3300, 3301, and 4300;
c. Six additional credit hours in Computer Science courses selected from Computer Science 2300, 4301, 4302, 4303, 4304; and
d. Three additional credit hours in Computer Science courses selected from those listed in c. above, or Computer Science 2100, 4766, 4768.
2. Additional courses required are: Mathematics 1000, 1001, 2000, 2050, and Statistics 1510 or 2550.

### 11.4.4 Honours in Computer Science

1. See Bachelor of Arts (Honours) Degree Regulations or Degree Regulations for the Honours Degree of Bachelor of Science (as appropriate).
2. Sixty-three credit hours in Computer Science courses are required for the Honours Degree in Computer Science, including:
a. Computer Science 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, and 4780.
b. Fifteen additional credit hours in Computer Science at the 4000 level.
c. Eighteen additional credit hours in Computer Science courses at the 3000 level or beyond.
3. Additional courses required are: Mathematics 1000, 1001, 2000, 2050, and Statistics 1510 or 2550.

Note: Students are encouraged to take Business 2000, Mathematics 3000, and Statistics 2560.

### 11.4.5 Honours in Computer Science (Software Engineering) (B.Sc. Only)

Completion of the Honours in Computer Science (Software Engineering) Program does not qualify persons to hold the designation "Professional Engineer" as defined by various Provincial Acts governing the Engineering Profession.

1. See Degree Regulations for the Honours Degree of Bachelor of Science.
2. Sixty-three credit hours in Computer Science courses are required for the Honours Degree in Computer Science (Software Engineering), including:
a. Computer Science 1000, 1001, 1002, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 4770, 4780.
b. Nine additional credit hours in Computer Science chosen from 4718, 4721, 4723, 4751, $4753,4756,4759,4766$, and 4768.
c. Nine additional credit hours in Computer Science at the 4000 level.
d. Twelve additional credit hours in Computer Science at the 3000 level or beyond.
3. Additional courses required are: Mathematics 1000, 1001, 2000, 2050, and Statistics 1510 or 2550.

Note: The Honours project (4780) must be in the area of Software Engineering.

### 11.4.6 Minor in Computer Science

[No change]

### 11.4.7 Computer Industry Internship Option (CIIO):

[No change]

### 11.4.8 Supplementary Examinations

Supplementary examinations will be allowed in certain Computer Science courses which have written final examinations. Students should refer to Supplementary Examinations in the Faculty of Science section for details.

### 11.4.9 Faculty Advisors

[No change]

### 11.4.10 Undergraduate Handbook

[No change]

### 11.5 Earth Sciences

[No change]

### 11.5.1 Undergraduate Handbook

[No change]

### 11.5.2 Entrance Requirements

[No change]

### 11.5.3 Minor in Earth Sciences

[No change]

### 11.5.4 Major Programs in Earth Sciences

Programs in Earth Sciences consist of a Common Block of Required Courses (below), and additional courses that depend on the degree being sought.

### 11.5.4.1 Common Block of Required Courses

All majors in Earth Sciences must complete those courses specified in Clauses 1. through 4. Students should examine prerequisites of 3000 level courses in order to decide which course to select under Clauses 3. and 4.

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses, Mathematics 1000 and 1001, Earth Sciences 1000 and 1002, Chemistry 1050 and 1051 or Chemistry 1200 and 1001, Physics 1050 and 1051 or Physics 1020 and 1021. Students are advised to consult the Department of Physics Course Descriptions section for credit restrictions.

Students who intend or are required to complete higher level Physics courses must complete Physics 1051 as well, since it is a prerequisite for higher level Physics courses. Students should review the Department of Physics Calendar entry for these courses.
2. Earth Sciences 2030, 2031, 2401, 2502, 2702, 2905, 3420, 3905.
3. Mathematics 2000 or Statistics 2550.
4. Either Biology 2120 (or Biology 1001 and 1002); or both Physics 2055 and Physics 2820.

Students must ensure that the prerequisites for Earth Sciences courses are fulfilled. Great difficulties in timetabling may be encountered if the required first-year courses are not completed before the beginning of second year.

### 11.5.5 Honours B.Sc. Degree in Earth Sciences

Geoscientific careers vary widely in required background. The Honours B.Sc. program is designed with considerable choice in order that students may personalize their programs based on career goals. Note that the flexibility afforded by this program is not without limits. Some courses have prerequisites, and it is ultimately the student's responsibility to ensure that these prerequisites are satisfied. Students should consult faculty members and the departmental Student Handbook for guidance in selecting courses appropriate to particular career paths.

In addition to the Common Block of Required Courses listed under Major Programs in Earth Sciences, the following requirements must be completed to qualify for the Honours B.Sc. degree in Earth Sciences:

1. Earth Sciences 499A and 499B.
2. At least 27 additional credit hours from Earth Sciences courses at 3000 and/or 4000 levels with a minimum of 12 credit hours from courses at the 4000 level. Credit hours from Earth Sciences 4310 and 4950 cannot be used to fulfill this requirement.
3. Six credit hours from the Faculty of Science courses numbered 2000 or higher. Credit hours from Earth Sciences courses, courses that are cross-listed with Earth Sciences courses, and the former Physics 2050 are excluded. However, Physics 2820 is permitted.
4. Additional credit hours selected to conform with regulations for the Honours Degree of Bachelor of Science so as to achieve a total of 120 credit hours. Students are encouraged to complete a minor in another department.
5. Three of the credit hours used to fulfill either requirement 3. or 4. above must be from Biology, Chemistry, Computer Science, Statistics or Physics. They may be from Mathematics only if Mathematics 2000 has not been taken as part of the Common Block of Required Courses.

### 11.5.6 General B.Sc. Degree in Earth Sciences

In addition to the Common Block of Required Courses listed under Major Programs in Earth Sciences, the following requirements must be completed to qualify for the General B.Sc. degree in Earth Sciences:

1. Eighteen additional credit hours from Earth Sciences courses at 3000 and/or 4000 levels with a minimum of 9 credit hours from courses at 4000 level. Credit hours from Earth Sciences 4310, 4950 and 499A/B cannot be used to fulfill this requirement.
2. Six credit hours from Science Faculty courses numbered 2000 or higher. Credit hours from Earth Sciences courses, courses that are cross-listed with Earth Sciences courses, and the former Physics 2050 are excluded. However, Physics 2820 is permitted.
3. Additional credit hours selected to conform with regulations for the General Degree of Bachelor of Science so as to achieve a total of 120 credit hours. Students are encouraged to complete a minor in another department.

Students are advised that this is the minimum requirement for the General B.Sc. in Earth Sciences. Many provinces, including Newfoundland and Labrador, have legislation requiring registration of professional geoscientists. A basic requirement for registration is, in most cases, the course equivalent of an Honours B.Sc. degree. Students intending to make a career in Earth Sciences should consider taking the Honours Degree program of courses, regardless of whether honours standing is maintained.

### 11.5.7 Credit Restrictions for Present Earth Sciences (EASC) Courses with Former Courses Table

[No change]

### 11.6 Economics

[No change]

### 11.7 Geography

[No change]

### 11.8 Mathematics and Statistics

www.mun.ca/math
The following undergraduate programs are available in the Department:

1. Applied Mathematics and Chemistry Joint Honours (B.Sc. only)
2. Applied Mathematics and Computer Science Joint Major (B.Sc. only)
3. Applied Mathematics and Economics Joint Major (B.Sc. only)
4. Applied Mathematics and Physics Joint Honours (B.Sc. only)
5. Applied Mathematics and Physics Joint Major (B.Sc. only)
6. Biology and Statistics Joint Honours (B.Sc. only)
7. Computer Science and Pure Mathematics Joint Honours (B.Sc. only)
8. Computer Science and Pure Mathematics Joint Major (B.Sc. only)
9. Computer Science and Statistics Joint Honours (B.Sc. only)
10. Computer Science and Statistics Joint Major (B.Sc. only)
11. Economics and Pure Mathematics Joint Major (B.Sc. only)
12. Economics and Statistics Joint Major (B.Sc. only)
13. Economics and Statistics (Co-operative) Joint Major (B.Sc. only)
14. Honours in Applied Mathematics (B.Sc. only)
15. Honours in Pure Mathematics
16. Honours in Statistics
17. Major in Applied Mathematics (B.Sc. only)
18. Major in Pure Mathematics
19. Major in Statistics
20. Minor in Mathematics
21. Minor in Statistics
22. Pure Mathematics and Statistics Joint Honours (B.Sc. only)

Details of Joint Major and Joint Honours programs are given under Joint Program Regulations.
Mathematics and Statistics course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Mathematics and Statistics.

### 11.8.1 Regulations

[No change]

### 11.8.2 Faculty Advisors

[No change]

### 11.8.3 Course Numbering System

[No change]

### 11.8.4 Major in Applied Mathematics (B.Sc. Only)

As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Mathematics $1000,1001,2000,2050,2051,2260,3000,3001,3100,3132,3161,3202$, 4160, 4190.
2. Three credit hours in courses numbered 3000 or higher that are offered by the Department of Mathematics and Statistics, excluding the former Mathematics 3330.
3. A computing course, early in your program. Computer Science 1510 is highly recommended.
4. A designated technical writing course offered by a Science department. Mathematics 2130 is recommended. The technical writing course is prerequisite to some 3000-level courses.
5. Physics 1050 (or 1020) and 1051.
6. A statistics course. Statistics 3410 is recommended.

### 11.8.5 Major in Pure Mathematics

As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, students shall complete the following requirements:

1. Mathematics $1000,1001,2000,2050,2051,2320,3000,3001,3320$;
2. One of Mathematics 2260, 3202, 3210;
3. One of Mathematics 3331, 3370;
4. Twelve further credit hours in Pure Mathematics courses numbered 3000 or higher, excluding the former Mathematics 3260 and 3330, at least 6 credit hours of which must be in courses numbered 4000 or higher;
5. A computing course. Computer Science 1510 is recommended.
6. A designated technical writing course offered by a Science department. Mathematics 2130 is recommended.
7. A statistics course. Statistics 3410 is recommended.

### 11.8.6 Major in Statistics

As a component of the Degree Regulations for the General Degree of Bachelor of Science or the Degree Regulations for the General Degree of Bachelor of Arts, as appropriate, students shall complete the following requirements:

1. Mathematics $1000,1001,2000,2050,2051$, Statistics $2560,3410,3411,3520,3521,4530$;
2. One of Statistics 1510,2500 , or 2550 ;
3. Nine further credit hours in Statistics courses numbered 3000 or higher, at least 6 credit hours of which must be in courses numbered 4000 or higher excluding Statistics 4581;
4. A computing course. Computer Science 1510 is recommended.
5. Mathematics 3000 and 3001 are recommended.

### 11.8.7 Honours in Applied Mathematics (B.Sc. Only)

See Degree Regulations for the Honours Degree of Bachelor of Science. Students shall complete the following:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 3000, 3001, 3100, 3111, 3132, 3161, 3202, 3210, 4160, 4180, 4190, 419A/B;
2. At least one of Mathematics 4162 or 4170 ;
3. Statistics 3410 ;
4. Nine further credit hours in courses numbered 3000 or higher that are offered by the Department of Mathematics and Statistics, excluding the former Mathematics 3330, at least 3 of which must be in courses numbered 4000 or higher;
5. A computing course early in the program is required. Computer Science 1510 is recommended.
6. Physics 1050 (or 1020), 1051, 2820, 3220.

### 11.8.8 Honours in Pure Mathematics

See Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations (as appropriate). Students shall complete the following requirements:

1. Mathematics 1000, 1001, 2000, 2050, 2051, 2130, 2260, 2320, 3000, 3001, 3202, 3210, 3300, 3320, 3331, 4300, 4310, 439A/B, Statistics 2550;
2. Either Mathematics 3340 or 3370;
3. Either Mathematics 4000 or 4001;
4. Either Mathematics 4320 or 4321;
5. Twelve further credit hours in Pure Mathematics courses numbered 3000 or higher, excluding the former Mathematics 3330, at least 9 credit hours of which must be in courses numbered 4000 or higher;
6. A computing course early in the program is required. Computer Science 1510 is recommended.

### 11.8.9 Honours in Statistics

See Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations (as appropriate). Students shall complete the following requirements:

1. Mathematics $1000,1001,2000,2050,2051,3000,3001,3132,3202,3210$, Statistics 2560 , 3410, 3411, 3520, 3521, 4410, 4530, 4590, 459A/B;
2. One of Statistics 1510,2500 , or 2550 ;
3. Eighteen further credit hours in Statistics courses including at least 12 credit hours in courses numbered 4000 or higher excluding Statistics 4581 ;
4. A computing course. Computer Science 1510 is recommended.
5. Mathematics 4000 is recommended.

### 11.8.10 Minor in Mathematics

[No change]

### 11.8.11 Minor in Statistics

[No change]

### 11.9 Ocean Sciences

[No change]

### 11.9.1 Minor in Oceanography

[No change]

### 11.9.2 Minor in Sustainable Aquaculture and Fisheries Ecology

[No change]

### 11.9.3 Major in Ocean Sciences and Major in Ocean Sciences (Environmental Systems)

The Major in Ocean Sciences is an interdisciplinary program that provides a solid foundation in ocean studies, including the basic principles of its main sub-disciplines (physical, chemical, geological, and biological oceanography).

The Major in Ocean Sciences (Environmental Systems) is a stream of the major that provides a geological/geographical context to biological and chemical phenomena in ocean sciences, and covers such key ocean-related topics as climate change and natural hazards.

Students wishing to take one of these major programs are encouraged to carefully consult the Degree Regulations for the General Degree of Bachelor of Science.

More information, including on how to declare a Major in Ocean Sciences, the recommended courses and time tables, can be found in the Handbook of Undergraduate Studies in Ocean Sciences at www.mun.ca/osc/undergrad/Ocean_Sciences_Handbook.pdf.

### 11.9.3.1 Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems)

Admission to the Ocean Sciences Major Programs is based on academic standing. To be considered for admission to one of the major programs, students must normally have completed 30 credit hours with an overall average of at least $65 \%$. The following courses should have been completed:

1. Biology 1001 and 1002;
2. Chemistry 1050 and 1051 (or 1010 and 1011) or (1200 and 1001);
3. Earth Sciences 1000;
4. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses;
5. Mathematics 1000 (or equivalent);
6. Ocean Sciences 1000 with a minimum grade of $65 \%$; and
7. Physics 1020 or Physics 1050.

Students who wish to enroll in any of these programs should plan well in advance so that they have the appropriate prerequisites. Entry to required courses may be limited and determined by academic performance. Students are advised to consult with the Department at the earliest opportunity to prepare
adequately for program admission. Each student registered in the Major will be assigned a faculty advisor who should be consulted on academic issues, including course selection.

### 11.9.3.2 Program Regulations for the Bachelor of Science with Major in Ocean Sciences

Students must successfully complete:

1. the 30 specified credit hours required under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems);
2. Statistics 2550 (or equivalent);
3. Physics 1021 or Physics 1051;
4. a minimum of 30 credit hours in Ocean Sciences, including:
a. Ocean Sciences 2000 (or Biology 3710), 2001, 2100 and 2500. Ocean Sciences 1000, completed under Admission Requirements for the Major in Ocean Sciences or the Major in Ocean Sciences (Environmental Systems), will count as 3 of the required 30 credit hours in Ocean Sciences;
b. at least one of Ocean Sciences 2200 or 2300; and
c. at least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3620, 3640, 4000, 4100, 4122, 4601;
5. extra Science courses as necessary to fulfil the minimum requirement for 78 credit hours in Science as stipulated under Electives of the Degree Regulations for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level; and
6. elective courses as necessary to make up the total of 120 credit hours.

### 11.9.3.3 Program Regulations for the Bachelor of Science with Major in Ocean Sciences (Environmental Systems)

[No change]

### 11.10 Physics and Physical Oceanography

## www.mun.ca/physics

The following undergraduate programs are available in the Department:

1. Applied Mathematics and Physics Joint Honours
2. Applied Mathematics and Physics Joint Major
3. Biochemistry and Physics Joint Honours
4. Chemistry and Physics Joint Honours
5. Computer Science and Physics Joint Honours
6. Computer Science and Physics Joint Major
7. Earth Sciences and Physics Joint Honours
8. Earth Sciences and Physics Joint Major
9. Geophysics and Physical Oceanography Joint Honours
10. Honours in Environmental Physics
11. Honours in Physics
12. Major in Environmental Physics
13. Major in Physics
14. Minor in Physics

Details of Joint Major and Joint Honours programs are given under Joint Program Regulations. Other joint programs may be arranged in consultation with the departments concerned.

Physics and Physical Oceanography course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Physics and Physical Oceanography.

Notes: 1. The attention of students intending to follow any one of the programs listed above is drawn to the UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), governing the appropriate degree. Additional Departmental requirements are given below.
2. Faculty advisors are available to provide advice to students who are registered in, or who are considering registering in, any of the programs. Students are urged to consult with these advisors at their earliest opportunity in order to ensure that they select appropriate courses and programs. Students with credits in Physics courses which are not listed in this calendar should consult with the Department.
3. The six course stream consisting of Physics 1050, 1051, 2053, 2055, 2750, and 2820 or alternatively the seven course stream of Physics 1020, 1021, 1051, 2053, 2055, 2750, and 2820 is intended to provide a cohesive overview of Physics for potential Physics majors. Students who receive a grade of greater than 70\% in Physics 1020 may proceed directly into Physics 1051 without taking Physics 1021.
4. Physics 1050 is recommended for students who have completed Level II Physics, Level III Physics and Level III Advanced Mathematics. Mathematics 1000 must be taken at the same time as, or be completed prior to, taking Physics 1050. Students who have completed Mathematics 1000 and Physics 1050 are required to register for or complete Mathematics 1001 before registering for Physics 1051.
5. Physics 1020 is intended for students who have no background in Physics or who are pursuing degree programs which do not require Physics 1050. Students who complete Physics 1020 (with a grade of at least 70\%) and Mathematics 1000 are eligible for admission to Physics 1051. Students may receive credit for only one of Physics 1050 and 1020.
6. Students who have successfully completed Advanced Placement courses in both Physics and Mathematics will normally be eligible for direct entry into Physics 1051, which can be taken concurrently with Physics 2053 and 2750. Eligible students are advised to consult the Department.
7. Where circumstances warrant, any prerequisites listed below may be waived by the Head of the Department.

### 11.10.1 Minor in Physics

[No change]

### 11.10.2 Major in Physics

As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031).
3. Mathematics 1000 and 1001.
4. Mathematics 2000, Mathematics 2050 and Mathematics 2260.
5. Physics 1050 (or 1020) and 1051.
6. Physics 2053, 2055, 2750, 2820, 3220, 3400, 3500, 3750 and 3900.
7. An additional 12 credit hours in physics courses numbered 3000 or higher which shall include at least 6 credit hours selected from the courses numbered Physics 3000, 3150, 3300, the former 3410, 3550, 3600, 3751.
8. Physics 3810 or Mathematics 3202.

Mathematics 1001, 2000 and 2050 are prerequisites to many Physics courses and should be completed by the end of second year. Mathematics 2260 is co-requisite to Physics 3220 and should be completed before the Winter of the third year. Those who intend to make a career in Physics should note that additional Physics courses are strongly recommended. Mathematics 2051 and Computer Science 1510 or the former 2602 are also recommended.

### 11.10.3 Honours in Physics

As a component of the Degree Requirements for the Honours Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031).
3. Mathematics 1000 and 1001 .
4. Computer Science 1510.
5. Mathematics 2000, 2050, and 2260.
6. Physics 1050 (or 1020) and 1051.
7. Physics 2053, 2055, 2750, 2820, 3220, 3230, 3400, 3500, 3600, 3750, 3820, 3900, 4400, 4500, 4820, 4850, 4900, 490A/B.
8. Physics 3810 or Mathematics 3202.
9. An additional 12 credit hours in physics courses numbered 3000 or higher which shall include at least 6 credit hours selected from physics courses numbered 4000 or higher.
10. Fifteen credit hours in applicable elective courses

Note: Certain graduate courses may be taken in the final year of the Honours Program with the permission of the Head of the Department.

Only 6 credit hours at the 1000 level in each of Physics, Chemistry and Mathematics can be used to fulfil the 120 credit hours required for the Honours program. The inclusion of Mathematics 1090 (or 109A/B), the sequence of Physics 1020, 1021, and 1051 or the substitution of Chemistry 1010, 1011 and the former 1031 for Chemistry 1050 and 1051 will each increase the number of credit hours required for the Honours Physics program by three.

An Honours thesis is to be presented on work undertaken by the candidate under the guidance of a Department of Physics and Physical Oceanography faculty member. The thesis comprises the 6 credit hour course Physics 490A/B. Students should seek departmental advice regarding a thesis project no later than the winter preceding the semester in which the project will be started.

The Honours Physics program in and beyond the third year requires a familiarity with computer programming and numerical analysis. In choosing electives for this program, the Department recommends that students supplement the prescribed program with the following courses Computer Science 2500 or 2510, and 3731 (or Mathematics 2130 and 3132). Mathematics 2051 and 3000 are also suitable electives. For specific courses and recommendations about electives, consultation with a faculty advisor in the Department is suggested.

The Department recommends that students wishing to complete the Honours Physics program in 120 credit hours follow the schedule given below. This schedule is intended for students who qualify for Physics 1050 and 1051. Other suggested course schedules are available from the Head of the Department.

## Recommended Course Schedule - Honours Physics Program

| Year | Semester I | Semester II |
| :---: | :---: | :---: |
| I | Chemistry 1050 <br> English 1090 or the former English 1080 <br> Mathematics 1000 <br> Physics 1050 <br> Elective | Chemistry 1051 <br> Computer Science 1510 <br> English 1110 (1191 or the former 1101, 1192 or the former 1102) <br> Mathematics 1001 <br> Physics 1051 |
| II | Mathematics 2000 <br> Mathematics 2050 <br> Physics 2053 <br> Physics 2820 <br> Elective | Mathematics 2260 <br> Mathematics 3202 <br> Physics 2055 <br> Physics 2750 <br> Elective |
| III | Physics 3220 <br> Physics 3400 <br> Physics 3500 <br> Physics 3750 <br> Physics 3820 | Physics 3900 <br> Physics 3600/4500 <br> Physics 3230/4400 <br> Physics 4820 <br> Physics Elective |
| IV | Physics 4900 <br> Physics 4850 <br> Physics 490A <br> Physics Elective <br> Elective | Physics 4500/3600 <br> Physics 4400/3230 <br> Physics 490B <br> Physics Elective <br> Physics Elective |

### 11.10.4 Major in Environmental Physics

As a component of the Degree Requirements for the General Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031)
3. Mathematics 1000 and 1001
4. Mathematics 2000, Mathematics 2050, Mathematics 2260, Mathematics 3202
5. Physics 1050 (or 1020) and 1051
6. Physics 2053, 2055, 2750, 2820, 3220, 3820, 3300, 3340, 4340
7. Physics 3400 or 3500
8. Earth Sciences $1000,1002,2502,3170,3172$
9. Geography $2102,2195,3120$
10. Biology 2120, 2600

The Major degree offers students a fair degree of latitude in choosing electives, students are encouraged to take electives from Geography and Earth Sciences: of particular merit would be any of Earth Sciences 3600, 3611 or 4105.

### 11.10.5 Honours in Environmental Physics

As a component of the Degree Requirements for the Honours Degree of Bachelor of Science, students shall complete the following requirements:

1. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses
2. Chemistry 1050 and 1051 (or Chemistry 1010, 1011, and the former 1031)
3. Mathematics 1000 and 1001
4. Mathematics 2000, Mathematics 2050, Mathematics 2260, Mathematics 3202
5. Physics 1050 (or 1020 ) and 1051
6. Physics 2053, 2055, 2750, 2820, 3220, 3300, 3340, 3820,4205, 4300, 4340, 4820, 490A/B
7. Physics 3400 or 3500
8. Earth Sciences 1000, 1002, 2502, 3170 and 3172
9. Geography $2102,2195,3120$
10. Biology 2120, 2600

An honours thesis is to be presented on work undertaken by the candidate under the guidance of a Department of Physics and Physical Oceanography faculty member. The thesis comprises the 6 credit hour course Physics 490A/B. Students should seek departmental advice regarding a thesis project no later than the winter preceding the semester in which the project will be started.

The Department recommends that students wishing to complete the Honours Environmental Physics program in 120 credit hours follow the schedule given below. This schedule is intended for students who qualify for Physics 1050 and 1051. Other suggested course schedules are available from the Head of the Department.

Those courses in which a grade of " $B$ " or better or an average of $75 \%$ or higher are required, as specified under Academic Standing in the Degree Regulations for the Honours Degree of Bachelor of Science, are 45 credit hours in Physics courses, and 15 credit hours in other courses (beyond the 1000 level) selected from the specified program courses in Earth Sciences, Geography and Biology.

## Recommended Course Schedule - Honours Environmental Physics Program

| Year | Semester I | Semester II |
| :---: | :---: | :---: |
| I | Chemistry 1050 <br> Earth Sciences 1000 <br> English 1090 or the former English 1080 <br> Mathematics 1000 <br> Physics 1050 | Chemistry 1051 <br> Earth Sciences 1002 <br> English 1110 <br> Mathematics 1001 <br> Physics 1051 |
| II | Geography 2102 <br> Mathematics 2000 <br> Mathematics 2050 <br> Physics 2053 <br> Physics 2820 | Geography 2195 <br> Mathematics 2260 <br> Mathematics 3202 <br> Physics 2750 <br> Elective |
| III | Earth Sciences 2502 <br> Physics 3220 <br> Physics 3820 <br> Physics 3400/3500 <br> Physics 3340 | Biology 2120 <br> Earth Sciences 3170 <br> Geography 3120 <br> Physics 2055 <br> Physics 4820 |
| IV | Biology 2600 <br> Earth Sciences 3172 <br> Physics 3300 <br> Physics 490A <br> Elective | Physics 4205 <br> Physics 4300 <br> Physics 4340 <br> Physics 490B <br> Elective |

Credit Restrictions for Present Physics Courses with Former Courses Table

Credit May Be Obtained For Only One Course From Each of The Pairs of Courses Listed in This Table

| Present Course | Former Course | Present Course | Former Course |
| :---: | :---: | :---: | :---: |
| 1020 | 1200 | 1051 | 2050 |
| 1021 | 1201 | 1051 | 1061 |
| 1051 | 1052 | 3750 | 3700 |
| 2820 | 2200 | 3750 | 3850 |
| 2053 | 2450 | 490A/B | 4990 |
| 2055 | 2550 | 1051 | 2054 |
| 2750 | 2700 | 1051 | 2550 |
| 3220 | 3200 | 4400 | 3410 |
| 3230 | 2210 | 4820 | 3821 |
|  |  | 4900 | 3920 |

Physics 1021 and the former Physics 1201 will be considered equivalent for prerequisite purposes. Physics 1051 and 2820 will be considered equivalent to the former Physics 1054 and 2054 for prerequisite purposes. Physics 1051 and the former Physics 1052 and 2050 will be considered equivalent for prerequisite purposes.

Not all courses are offered every year. Students should check with the Department prior to registration to plan programs.

### 11.11 Psychology

www.mun.ca/psychology
The following undergraduate programs are available in the Department.

1. Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
2. Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
3. Biology and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
4. Biology and Psychology Joint Honours (B.Sc. only)
5. Major and Honours in Behavioural Neuroscience (B.Sc. only)
6. Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)
7. Major and Honours in Psychology (B.A. or B.Sc.)
8. Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.)
9. Minor in Psychology (B.A. or B.Sc.)

Details of the Joint Honours programs are given under the Joint Program Regulations.
Psychology course descriptions are found at the end of the Faculty of Science section under Course Descriptions, Psychology.

### 11.11.1 Admission to Major Programs

Admission to the Major programs in the Department of Psychology is competitive and selective. Students who wish to enter these programs must submit a completed application form to the Psychology Department by June 1 for Fall semester registration. To be eligible for admission, students must have completed the 24 credit hours as listed below with an average of at least 65\% in Psychology 1000/1001 and an overall average of at least 60\% in Psychology, Critical Reading and Writing, and Mathematics:

1. Psychology $1000,1001$.
2. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
3. Mathematics 1000 , or two of $1090,1050,1051$ (or equivalent).
4. Six credit hours of electives ( 9 if only Mathematics 1000 is completed).

Students who fulfil the eligibility requirements compete for a limited number of available spaces. Selection is based on academic performance, normally cumulative average and performance in recent courses.

### 11.11.2 Admission to Honours Programs

The Honours programs in the Department of Psychology are designed for students who would like to concentrate their studies or pursue graduate work. Students who wish to be admitted to these programs must submit an "Application for Admission to Honours Program Faculties of Humanities and Social Sciences or Science" to the Department of Psychology by June 1 for Fall semester registration. This form is available at www.mun.ca/regoff/Application_Honours_Program.pdf. To be eligible for admission, students must have completed Psychology 2910, 2911, 2520, and 2930 and obtained in these courses a grade of "B" or better, or an average of $75 \%$ or higher. Students who fulfill the eligibility requirements compete for a limited number of available spaces. Selection is based on academic performance in the required courses. In special circumstances, students may be admitted to Honours Programs at times other than June.

Note: Students are advised to consult the Bachelor of Arts (Honours) Degree Regulations or Degree
Regulations for the Honours Degree of Bachelor of Science, as appropriate.

### 11.11.3 Requirements for a Major in Psychology

Students completing this program cannot receive credit for Psychology 2920. Students who intend to pursue graduate studies should take courses leading to the Honours degree.

1. Students may Major in Psychology as part of either a B.A. or a B.Sc. program, and should consult the Degree Regulations for the General Degree of Bachelor of Science or the Degree
Regulations for the General Degree of Bachelor of Arts, as appropriate. All Majors are required to complete a minimum of 42 credit hours of Psychology as listed below:
a. Psychology 1000, 1001, 2520, 2910, 2911, 2930.
b. Twelve credit hours in Psychology chosen from the following: 3050, 3100, 3250, 3350, $3450,3620,3650,3750$, or one of 3800 or 3830.
c. Twelve credit hours of 4000-level courses in Psychology, of which at least one must be a research experience course and one must be a selected topics course.
2. Psychology Majors following the B.Sc. program are also required to complete the following:
a. Mathematics 1000 (or equivalent).
b. Biology 1001 and 1002.
c. Either Chemistry 1010 and 1011 (or 1050 and 1051); OR Physics 1020 (or 1050) and 1021 (or 1051).
Note: First year students should think carefully about whether Chemistry or Physics best suits their future program needs. Students should examine the prerequisites for upper-level science courses and attempt to take them in their first year.
d. Six credit hours of laboratory courses at the 2000 level or above in one of Biology, Chemistry, or Physics.
Note: Biology/Psychology 4701 and Biology 3053 cannot be used to satisfy the requirement of 6 laboratory credit hours at the 2000 level or above in either Biology, Chemistry, or Physics.
3. Psychology Majors following the B.A. program are also required to complete Mathematics 1000 or two of 1090, 1050, 1051 (or equivalent), and are encouraged to complete at least 6 credit hours in Biology.

### 11.11.4 Requirements for Honours in Psychology

Students completing this program cannot receive credit for Psychology 2920.

1. Honours students in Psychology should consult Degree Regulations for the Honours Degree of Bachelor of Science or Bachelor of Arts (Honours) Degree Regulations, as appropriate. All Honours students are required to complete the 60 credit hours of Psychology as listed below:
a. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3900, 4910, 499A/B
b. Eighteen credit hours chosen from the alternatives listed in Clause 1. b. of the requirements for a Major in Psychology
c. Twelve credit hours of 4000-level courses in Psychology, of which at least one must be a research experience course and one must be a selected topics course.
2. Honours students must also complete the requirements listed in either Clause 2. or Clause 3., as applicable, of the requirements for a Major in Psychology.
3. Honours students will be required to submit in their graduating year, an undergraduate thesis (Psychology 499A/B) which demonstrates their competence in Experimental Psychology.

### 11.11.5 Requirements for a Major in Behavioural Neuroscience (B.Sc. Only)

Students completing this program cannot receive credit for Psychology 2920.
A program is offered in the Psychology Department to provide an education in Behavioural Neuroscience. Students planning to enroll in the program are advised to consult with the Head of the Department at the earliest opportunity because certain course choices may restrict later options. Students who intend to pursue graduate studies should take courses leading to the Honours degree.

As a component of the Degree Requirements for the General Degree of Bachelor of Science, the program for a Major in Behavioural Neuroscience shall include:

1. a. Psychology 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820.
b. Three credit hours in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750.
c. Any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
2. a. Mathematics 1000 (or equivalent) and 1001.
b. Chemistry 1010 and 1011 (or 1050 and 1051), and 2440 (or 2400/2401).
c. Physics 1020 (or 1050) and 1021 (or 1051).
d. Biology 1001 and 1002.
e. Six credit hours in Critical Reading and Writing (CRW) courses, including at least three credit hours in English courses.
3. Eighteen credit hours from the following courses chosen from at least two different sciences:
a. Biochemistry: Any 2000-, 3000-, or 4000-level course except the former 2000, 2005, the former 2010, the former 2011, 3202, 3402, or 4502.
b. Biology: 2060, 2122, 2210, 2250, 2900, 3050, 3160, 3202, 3295, 3401, 3500, 3530, 3540, $3750,4200,4241,4245,4250,4402$, the former $4450,4601,4605,4701$, the former 4900 (see note below).
c. Chemistry: $2100,2210,2301$ (or the former Chemistry 2300) or any 3000 or 4000 level course.
d. Computer Science: Any 2000, 3000, or 4000 level course except the former 2650 and the former 2801.
e. Mathematics: 2000, 2050, 2051, 3000, 3001 or any 3000 or 4000 level pure or applied mathematics course.
f. Physics: Any 2000, 3000, or 4000 level course except 2151, 3150, 3151.

Notes: 1. Credit may not be obtained for both Biology 3750 and Psychology 3750 or for both Biology 4701 and Psychology 4701.
2. The courses listed under Clause 3 may have prerequisites. It is the student's responsibility to ensure that all prerequisites have been met, or that waivers have been obtained, before registering for these courses.

### 11.11.6 Requirements for Honours in Behavioural Neuroscience (B.Sc. Only)

Students in Behavioural Neuroscience should consult Degree Regulations for the Honours Degree of Bachelor of Science. Students completing this program cannot receive credit for Psychology 2920.

1. Honours students in Behavioural Neuroscience are required to complete the following Psychology courses: 1000, 1001, 2520, 2910, 2911, 2930, 3250, 3800, 3820, 3900, 499A/B, one further course in Psychology chosen from the following: 3050, 3100, 3350, 3450, 3620, 3650, 3750; any research experience course and one of Psychology 4250, 4251, 4850 or 4851 ; or, any selected topics course and one of Psychology 4270 or 4870.
2. Honours students in Behavioural Neuroscience must also complete the requirements listed in Clauses 2. and 3. of the requirements for a Major in Behavioural Neuroscience.
3. In accordance with Academic Standing under the Degree Regulations for the Honours Degree of Bachelor of Science, Honours candidates must obtain a grade of "B" or better, OR an average of $75 \%$ or higher in all the required courses listed in Clauses 1. and 3. of the requirements for a major in Behavioural Neuroscience and Clause 1 of the requirements for honours in Behavioural Neuroscience, except those at the 1000 level.

### 11.11.7 Requirements for a Minor in Psychology

[No change]

### 11.11.8 Requirements for Major and Honours in Psychology (Co-operative) (B.A. or B.Sc.), and Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)

[No change]

### 10.11.9 Suggested Course Sequences

The tables below show suggested course sequences for the B.A. in Psychology (Co-operative), the B.Sc. in Psychology (Cooperative), the B.A. Honours in Psychology (Co-operative), the B.Sc. Honours in Psychology (Co-operative), the B.Sc. in Behavioural Neuroscience (Co-operative), and the B.Sc. Honours in Behavioural Neuroscience (Co-operative).

Table 1 Suggested Course Sequence for B.A. in Psychology (Co-operative)

| Term | Suggested Courses |
| :--- | :--- |


| Fall <br> Semester 1 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Critical Reading and Writing requirement Mathematics 1000 or one of Mathematics 1090, 1050, 1051 Psychology 1000 |
| :---: | :---: |
| Winter Semester 2 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Critical Reading and Writing requirement One of Mathematics 1000, 1090, 1050 or 1051* Psychology 1001 |
| Fall <br> Semester 3 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring <br> Work Term 1 | Psychology 199W |
| Fall <br> Semester 5 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 3000-Level Core Psychology 3000-Level Core |
| Winter Semester 6 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 3000-Level Core Psychology 3000-Level Core |
| Spring <br> Work Term 2 | Psychology 299W |
| Fall <br> Semester 7 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 4000-Level Psychology Selected Topics course |
| Winter Work Term 3 | Psychology 399W |
| Fall <br> Semester 8 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 4000-Level <br> Psychology Research Experience course |

[^2]
## was taken in Semester 1.

Table 2 Suggested Course Sequence for B.Sc. in Psychology (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| Fall <br> Semester 1 | Biology 1001 <br> Chemistry 1010 (1050) or Physics 1020 (1050)* <br> Critical Reading and Writing requirement <br> Mathematics 1090 or 1000 <br> Psychology 1000 |
| Winter Semester 2 | Biology 1002 <br> Chemistry 1011 (1051) or Physics 1021 (1051) <br> Critical Reading and Writing requirement <br> Mathematics 1000 or Elective or Science requirement <br> Psychology 1001 |
| Fall <br> Semester 3 | Biology, Chemistry, or Physics Lab Course <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | Biology, Chemistry, or Physics Lab Course <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring Work Term 1 | Psychology 199W |
| Fall <br> Semester 5 | Elective or Science requirement Elective or Science requirement Elective or Science requirement Psychology 3000-Level Core Psychology 3000-Level Core |
| Winter Semester 6 | Elective or Science requirement Elective or Science requirement Elective or Science requirement Psychology 3000-Level Core Psychology 3000-Level Core |
| Spring Work Term 2 | Psychology 299W |
| Fall <br> Semester 7 | Elective or Science requirement <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 4000-Level <br> Psychology Selected Topics |
| Winter Work Term 3 | Psychology 399W |
| Fall <br> Semester 8 | Elective or Science requirement Elective or Science requirement |



Elective or Science requirement Psychology 4000-Level Psychology Research Experience
*Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090).

## Table 3 Suggested Course Sequence for B.A. (Honours) in Psychology (Cooperative)

| Term | Suggested Courses |
| :---: | :---: |
| Fall <br> Semester 1 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Critical Reading and Writing requirement <br> Mathematics 1000 or one of Mathematics 1090, 1050, 1051 Psychology 1000 |
| Winter Semester 2 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Critical Reading and Writing requirement One of Mathematics 1000, 1090, 1050 or 1051* Psychology 1001 |
| Fall <br> Semester 3 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement <br> Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring Work Term 1 | Psychology 199W |
| Fall <br> Semester 5 | Elective or Humanities and Social Sciences requirement <br> Psychology 3000-Level Core <br> Psychology 3000-Level Core <br> Psychology 3000-Level Core <br> Psychology 3900 |
| Winter Semester 6 | Elective or Humanities and Social Sciences requirement Elective or Humanities and Social Sciences requirement Psychology 3000-Level Core <br> Psychology Research Experience course <br> Psychology 4910 |
| Spring Work Term 2 | Psychology 299W |
| Fall <br> Semester 7 | Elective or Humanities and Social Sciences requirement <br> Psychology 3000-Level Core <br> Psychology 4000-Level Core <br> Psychology Selected Topics course <br> Psychology 499A |
| Winter | Psychology 399W |


| Work Term 3 |  |
| :--- | :--- |
| Spring (Optional) | Psychology 499A |
|  | Elective or Humanities and Social Sciences requirement <br> Fall <br> Semester 8 <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br>  <br> Psychology 3000-Level Core <br> Psychology 4000-Level Core <br> Psychology 499B |

*Psychology Majors are required to complete Mathematics 1000 or two of 1090, 1050, 1051 (or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000 was taken in Semester 1.

Table 4 Suggested Course Sequence for B.Sc. (Honours) in Psychology (Cooperative)

| Term | Suggested Courses |
| :---: | :---: |
| Fall <br> Semester 1 | Biology 1001 <br> Chemistry 1010 (1050) or Physics 1020 (1050)* <br> Critical Reading and Writing requirement <br> Mathematics 1090 or Mathematics 1000 <br> Psychology 1000 |
| Winter Semester 2 | Biology 1002 <br> Chemistry 1011 (1051) or Physics 1021 (1051) <br> Critical Reading and Writing requirement <br> Mathematics 1000 or Elective or Science requirement <br> Psychology 1001 |
| Fall Semester 3 | Biology, Chemistry, or Physics Lab Course <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | Biology, Chemistry, or Physics Lab Course <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring Work Term 1 | Psychology 199W |
| Fall <br> Semester 5 | Elective or Science requirement Elective or Science requirement Psychology 3000-Level Core Psychology 3000-Level Core Psychology 3900 |
| Winter Semester 6 | Elective or Science requirement Psychology 3000-Level Core Psychology 3000-Level Core Psychology Research Experience Psychology 4910 |
| Spring | Psychology 299W |


| Work Term 2 |  |
| :---: | :---: |
| Fall <br> Semester 7 | Elective or Science requirement Psychology 3000-Level Core <br> Psychology 4000-Level <br> Psychology Selected Topics Psychology 499A |
| Winter <br> Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| Fall <br> Semester 8 | Elective or Science requirement Elective or Science requirement Psychology 3000-Level Core Psychology 4000-Level Core Psychology 499B |

Table 5 Suggested Course Sequence for B.Sc. in Behavioural Neuroscience (Cooperative)

| Term | Suggested Courses |
| :---: | :---: |
| Fall <br> Semester 1 | Biology 1001 or Physics 1020 (1050)* Chemistry 1010 (1050) <br> Critical Reading and Writing requirement Mathematics 1090 or Mathematics 1000 Psychology 1000 |
| Winter Semester 2 | Biology 1002 or Physics 1021 (1051) Chemistry 1011 (1051) <br> Critical Reading and Writing requirement Mathematics 1000 or Mathematics 1001 Psychology 1001 |
| Fall <br> Semester 3 | BHNR Requirement 1** <br> Chemistry 2440*** <br> Physics 1020 (1050)* or Biology 1001 <br> Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | BHNR Requirement 2 <br> Physics 1021 (1051) or Biology 1002 <br> Mathematics 1001 or Elective or Science requirement <br> Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring <br> Work Term 1 | Psychology 199W |
| Fall <br> Semester 5 | BHNR Requirement 3 <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 3250 <br> Psychology 3800 |
| Winter | BHNR Requirement 4 |


| Semester 6 | Elective or Science requirement <br> Elective or Science requirement <br> Psychology 3000-Level Core <br> Psychology 3820 |
| :---: | :---: |
| Spring Work Term 2 | Psychology 299W |
| Fall <br> Semester 7 | BHNR Requirement 5 <br> Elective or Science requirement <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology Research Experience course |
| Winter Work Term 3 | Psychology 399W |
| Fall <br> Semester 8 | BHNR Requirement 6 <br> Elective or Science requirement <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology Selected Topics course |

*Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090).
**BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural
Neuroscience (B.Sc. Only)
***Students may choose to instead take Chemistry 2400 and 2401. These students should consult with the Psychology Undergraduate Advisor.

Table 6 Suggested Course Sequence for B.Sc. (Honours) in Behavioural Neuroscience (Co-operative)

| Term | Suggested Courses |
| :---: | :---: |
| Fall <br> Semester 1 | Biology 1001 or Physics 1020 (1050)* <br> Chemistry 1010 (1050) <br> Critical Reading and Writing requirement <br> Mathematics 1090 or 1000 <br> Psychology 1000 |
| Winter Semester 2 | Biology 1002 or Physics 1021 (1051) Chemistry 1011 (1051) <br> Critical Reading and Writing requirement Mathematics 1000 or 1001 Psychology 1001 |
| Fall <br> Semester 3 | BHNR Requirement 1** <br> Chemistry 2440*** <br> Physics 1020 (1050)* or Biology 1001 <br> Psychology 2520 or 2930 <br> Psychology 2910 |
| Winter Semester 4 | BHNR Requirement 2 <br> Mathematics 1001 or Elective or Science requirement <br> Physics 1021 (1051) or Biology 1002 <br> Psychology 2911 <br> Psychology 2930 or 2520 |
| Spring | Psychology 199W |


| Work Term 1 |  |
| :---: | :---: |
| Fall <br> Semester 5 | BHNR Requirement 3 <br> Elective or Science requirement <br> Psychology 3250 <br> Psychology 3800 <br> Psychology 3900 |
| Winter Semester 6 | BHNR Requirement 4 <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology 3000-level core <br> Psychology 3820 |
| Spring Work Term 2 | Psychology 299W |
| Fall <br> Semester 7 | BHNR Requirement 5 <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology Research Experience course <br> Psychology 499A |
| Winter Work Term 3 | Psychology 399W |
| Spring (Optional) | Psychology 499A |
| Fall <br> Semester 8 | BHNR Requirement 6 <br> Elective or Science requirement <br> Elective or Science requirement <br> Psychology Selected Topics course <br> Psychology 499B |
| *Students registered in Physics 1050 must also be registered in Mathematics 1000 (not 1090). **BHNR Requirement 1-6 specified in clause 3, Requirements for a Major in Behavioural Neuroscience (B.Sc. Only). <br> ***Students may choose to instead take Chemistry 2400 and 2401. These students should consult with the Psychology Undergraduate Advisor. |  |

### 11.12 Science

[No change]

## 12 Course Descriptions

[No change]

## Secondary Calendar Changes (Clean Version)

### 6.8 Joint Degrees of Bachelor of Arts and Bachelor of Science

Students who wish to simultaneously pursue a Bachelor of Arts program and a Bachelor of Science program may do so by completing a minimum of 135 credit hours in courses, rather than the minimum of 150 credit hours required under UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Residence Requirements - Second Degree.

Students who complete the Joint Degrees of Bachelor of Arts and Bachelor of Science are not required to complete a minor. Students may complete the requirements for a minor, or an additional (third) major, in accordance with UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Degree and Departmental Regulations - Further Credentials.

Credit hours earned in Computer Science, Economics, Geography, Mathematics and Statistics, and Psychology may be eligible to simultaneously satisfy a requirement for credit hours in the Faculty of Humanities and Social Sciences and a requirement for credit hours in the Faculty of Science.

Careful planning of courses is crucial to ensure timely completion of the Joint Degrees of Bachelor of Arts and Bachelor of Science. Students enrolled in this program, or who plan to enroll in this program, are strongly encouraged to consult regularly with appropriate academic advisors in both the Faculty of Humanities and Social Sciences and the Faculty of Science. It may not be possible to complete the requirements for the Joint Degrees in the normal time if the decision to embark on the program is delayed.

Students who have enrolled in the Joint Degrees of Bachelor of Arts and Bachelor of Science must satisfy all program requirements before they may be granted either the degree of Bachelor of Arts or the degree of Bachelor of Science, and must graduate with both degrees at the same convocation.

1. The minimum of 135 credit hours for the Joint Degrees of Bachelor of Arts and Bachelor of Science shall include:
a. a Major program chosen from those majors offered by departments within the Faculty of Humanities and Social Sciences and the Interdisciplinary Arts majors, with the exception of majors offered by the Department of Computer Science, the Department of Mathematics and Statistics, and the Department of Psychology;
b. a Major program chosen from those majors offered by departments within the Faculty of Science, with the exception of majors offered by the Department of Economics and the Department of Geography;
c. the Core Requirements for the Faculty of Humanities and Social Sciences (including the Breadth of Knowledge Requirement, the Critical Reading and Writing (CRW) Requirement, the Language Study (LS) Requirement, and the Quantitative Reasoning (QR) Requirement), for which the Quantitative Reasoning Requirement shall be satisfied by 6 credit hours in Mathematics courses;
d. 6 credit hours in courses from each of two Sciences other than Mathematics;
e. a total of at least 78 credit hours in courses offered by departments within the Faculty of Humanities and Social Sciences, and a total of at least 78 credit hours offered by departments within the Faculty of Science; and
f. no more than 6 credit hours in courses offered by a Faculty or School other than the Faculty of Humanities and Social Sciences or the Faculty of Science.

While the Joint Degrees of Bachelor of Arts and Bachelor of Science is available to all Major programs offered by the Faculty of Humanities and Social Sciences and the Faculty of Science, students pursuing a major outside of Computer Science, Economics, Geography, Psychology, Pure Mathematics or Statistics should pay special attention to course planning and selection to ensure that this requirement is met within the required 135 credit hours.
2. Admission to the Major programs shall be governed by Faculty of Humanities and Social Sciences - Admission to the Bachelor of Arts General Degree Programs and Faculty of Science - Admission.
3. Students who have already completed a bachelor's degree are not eligible to complete the Joint Degrees of Bachelor of Arts and Bachelor of Science, but may separately complete a Bachelor of Arts or a Bachelor of Science in accordance with UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Residence Requirements - Second Degree.

### 13.4 Computer Science

For Departmental Regulations and Course Descriptions, see Faculty of Science section of the Calendar.
The following undergraduate programs are available in the Department of Computer Science:

1. Applied Mathematics and Computer Science Joint Major (B.Sc. only)
2. Computer Science and Economics Joint Major (B.Sc. only)
3. Computer Science and Geography Joint Honours (B.Sc. only)
4. Computer Science/ and Geography Joint Major (B.Sc. only)
5. Computer Science and Physics Joint Honours (B.Sc. only)
6. Computer Science and Physics Joint Major (B.Sc. only)
7. Computer Science and Pure Mathematics Joint Honours (B.Sc. only)
8. Computer Science and Pure Mathematics Joint Major (B.Sc. only)
9. Computer Science and Statistics Joint Honours (B.Sc. only)
10. Computer Science and Statistics Joint Major (B.Sc. only)
11. Computer Science Honours (B.A., B.Sc.)
12. Major in Computer Science (B.A., B.Sc.)
13. Major in Computer Science (Smart Systems) (B.Sc. only)
14. Major in Computer Science (Visual Computing and Games) (B.Sc. only)
15. Honours in Computer Science (Software Engineering) (B.Sc. only)
16. Minor in Computer Science (B.A., B.Sc.)
17. Computer Internship Option (CIIO)

### 13.5 Economics

### 13.5.3 Admission Regulations (B.Sc.)

Students are normally admitted to the B.Sc. Program upon successful completion of 30 credit hours which must include:

1. 6 credit hours in Critical Reading and Writing (CRW) courses, including at least 3 credit hours in English courses; and
2. 6 credit hours in Mathematics courses.

### 13.5.4 Major in Economics (B.A. or B.Sc.)

1. Students may Major in Economics as part of either a B.A. or a B.Sc program. See the Regulations for the General Degree of Bachelor of Arts and the Degree Regulations for the General Degree of Bachelor of Science as appropriate.
2. ECON 1010 (or the former ECON 2010) and/or ECON 1020 (or the former ECON 2020) are prerequisites for all other Economics courses except the former Economics 2070.
3. Economics 2550,3000 and 3010 are prerequisites for all 4000 -level courses.
4. Students shall consult with the Head of the Department or delegate when choosing courses for a Major in Economics.
5. Mathematics 1000 or its equivalent is the prerequisite for Economics 3000, 3010, and 3550.
6. B.A. students who undertake a Major in Economics shall complete Statistics 2500 and at least 39 credit hours in courses in Economics of which:
a. 1010 (or the former 2010), 1020 (or the former 2010), 2550, 3000, 3001, 3010 and 3550 are obligatory.
b. Eighteen credit hours shall be chosen from among the various Economics courses in consultation with the Head of the Department or delegate, and will include at least 9 credit hours in courses at the 4000-level.
c. Students may, with the approval of the Head of the Department or delegate, substitute Statistics 2550 for Statistics 2500.
7. B.A. students majoring in Economics shall complete a minor of 24 credit hours in one other approved subject, or a second Major in accordance with Regulations for the General Degree of Bachelor of Arts. It is recommended that the Minor or second Major be chosen from the following subjects: Business, Mathematics, Political Science, Statistics, Computer Science, History, Geography, Philosophy, Sociology, or Anthropology.
8. B.Sc. students who undertake a Major in Economics shall complete at least 42 credit hours in courses in Economics of which:
a. 1010 (or the former 2010), 1020 (or the former 2010), 2550, 3000, 3001, and 3010 are obligatory.
b. Six credit hours shall be chosen from either 3550 and 3551 , OR 4550 and 4551 .
c. Eighteen credit hours shall be chosen from among the various Economics courses in consultation with the Head of the Department or delegate, and will include at least 9 credit hours in courses at the 4000-level.
9. B.Sc. students must complete credits from other Science disciplines as follows:
a. Mathematics 1000,1001 , and 2050.
b. Statistics 2550, or its equivalent, and an additional 3 credit hours of Statistics.
c. Computer Science 1000, and an additional 3 credit hours of Computer Science. With the approval of the Head of the Department or delegate, students may substitute another 1000-level Computer Science course for Computer Science 1000.
d. At least 3 credit hours in an additional science subject other than Mathematics/Statistics, Economics, and Computer Science.

### 13.5.5 Honours in Economics (B.A. or B.Sc.)

1. See the General Regulations for the B.A. (Honours) Degree and the Degree Regulations for the Honours Degree of Bachelor of Science.
2. All students shall consult with the Head of the Department or delegate when choosing courses for an Honours program.
3. All students shall complete all non-Economics courses required of B.A. or B.Sc. Majors, and at least 60 credit hours in courses in Economics, including 1010 (or the former 2010), 1020 (or the former 2010), 2550, and at least 36 credit hours at the 3000 -level or above including 3000, 3001, 3010, 3011, 3550, 3551, 4550 and 4551.
4. Twenty-four credit hours in electives in Economics shall be chosen in consultation with the Head of the Department or delegate, including at least 9 credit hours in courses at the 4000 -level. In addition, all Economics Honours students are required to write an essay.

### 13.5.7 Joint Programs

Programs for Joint Majors in Economics and Computer Science, Pure Mathematics, Applied Mathematics or Statistics, and a Joint Major in Statistics and Economics (Co-operative) are found under the heading Joint Program Regulations in the entry for the Faculty of Science.

Students who wish to take a Joint Major in Economics and Computer Science, Mathematics or Statistics must arrange their program in consultation with the heads of the respective departments and comply with the General Regulations for the Majors Degrees.

### 13.5.9.2 Program of Study

1. See the General Regulations for the B.A. (Honours) Degree and the Degree Regulations for the Honours Degree of Bachelor of Science.
2. All students shall consult with the Head of the Department or delegate when choosing courses for an Honours program.
3. All students shall complete all non-Economics courses required of B.A. or B.Sc. Majors, and at least 60 credit hours in Economics, including 1010 (or the former 2010), 1020 (or the former 2010), 2550, and at least 36 credit hours at the 3000 -level or above including 3000, 3001, 3010, 3011, 3550, 3551, 4120, 4550 and 4551.
4. Twenty-one credit hours in electives in Economics shall be chosen in consultation with the Head of the Department or delegate, including at least 6 credit hours in courses at the 4000 -level. In addition, all Economics Honours students are required to write an essay.
5. Promotion from each Term requires a grade of $70 \%$ in all specified required courses and an overall average of at least $70 \%$ in all courses including electives. A student who fails a required course or fails to maintain an overall average of $70 \%$ will not be promoted to the next term and will be required to withdraw from the program. The student in question may be eligible from readmission in the subsequent year after passing the specified required course(s) previously failed, or re-establishing the 70\% average. See also UNIVERSITY REGULATIONS -

## Regulations for the Honours Degree.

6. In addition to the 30 credit hours required for admission, students are required to complete 120 credit hours and three Work Terms. Students wishing to change the sequence of the work terms must first consult with the Co-op Coordinator and receive approval in writing from the Head of the Department or delegate. Students must complete their program on an academic term.
7. Courses shall normally be taken in academic terms in the sequenced order as set out in Table 3 Honours in Economics (Cooperative Option) B.A. Academic Course Program or in Table 4 Honours in Economics (Co-operative Option) B.Sc. Academic Course Program.
Students wishing to change the sequence of the courses and/or reduce the course load required in the academic terms must consult with the Co-op Coordinator and receive written approval from the Head of the Department or delegate. Unspecified credits may be used to fulfill elective requirements only.
8. UNIVERSITY REGULATIONS - General Academic Regulations (Undergraduate), Classification of Students notwithstanding, students do not require special permission to register for courses while on work terms if the courses are in addition to the prescribed program.

## Table 2 Major in Economics (Co-operative Option) B.Sc. - Academic Course Program

```
Term 1 (Fall)
Computer Science 1000
Economics }300
Economics 3550
Statistics 2550
3 credit hours in elective courses [see Note
1.]
Term 2 (Winter)
Economics }300
Economics }301
Economics 2550
Mathematics }205
3 credit hours in elective courses [see Note
1.]
```

Economics 3000
Economics 3550
Statistics 2550
3 credit hours in elective courses [see Note 1.]

Term 2 (Winter)
Economics 3001
Economics 3010
Mathematics 2050
3 credit hours in elective courses [see Note
1.]

Work Term II (Spring)
Economics 399W

Term 5 (Fall)
6 further credit hours in Computer Science courses
[see Note 2.]
9 credit hours in elective courses [see Note 1.]

| Work Term 1 (Spring) <br> Economics 299w | Work Term III <br> Economics 499w |
| :--- | :--- |
| Term 3 (Fall) | Term $\mathbf{6}$ (Spring) <br> Economics 4550 <br> 3 further credit hours in Economics courses <br> 9 credit hours in elective courses |
| 6 further credit hours in Economics courses |  |
| 9 credit hours in elective courses [see Note 1.] |  |
| Term 4 (Winter) |  |
| Economics 3011 |  |
| Economics 4120 |  |
| Economics 4551 |  |
| 3 further credit hours in Statistics courses |  |
| [see Note 2.] |  |
| 3 credit hours in elective courses [see Note |  |
| 1.$]$ |  |

## Notes:

1. Elective courses should be chosen with reference to the Degree Regulations for the General Degree of Bachelor of Science, since courses specified for admission to and completion of the ECEO only partially satisfy these regulations. In particular note that (1) at least 78 credit hours (26 courses) in Science subjects are required and that (2) at least 3 credit hours in an additional Science subject other than Mathematics/Statistics, Economics and Computer Science must be included in these Science courses.
2. The Statistics and Computer Science elective courses may both be taken in either Term 4 or 5 .

Table 4 Honours in Economics (Co-operative Option) B.Sc. - Academic Course Program

| Term 1 (Fall) <br> Computer Science 1000 [see Note 1] <br> Economics 3000 <br> Economics 3550 <br> Statistics 2550 <br> 3 credit hours in elective courses [see Note <br> 2.] | Work Term II (Spring) <br> Economics 399W |
| :---: | :---: |
| Term 2 (Winter) <br> Economics 3001 <br> Economics 3010 <br> Economics 2550 <br> Mathematics 2050 <br> 3 credit hours in elective courses [see Note <br> 2.] | Term 5 (Fall) <br> 6 further credit hours in Computer Science courses [see Note 4.] <br> 9 further credit hours in Economics courses [see Note 3.] |
| Work Term I (Spring) Economics 299W | Work Term III (Winter) Economics 499W |
| Term 3 (Fall) <br> Economics 4550 <br> 6 further credit hours in Economics courses <br> [see Note 3.] <br> 6 credit hours in elective courses [see Note | Term 6 (Spring) <br> 6 further credit hours in Economics courses [see Note 3.] <br> 9 credit hours in elective courses [see Note 2.] |

```
2.]
Term 4 (Winter)
Economics 3011
Economics 3551
Economics 4120
Economics 4551
3 further credit hours in Statistics courses
[see Note 4.]
```


## Notes:

1. Another 1000-level Computer Science course may be substituted for Computer Science 1000 with the approval of the Department Head.
2. Elective courses should be chosen with reference to the Degree Regulations for the Honours Degree of Bachelor of Science, since courses specified for admission to and completion of the ECEO only partially satisfy these regulations. In particular note that (1) at least 90 credit hours in Science subjects are required and that (2) at least 3 credit hours in an additional Science subject other than Mathematics/Statistics, Economics and Computer Science must be included in these Science courses.
3. Twenty-one credit hours in electives in Economics shall be chosen in consultation with the Head of Department or delegate, including at least 6 credit hours in courses at the 4000-level. In addition, all Economics Honours students are required to write an essay.
4. The Statistics and Computer Science elective courses may both be taken in either Term 4 or 5.

### 13.10 Geography

### 13.10.3 Major in Geography (B.A. or B.Sc.)

1. Students may complete a Major in Geography as part of either a B.A. or B.Sc. program. See the Regulations for the General Degree of Bachelor of Arts and Degree Regulations for the General Degree of Bachelor of Science as appropriate.
2. All students who major in Geography shall consult with their assigned faculty advisor, or the Head of the Department, who will help them in planning their academic program. For this purpose, it is essential that students declare their major at an early stage of their studies.
3. The Major in Geography consists of 45 credit hours in Geography courses including:
a. 1050, or the former 1000 \& 1001, or 1010 \& 1011;
b. 2001, 2102, 2195, 2226, 2302, 2425;
c. 3222,3226 ;
d. 9 credit hours from courses at the 3000-level;
e. at least 9 credit hours chosen from courses at the 4000-level; and
f. further credit hours in courses at the 3000 -level or above, to fulfil the required 45 credit hours in Geography courses.
4. B.Sc. students must complete 15 credit hours in science courses outside Geography at the 2000level or above.

### 13.10.4 Honours in Geography (B.A. or B.Sc.)

1. Students intending to take an Honours degree in Geography must apply for entry to the Honours program through the Office of the Registrar.
2. Students accepted in the Honours program must:
a. comply with the Regulations for the Honours Degree of Bachelor of Arts or Degree Regulations for the Honours Degree of Bachelor of Science as appropriate; and
b. arrange their program in consultation with the Head of the Department.
3. For the Honours Degree, a student will be required to have completed at least 60 credit hours in courses in Geography, including:
a. 45 credit hours in courses as listed under Major in Geography;
b. Geography 3230, 4990 and 4999; and
c. 6 additional credit hours at the 4000 -level.

### 13.10.6 Joint Programs

Regulations for the Joint Honours in Computer Science and Geography, Joint Honours in Geography/Earth Sciences, and Joint Major in Computer Science and Geography are found under the heading Joint Program Regulations in the entry for the Faculty of Science.

Students who wish to take a Joint Major or a Joint Honours in Geography and another subject must arrange their program in consultation with the heads of the Departments concerned, and comply with the General Regulations of the appropriate Faculty.

### 13.13 Mathematics and Statistics

For Departmental Regulations and Course Descriptions, see Faculty of Science section of the Calendar.
The following undergraduate programs are available in the Department of Mathematics and Statistics:

1. Applied Mathematics Honours (B.Sc. only)
2. Applied Mathematics Major (B.Sc. only)
3. Applied Mathematics and Chemistry Joint Honours (B.Sc. only)
4. Applied Mathematics and Computer Science Joint Major (B.Sc. only)
5. Applied Mathematics and Economics Joint Major (B.Sc. only)
6. Applied Mathematics and Physics Joint Honours (B.Sc. only)
7. Applied Mathematics and Physics Joint Major (B.Sc. only)
8. Biology and Statistics Joint Honours (B.Sc. only)
9. Computer Science and Pure Mathematics Joint Honours (B.Sc. only)
10. Computer Science and Pure Mathematics Joint Major (B.Sc. only)
11. Computer Science and Statistics Joint Honours (B.Sc. only)
12. Computer Science and Statistics Joint Major (B.Sc. only)
13. Economics and Pure Mathematics Joint Major (B.Sc. only)
14. Economics and Statistics Joint Major (B.Sc. only)
15. Economics (Co-operative) and Statistics Joint Major (B.Sc. only)
16. Mathematics Minor
17. Pure Mathematics Honours
18. Pure Mathematics Major
19. Pure Mathematics and Statistics Joint Honours (B.Sc. only)
20. Statistics Honours
21. Statistics Major
22. Statistics Minor

### 13.17 Psychology

For Departmental Regulations and Course Descriptions, see Faculty of Science section of the Calendar.
The following undergraduate programs are available in the Department of Psychology:

1. Biochemistry and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
2. Biochemistry (Nutrition) and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
3. Biology and Psychology Joint Honours (B.Sc. only)
4. Biology and Psychology (Behavioural Neuroscience) Joint Honours (B.Sc. only)
5. Major and Honours in Behavioural Neuroscience (B.Sc. only)
6. Major and Honours in Behavioural Neuroscience (Co-operative) (B.Sc. only)
7. Major and Honours in Psychology (B.A. or B.Sc.)
8. Major and Honours in Psychology (Co-operative) (B.Sc. only)
9. Minor in Psychology (B.A. or B.Sc.)

## Appendix A: Consultations

## Consultation E-mail

```
From: "Bishop, Nancy" <nlbishop@mun.ca>
To: Biochemistry Head <biochead@mun.ca>, "Marino, Paul" <pmarino@mun.ca>,
    "chemconsult@mun.ca" <chemconsult@mun.ca>, "cs-chair@mun.ca"
        <cs-chair@mun.ca>, "eascugcon@mun.ca" <eascugcon@mun.ca>,
        "mathconsult@mun.ca" <mathconsult@mun.ca>, "Fletcher, Garth"
        <fletcher@mun.ca>, "physicshead@mun.ca" <physicshead@mun.ca>,
        "psychology.head@mun.ca" <psychology.head@mun.ca>, "Faculty of
        Humanities and Social Sciences" <hss@mun.ca>, "Coady, Peggy"
        <pacoady@mun.ca>, "Collett, Meghan" <mcollett@mun.ca>,
        "engrconsult@mun.ca" <engrconsult@mun.ca>,
        "lrobinson@grenfell.mun.ca" <lrobinson@grenfell.mun.ca>,
        "ssedean@grenfell.mun.ca" <ssedean@grenfell.mun.ca>,
        "thennessey@grenfell.mun.ca" <thennessey@grenfell.mun.ca>,
        "Rohr, Linda" <lerohr@mun.ca>,
        "miugconsultations@mi.mun.ca" <miugconsultations@mi.mun.ca>,
        "deanofmedicine@med.mun.ca" <deanofmedicine@med.mun.ca>,
        "Sutherland,Ian D" <isutherland@mun.ca>, DeanNurse
        <DeanNurse@mun.ca>, "pharminfo@mun.ca" <pharminfo@mun.ca>,
        adeanugradswk <adeanugradswk@mun.ca>, "Cleyle, Susan"
        <scleyle@mun.ca>
CC: "Foster, Andy" <afoster@mun.ca>, "Sullivan,Shannon" <shannon@mun.ca>,
        "Murray, Maria" <mmurray@mun.ca>
Subject: Consultation on Calendar Changes: Faculty of Science
Date: Fri, 27 Oct 2017 19:00:36 +0000
Greetings,
Attached is a proposed set of Calendar changes to update and revise the
general regulations for the Faculty of Science.
If you have any comments on this proposal, we would appreciate receiving your
responses no later than Friday, November 24th. Comments can be sent to
Shannon Sullivan at shannon@mun.ca."
Thank you,
    Andy
DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration & Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155
```


## Responses

## Queen Elizabeth II Library

```
From: "Foster, Andy" <afoster@mun.ca>
To: "Ambi, Alison" <aambi@mun.ca>
CC: "Bishop, Nancy" <nlbishop@mun.ca>, "Sullivan,Shannon" <shannon@mun.ca>
Subject: Re: Consultation on Calendar Changes: Faculty of Science
Date: Thu, 2 Nov 2017 12:28:59 +0000
Thank you, Alison.
    Andy
DR. ANDY FOSTER | ASSOCIATE DEAN OF SCIENCE
(Administration & Undergraduate)
Memorial University
St. John's, NL , Canada A1B 3X7
T 709-864-8155
On Nov 2, 2017, at 8:03 AM, Ambi, Alison <aambi@mun.ca<mailto:aambi@mun.ca>>
wrote:
Hello Andy,
These proposed changes to the general regulations for the faculty of science
will have no impact on library resources.
Alison
```

```
Alison Ambi
709 864 7125
Interim Head, Collections
Subject Librarian:
Earth Sciences
Computer Science
Mathematics and Statistics
Physics and Physical Oceanography
Psychology
QEII Library
Memorial University of Newfoundland
www.library.mun.ca<http://www.library.mun.ca/>
```


## Grenfell Campus (School of Science and the Environment)

```
From: "Foster, Andy" <afoster@mun.ca>
To: "Sullivan,Shannon" <shannon@mun.ca>
Subject: Fwd: Consultation on Calendar Changes: Faculty of Science
Date: Mon, 20 Nov 2017 13:22:28 +0000
Begin forwarded message:
```

From: "Bishop, Nancy" <nlbishop@mun.ca[mailto:nlbishop@mun.ca](mailto:nlbishop@mun.ca)> Subject: RE: Consultation on Calendar Changes: Faculty of Science Date: November 20, 2017 at 9:09:58 AM NST
To: Dean - School of Science and the Environment
<ssedean@grenfell.mun.ca[mailto:ssedean@grenfell.mun.ca](mailto:ssedean@grenfell.mun.ca)>
Cc: "Foster, Andy" <afoster@mun.ca[mailto:afoster@mun.ca](mailto:afoster@mun.ca)>
Thank you for your response, Michele. I have copied Dr. Foster for his information.

Nancy Bishop
Academic Program Administrator
Faculty of Science, Dean of Science Office C2001H
Memorial University of Newfoundland
nlbishop@mun.ca[mailto:nlbishop@mun.ca](mailto:nlbishop@mun.ca)
Tel: 709-864-3414
Fax: 709-864-3316
From: Dean - School of Science and the Environment
[mailto:ssedean@grenfell.mun.ca]
Sent: November-18-17 11:10 AM
To: Bishop, Nancy <nlbishop@mun.ca[mailto:nlbishop@mun.ca](mailto:nlbishop@mun.ca)>
Subject: Re: Consultation on Calendar Changes: Faculty of Science
Dear Nancy,
The proposal was circulated among all program chairs within the School of Science and the Environment (SSE) for review. The only comment has been pasted below. Otherwise there seems to be no implications for the SSE.
Best wishes,
Michele
"I see no mechanism for creating/designating a Critical Reading \& Writing course by a department in the Faculty of Science - although there is mention of this possibility in Section 4.3 (page 4) of the document. So my question is how that would come about in terms of the regulations (presumably the same criteria would be used as those developed by the Faculty of Humanities and Social Sciences) and who would evaluate/approve departmental requests to have such courses recognized (presumably the Faculty of Science Committee on Undergraduate Studies)?"

Michele Piercey-Normore
Dean, School of Science and the Environment

## Faculty of Education

```
From: "Collett, Meghan" <mcollett@mun.ca>
To: "Sullivan,Shannon" <shannon@mun.ca>
Subject: RE: Consultation on Calendar Changes: Faculty of Science
Date: Mon, 30 Oct 2017 15:01:59 +0000
```

Hello Dr. Sullivan,

Thank you very much for the opportunity to provide feedback on this proposal. There appears to be no impact on the Faculty of Education's programs.

Thank you,
Meghan

```
Meghan Collett, B.Sc., M.Sc. | Coordinator of Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
St. John's, Newfoundland, Canada A1B 3X8
G.A.Hickman Building | Room ED 2020
Tel: 709 864-7554 |
Fax: 709 864-2623
```


## Faculty of Engineering and Applied Science

```
Date: Wed, 15 Nov 2017 14:20:38 -0330
From: Engineering Consult <engrconsult@mun.ca>
To: =?UTF-8?Q?Shannon_Sullivan=22=C2?= <shannon@mun.ca>,
    "Foster, Andy" <afoster@mun.ca>
Cc: "Bishop, Nancy" <nlbishop@mun.ca>, Andrew Fisher <adfisher@mun.ca>,
        Howard Heys <hheys@mun.ca>, Jayde Edmunds <edmundsj@mun.ca>
Subject: Re: Consultation on Calendar Changes: Faculty of Science
Thank you for the opportunity to comment on your proposals to revise the
Faculty of Science General Regulations and for the deletion of Science 1000,
1001, 1150 and 1151.
In its meeting on Wed. Nov. 15, the Committee on Undergraduate Studies of the
Faculty of Engineering and Applied Science found that these changes will have
no impact on our programs.
We do note one minor typo in the existing regulations: 13.4 Computer Science,
list of undergraduate programs: In item 11 the second instance of the word
"Honours" should be deleted.
Yours sincerely,
---
Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science
Memorial University of Newfoundland
St. John's NL A1B 3X5
```


## Faculty of Medicine

```
From: "Foster, Andy" <afoster@mun.ca>
To: "Sullivan,Shannon" <shannon@mun.ca>
Subject: Fwd: Consultation on Calendar Changes: Faculty of Science
Date: Wed, 8 Nov 2017 15:50:47 +0000
From: cvardy@mun.ca<mailto:cvardy@mun.ca> [mailto:cvardy@mun.ca]
Sent: November-08-17 11:45 AM
To: Bishop, Nancy <nlbishop@mun.ca<mailto:nlbishop@mun.ca>>
Subject: FW: Consultation on Calendar Changes: Faculty of Science
The Faculty of Medicine is supportive of the calendar change to existing
programs: Faculty of Science General Regulations.
Regards
Cathy Vardy, MD, FRCPC
Vice Dean and Professor of Pediatrics
Faculty of Medicine
Health Sciences Centre, M2M319
Memorial University of NL
Tel: 709-864-6417
Fax: 709-864-6336
```


## School of Human Kinetics and Recreation

```
From: "Rohr, Linda" <lerohr@mun.ca>
To: "Sullivan,Shannon" <shannon@mun.ca>
Subject: calendar changes: Faculty of Science
Date: Mon, 6 Nov 2017 16:56:26 +0000
Shannon,
I have reviewed the proposed calendar changes to the General Regulations for
the Faculty of Science and have no concerns.
Linda
Linda E. Rohr PhD
Associate Professor & Associate Dean Undergraduate Studies
Human Kinetics and Recreation, Memorial University
t: 709.864.6202 f: 709.864.7531 e: <lerohr@mun.ca> lerohr@mun.ca
PE 2025
```


## School of Pharmacy

From: "Phillips, Leslie" [lphillip@mun.ca](mailto:lphillip@mun.ca)
To: "Sullivan,Shannon" [shannon@mun.ca](mailto:shannon@mun.ca)
Subject: consult re Science General Regs calendar changes

```
Thread-Topic: consult re Science General Regs calendar changes
Thread-Index: AQHTUn81rGivVox8fES/ez904x2ppA==
Date: Tue, 31 Oct 2017 19:34:03 +0000
Hi Shannon,
The School of Pharmacy is not impacted by the proposed updates to the general
regs for the Faculty of Science.
Thanks,
Leslie
DR. LESLIE PHILLIPS
ASSOCIATE DEAN UNDERGRADUATE STUDIES
PROFESSOR | MUN SCHOOL Of PHARMACY
Joint Appointment | MUN FACULTY of MEDICINE/Psychiatry
Clinical Pharmacotherapy Specialist |EASTERN HEALTH
Health Sciences Centre
300 Prince Philip Dr | St. John's, NL | A1B 3V6
Ph: 709-777-8299
Fax: 709-777-7044
```


## Department of Chemistry

```
Date: Mon, 27 Nov 2017 11:32:06 -0330
From: Department of Chemistry Consult <chemconsult@mun.ca>
To: shannon@mun.ca
Subject: faculty of Science regulations proposal
Hi Shannon,
```

4.2.1 Admission to the general degree of bachelor of science:
2 (a) Declaration of one or more majors may be made upon the completion of 30
credit hours in courses ...
Can the word normally be inserted as below:
2 (a) Declaration of one or more majors may normally be made upon the
comnpletion of 30 credit hours in courses ... to allow departments to sign up
exceptional students as majors early.
Cheers,
Chris

## Department of Earth Sciences

```
From: UGradMattersES <eascugcon@mun.ca>
Content-Type: multipart/mixed;
    boundary="Apple-Mail=_DD5D0167-97D8-4157-857B-0C37E2B964EB"
Mime-Version: 1.0 (Mac OS X Mail 10.3 \(3273\))
Subject: Consultation on Calendar Changes: Faculty of Science
Message-Id: <C0BE295E-06A7-4D55-8A72-11BE7E3690B9@mun.ca>
Date: Fri, 3 Nov 2017 10:00:40 -0230
Cc: Graham Layne <gdlayne@mun.ca>, Michelle Miskell <mmiskell@mun.ca>,
    John Hanchar <jhanchar@mun.ca>
To: shannon@mun.ca
Hello Shannon,
Regarding the proposed calendar changes for the Faculty of Science
(attached), the Earth Sciences Undergraduate Matters Committee would like to
request that the wording be limited to "six credit hours in CRW courses" as
opposed to "six credit hours in CRW courses offered by HSS" - so as not to
discourage other units from developing their own compliant CRW courses in the
future.
Thanks and all the best,
Kim Welford
Chair of ES UGMC
```


## Department of Physics and Physical Oceanography

From: Ivan Saika-Voivod [ivansaikabackup@gmail.com](mailto:ivansaikabackup@gmail.com)
Subject: Re: Consultation on Calendar Changes: Faculty of Science Date: Mon, 13 Nov 2017 10:01:09-0330
Cc: rgouldng Goulding [rgoulding@mun.ca](mailto:rgoulding@mun.ca), Physics Head [physicshead@mun.ca](mailto:physicshead@mun.ca)
To: Shannon Patrick Sullivan [shannon@mun.ca](mailto:shannon@mun.ca)

Dear Shannon,
Thank you for the opportunity to provide feedback on the Calendar Changes for FoS General Regulations. The Department of Physics and Physical Oceanography is supportive of the proposal.

We are appreciative of the large amount of careful work that went into this and find that the readability is improved. Students should benefit from this. The new English/CRW requirements and the added flexibility they offer are good.

Best regards,

Ivan

Dr. Ivan Saika-Voivod, Associate Professor
Department of Physics and Physical Oceanography, Memorial University of Newfoundland

Tel: 709-864-8886, Fax: 709-864-8739, http://www.physics.mun.ca/~saika/

## Appendix B: Chart of Calendar changes

| Proposed Reg. | Current Reg. | Comment |
| :---: | :---: | :---: |
| 1 | 1 |  |
| 2 | 2 |  |
| 3 | 3 |  |
| 4 | 7 |  |
| 4.1.1 | -- | General and Honours Degrees are now defined as including a "minimum" of 120 credit hours, rather than exactly 120 credit hours. |
| 4.1.2 | -- |  |
| 4.1.3 | -- |  |
| 4.1.4 | $\begin{aligned} & \text { 7.4.2(a) } \\ & 7.4 .2(\mathrm{c}) \end{aligned}$ | Ocean Sciences is included as an additional subject area for the purposes of Majors/Minors. The reference to Math 1150/1151 in 7.4.2(a) has been deleted, as these courses have not been offered since 1987 and 1989, respectively. |
| 4.1.5 | 7.4.2(a) |  |
| 4.1.6 | 7.4.2(e) |  |
| 4.2.1.1 | 7.1 | The longstanding ability of students to declare themselves as Science students (without declaring a Major) is made explicit. |
| 4.2.1.2 | 7.1 |  |
| 4.2.1.2(a) | 7.1 |  |
| 4.2.1.2(b) | $\begin{gathered} 7.1 \\ 7.4 .2(\mathrm{~b}) \end{gathered}$ |  |
| 4.2.1.2(c) | 7.1 |  |
| 4.2.1.2 (d) | -- |  |
| 4.2.1.2(e) | 7.4.2(d) |  |
| 4.2.2.1 | 7.5.1.1 |  |
| 4.2.2.2 | 7.5.1.1 [ N$]$ |  |
| 4.2.2.3 | 7.5.1.3 |  |
| 4.2.3.1 | 7.4.7(a) |  |
| 4.3.1 | 7.4.1 |  |
| 4.3.2 | $\begin{gathered} \text { 7.4.4 } \\ 7.4 .7(\mathrm{c}) \\ 7.5 .1 .2 \end{gathered}$ |  |
| 4.4.1 | -- |  |
| 4.4.1(a) | -- |  |
| 4.4.1(b) | -- |  |
| 4.4.1(c) | 7.4.6 |  |
| 4.4.2 | 7.4.2(a) | The requirement of 36 to 45 credit hours from the Major subjects is now presented the normal parameters for the General Degree, with the possibility of a program possessing an alternative structure when sufficient rationale exists. |
| 4.4.3 | -- |  |
| 4.4.4 | 7.4.2(a) |  |
| 4.4.5 | 7.4 [ N 2 ] | The current residence requirement of 12 credit hours in courses from the Major subject has been increased to 15 credit hours at the 3000-level or above. |
| 4.5 | 7.5 |  |
| 4.5.1.1 | -- |  |
| 4.5.1.1(a) | -- |  |


| 4.5.1.1(b) | -- |  |
| :---: | :---: | :---: |
| 4.5.1.1(c) | -- |  |
| 4.5.1.2 | $\begin{aligned} & 7.5 .2 .2 .1 \\ & 7.5 .2 .2 .2 \\ & 7.5 .2 .2 .3 \end{aligned}$ | The existing Honours and Joint Honours requirements for credit hours from the Major subjects are unchanged, but are now presented as the normal parameters for the Honours Degree, with the possibility of a program possessing an alternative structure when sufficient rationale exists. The requirement for the sui generis Honours program is reduced from a minimum of 90 credit hours to a minimum of 84 , in line with the Joint Honours program. |
| 4.5.1.3 | -- |  |
| 4.5.1.4 | 7.5.2.1(b) |  |
| 4.5.2.1 | $\begin{aligned} & \hline 7.5 .3 .1 \\ & 7.5 .3 .4 \end{aligned}$ |  |
| 4.5.2.2 | $\begin{aligned} & \hline 7.5 .3 .2 \\ & 7.5 .3 .3 \end{aligned}$ |  |
| 4.5.2.3 | 7.5.3.2 |  |
| 4.5.3 | 7.5.4 |  |
| 4.5.4.1 | 7.5.5.1 |  |
| 4.5.4.2 | 7.5.5.1 |  |
| 4.6 | 7.5.2.1(a) |  |
| 4.6.1(a) | 7.4.3(a) |  |
| 4.6.1(b) | 7.5.2.3(a) |  |
| 4.6.2 | $\begin{gathered} 7.4 .3(b) \\ 7.5 .2 .3(b) \end{gathered}$ |  |
|  |  |  |
| 4.6.4 | $\begin{gathered} 7.4 .3(c) \\ 7.5 .2 .3(c) \end{gathered}$ |  |
| 4.6.5 | 7.4 [N1] |  |
| 4.6.6 | 7.4.7 |  |
| 4.7.1 | -- |  |
| 4.7.2 | $\begin{gathered} \hline 7.4 .7 \\ 7.4 .7(b) \end{gathered}$ | The existing requirement of 24 credit hours in the Minor subject is unchanged, but is now presented as the normal parameter for the Minor program, with the possibility of a program possessing an alternative structure when sufficient rationale exists. |
| 4.7.3 | 7.4.7(d) |  |
| 4.8.1.1(a) | 7.4.5(a) |  |
| 4.8.1.1(b) | 7.4.5(c) | The ability of department to include courses from subjects other than the Major subject(s) in this calculation is made explicit. |
| 4.8.1.1(c) | 7.4.5(b) |  |
| 4.8.1.2(a) | -- |  |
| 4.8.1.2(b) | 7.5.6.1 | The ability of department to include courses from subjects other than the Major subject(s) in this calculation is made explicit. |
| 4.8.1.2(c) | 7.5.6.2 |  |
| 4.8.1.2(d) | 7.5 .6 [ N$]$ |  |
| 4.8.1.2(e) | 7.5.7.4 |  |
| 4.8.1.3 | 7.4.7(e) |  |
| 4.8.2.1 | -- |  |
| 4.8.2.2(a) | 7.5.7.1 | The ability of department to include courses from subjects other than the Major subject(s) in this calculation is made explicit. |
| 4.8.2.2(b) | 7.5.7.2 |  |
| 4.8.2.2(c) | 7.5.7.3 | The portion of the regulation relating to 1959 has been deleted, as it is now obsolete. |
| 5 | 4 |  |
| 6 | 5 |  |


| 7 | 7.2 |  |
| :---: | :---: | :--- |
| 8 | 7.3 |  |
| 9 | 7 |  |
| 9 | 8 | Appeal of Decisions has been merged into the section on Waiver of Regulations. |
| 10 | 5 |  |
| 10.1 | 5.2 | Joint Majors and Joint Honours have swapped places to maintain consistency with the <br> Program Regulations. |
| 10.2 | 5.1 |  |
| 10.3 | 5.3 |  |
| 11 | 9 |  |
| 12 | 10 |  |
| -- | $7.4[\mathrm{~N} 3]$ | Deleted: Science 2010/2011 have not been offered since 1981. |
| -- | $7.4[\mathrm{~N} 4]$ | Deleted: There are several Biology courses which are restricted in terms of their use <br> towards a Biology major, and no reason to single any one out here. |
| -- | $7.4[\mathrm{~N} 5]$ | Deleted: Dealt with via credit restrictions. |
| -- | $7.4[\mathrm{~N} 6]$ | Deleted: There seems to be no reason to single out this departmental matter in <br> Faculty-wide regulations. The Biochemistry regulations already address this. |
| -- | 7.5 .1 .4 | Deleted: The "Core Requirements" are now explicitly included as part of an Honours <br> program. |
| -- | $7.5 .2 .1[\mathrm{~N}]$ | Deleted: There doesn't seem to be a compelling reason to further illustrate 7.5.2.1(b). |
| -- | $7.5 .2 .2[\mathrm{~N} 1$, | Deleted: All of these notes have been made redundant. <br> $\mathrm{N} 2, \mathrm{~N} 3]$ |
| -- | 7.5 .5 .2 | Deleted: This scenario is already governed by the General Academic Regulations, and <br> doesn't seem enforceable at the Faculty level. |

## Appendix C: Programs in the Faculty of Science

## 1: Major Programs in the Faculty of Science

|  | Subject of <br> Major CH | Other CH Required | Total CH Required | $3000+$ <br> Required |
| :---: | :---: | :---: | :---: | :---: |
| Applied Mathematics | 45-51 | 18-24 | 69 | 27 |
| Biochemistry | 30-36 | 36-42 | 72 | 24 |
| Biochemistry (Nutrition) | 30-33 | 42-45 | 75 | 27 |
| Biology | 45 | 33 | 78 | 6 |
| Biology (Cell and Molecular) | 45 | 33 | 78 | 18 |
| Biology (Ecology and Conservation) | 45 | 33 | 78 | 18 |
| Chemistry | 39 | 27 | 66 | 15 |
| Chemistry (Biological) | 39 | 48 | 87 | 30 |
| Computational Chemistry | 36 | 51 | 87 | 18 |
| Computer Science | 45 | 27 | 72 | 18 |
| Computer Science (Smart Systems) | 45 | 27 | 72 | 18 |
| Computer Science (Visual Comp \& Games) | 45 | 27 | 72 | 12 |
| Earth Sciences | 45 | 36 | 81 | 22 |
| Economics | 36 | 30 | 66 | 24 |
| Environmental Physics | 36 | 60 | 96 | 30 |
| Geography | 45 | 27 | 72 | 26 |
| Ocean Sciences | 27-30 | 33-36 | 63 | 9 |
| Ocean Sciences (Environmental Systems) | 27-30 | 57-60 | 87 | 18 |
| Physics | 45-48 | 27-30 | 75 | 30 |
| Psychology | 36 | 30 | 66 | 24 |
| Psychology (Behavioural Neuroscience) | 36 | 51 | 87 | 18 |
| Pure Mathematics | 45-51 | 12-18 | 63 | 24 |
| Statistics | 45 | 18 | 63 | 24 |

Notes:

- Based on the 2017-18 Calendar.
- For consistency, Other Required includes courses necessary to meet the Core Requirements for the Bachelor of Science, even if these are not explicitly stated in the program regulations.
- The true number of required courses at the 3000 -level or above may actually be higher, depending on course availability. For example, the Major in Biology requires 24 CH in courses at the " 2000,3000 or 4000 level" which are not included in this total.


## 2: Honours Programs in the Faculty of Science

|  | Subject of <br> Major CH | Other CH <br> Required | Total CH <br> Required | $3000+$ <br> Required |
| ---: | :---: | :---: | :---: | :---: |
| Applied Mathematics | 75 | 24 | 99 | 57 |
| Biochemistry | $42-48$ | $54-60$ | 102 | 48 |
| Biochemistry (Nutrition) | $45-57$ | $36-48$ | 93 | 51 |
| Biology | 63 | 33 | 96 | 12 |
| Biology (Cell and Molecular) | 63 | 33 | 96 | 30 |
| Biology (Ecology and Conservation) | 63 | 33 | 96 | 30 |
| Biology (Marine) | 63 | 33 | 96 | 30 |
| Chemistry | 57 | 21 | 78 | 33 |
| Chemistry (Biological) | 45 | 48 | 93 | 33 |
| Computational Chemistry | $42-45$ | $51-54$ | 96 | 24 |
| Computer Science | 63 | 27 | 90 | 36 |
| Computer Science (Software Engineering) | 63 | 27 | 90 | 36 |
| Earth Sciences | 60 | 36 | 96 | 37 |
| Economics | 60 | 12 | 72 | 36 |
| Environmental Physics | 51 | 60 | 111 | 45 |
| Geography | 60 | 12 | 72 | 41 |
| Physics | $75-78$ | $30-33$ | 108 | 60 |
| Psychology | 60 | 30 | 90 | 42 |
| Psychology (Behavioural Neuroscience) | 45 | 51 | 96 | 27 |
| Pure Mathematics | 81 | 18 | 99 | 48 |
| Statistics | 81 | 18 | 99 | 54 |

## 3: Minor Programs in the Faculty of Science

|  | Subject of <br> Minor CH | Other CH <br> Required | Total CH <br> Required | $3000+$ <br> Required |
| ---: | :---: | :---: | :---: | :---: |
| Biochemistry | $12-21$ | $3-12$ | 24 | 12 |
| Biology | 24 | 0 | 24 | 6 |
| Chemistry | 24 | 0 | 24 | 0 |
| Chemistry (Process Engineering) | $21-24$ | $0-3$ | 24 | 0 |
| Computer Science | 24 | 0 | 24 | 3 |
| Earth Sciences | 24 | 0 | 24 | 0 |
| Economics | 24 | 0 | 24 | 9 |
| Geography | 24 | 0 | 24 | 6 |
| Mathematics | 24 | 0 | 24 | 6 |
| Oceanography | $12-21$ | $3-12$ | 24 | 3 |
| Physics | 24 | 0 | 24 | 0 |
| Physics (Electrical $\left.\begin{array}{rl}\text { Engineering) } & 24\end{array}\right) 0$ | 24 | 12 |  |  |
| Psychology | 24 | 0 | 24 | 0 |
| Statistics | 24 | 0 | 24 | 12 |
| Sustainable Aquaculture \& Fisheries Ecol | $12-15$ | $9-12$ | 24 | 9 |

## 4: Joint Major Programs in the Faculty of Science

|  | Subject of $1^{\text {st }}$ <br> Major CH | Subject of $2^{\text {nd }}$ <br> Major CH | Total Subject of Major CH | Other Requirements | Total Requirements | 3000+ <br> Requirements |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Applied <br> Mathematics / Computer Science | 48 | 42 | 90 | 12 | 102 | 42 |
| Applied Mathematics / Economics | 42 | 42 | 84 | 15 | 99 | 42 |
| Applied Mathematics / Physics | 36-48 | 36-48 | 84 | 12 | 96 | 42 |
| Computer <br> Science / <br> Economics | 42 | 42 | 84 | 21 | 105 | 36 |
| Computer <br> Science / Geography | 39 | 39 | 78 | 21 | 99 | 30 |
| Computer Science / Physics | 39 | 36 | 75 | 30 | 105 | 30 |
| Computer Science / Pure Mathematics | 42 | 48 | 90 | 12 | 102 | 39 |
| Computer Science / Statistics | 45 | 54 | 99 | 12 | 111 | 48 |
| Earth Sciences/ Physics | 33 | 36 | 69 | 27 | 96 | 22 |
| Economics / Pure Mathematics | 42 | 39 | 81 | 12 | 93 | 39 |
| Economics / Statistics | 42 | 42 | 84 | 12 | 96 | 45 |
| Marine <br> Biology [Biology / Ocean Sciences] | 33 | 33 | 66 | 36 | 102 | 21 |

## 5: Joint Honours Programs in the Faculty of Science

|  | Subject of $1^{\text {st }}$ <br> Major CH | Subject of $2^{\text {nd }}$ Major CH | Total Subject of Major CH | Other Requirements | Total Requirements | 3000+ Requirements |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Applied Mathematics / Chemistry | 42-48 | 39-45 | 87 | 18 | 105 | 42 |
| Applied Mathematics /Physics | 39-57 | 39-57 | 96 | 12 | 108 | 57 |
| Biochemistry / Cell Biology | 21-39 | 33-45 | 66-72 | 36-42 | 108 | 51 |
| Biochemistry / Chemistry | 24-36 | 42-48 | 72-78 | 21-27 | 99 | 48 |
| Biochemistry/ Physics | 24-36 | 36-48 | 66-78 | 33-45 | 111 | 54 |
| Biochemistry/ Psychology (Behavioural Neuroscience) | 27-36 | 39-45 | 75 | 45-48 | 120 | 57 |
| Biochemistry (Nutrition) / Psychology (Behavioural Neuroscience) | 27-36 | 39-45 | 72-75 | $33-36$ | 108 | 54 |
| Biology / Earth Sciences | 42-48 | 41-47 | 89 | 36 | 125 | 24 |
| Biology / Psychology | 33-45 | 36-48 | 81 | 33 | 114 | 36 |
| Biology / Psychology (Behavioural Neuroscience) | 36-42 | 39-45 | 81 | 33 | 114 | 33 |
| Biology / Statistics | 42-48 | 39-45 | 87 | 27 | 114 | 30 |
| Chemistry / Earth Sciences | 39-45 | 44-50 | 89 | 30 | 119 | 42 |
| Chemistry / Physics | 36-42 | 42-48 | 84 | 27 | 111 | 48 |
| Computer <br> Science / Geography | 48-51 | 48-51 | 99 | 18 | 117 | 50 |
| Computer Science / Physics | 39-45 | 39-45 | 84 | 30 | 114 | 39 |
| Computer Science / Pure Mathematics | 51-54 | 63-69 | 117-120 | 12 | 129-132 | 63-66 |


| Computer <br> Science $/$ <br> Statistics | $48-51$ | $66-72$ | $117-120$ | 12 | $129-132$ | $63-66$ |
| ---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Earth Sciences <br> Geography | $36-48$ | $36-51$ | $84-87$ | $27-33$ | $114-117$ | 26 |
| Earth Sciences <br> Physics <br> Geophysics/ <br> Physical | $39-45$ | $39-45$ | 84 | 36 | 120 | 52 |
| Oceanography <br> [Earth | $36-42$ | $42-48$ | 84 | 33 | 117 | 57 |
| Sciences/ <br> Physics] <br> Pure | 93 | N/A | 93 | 18 | 111 | 63 |
| Mathematics <br> Statistics |  |  |  |  |  |  |

Deputy Head (Graduate Studies)

To: Gail Kenny, Dean of Science Office
From: Stephanie Curnoe, Professor and Deputy Head (Graduate Studies), Department of Physics and Physical Oceanography

Date: $\quad$ November 10, 2017
Re: Proposed calendar changes for M.Sc. degrees in Physics and Physical Oceanography

## Rationale for proposed calendar changes

The proposed calendar changes are housekeeping changes and clarifications of program requirements. These changes are intended to reflect (and not alter) what is current practice in the Department.

1. In the first and second paragraphs, unnecessary and outdated statements have been removed.
2. The program of study for M.Sc. degrees in Physics and in Physical Oceanography has been removed and replaced by new separate entries in Physics and in Physical Oceanography.
3. The new entry for Physical Oceanography now specifies undergraduate requirements, and also specifies that at least two out of four of the required graduate courses be courses in Physical Oceanography.
4. The new entry for Physics now specifies undergraduate requirements, and also specifies that at least two out of four of the required graduate courses be courses in Physics.
5. Four courses which have not been taught in the past twenty years have been struck from the course listing. The table of exemptions has also been struck because it refers to courses last taught more than twenty years ago. Unnecessary and outdated information at the end has also been removed.

### 24.19 Physics and Physical Oceanography

www.mun.ca/science
www.mun.ca/physics

## Professor and Head of the Department

## J. Lagowski

Programs leading to the Degree of Master of Science in Physics and in Physical Oceanography are offered to both full and part-time students. Beeatse Oeeanography is multidiseiplinaty in mature, undergraduate students who plan to undertake Physical Oceanography studies are urged to consult thefaculty member in charge of Physical Oceanography programs at their earliest opportunity, in order to enstre the appropriateness of their undergraduate course selections. The Degree of Doctor of Philosophy in Physics is offered through both full-time and part-time study in Atomic and Molecular Physics, Condensed Matter Physics, and Physical Oceanography. The following Departmental Regulations are supplementary to the General Regulations governing M.Sc. and Ph.D. degrees.A thorough familiarity with the latter Regulations should be regarded as the prerequisite to further reading in this section.

The Department of Physies and Physical Oceanography compiles, and regularly reviews, a brochurewhich contains reasonably detailed deseriptions of etrrently active researeh projects, as well as a eomprehensive listing of recent research publications, and other material which may be of interest toprospective graduate students.
24.19.1 Program of Study

1. Admission to a M.Se. program in the Department of Physies and Physical-Oceanography is normally restricted to candidates holding an Honours B.Se. Degree in Physies. However, depending on background and area of specialization and with particular reference to Physieal Өeeanography, other Bacealatreate degrees in science, applied seience or mathematies, may beaceepted.
Z. A program of study for the M.Sc. Degree in Physies or Physical Oceanography shall normally include a minimum of 12 graduate credit hours. However, depending on the student's background and area of specialization, more or fewer graduate and/or undergraduate courses may be required.
2. Exeept with the special permission of the Department and the approval of the Dean of GraduateStudies, a candidate may not take any courses in addition to those approved for hisfher M.Se. program.
3. Before submission of the thesis to the School of Graduate Studies for examination, the student must present a seminar on the topic of his/her thesis research.

### 24.19.1 Program of Study for M. Sc. in Physical Oceanography

1. Preference for admission will be given to students with a B. Sc. Honours Degree who have taken senior undergraduate courses in fluids, oceanography, and mathematical physics.
2. Candidates are normally required to take a minimum of 12 credit hours in graduate level courses, of which at least 6 credit hours shall be selected from among the courses listed in Section 24.19.3 between the numbers 6300-6399.
3. Before submission of the thesis to the School of Graduate Studies for examination, the student must present a seminar on the topic of his/her thesis research.

### 24.19.2 Program of Study for M. Sc. in Physics

1. Preference for admission will be given to students with a B. Sc. Honours Degree in physics. Students should normally have taken senior undergraduate courses in physics, such as electricity and magnetism, statistical physics, quantum mechanics, or experimental physics.
2. Candidates are normally required to take a minimum of 12 credit hours in graduate level courses, of which at least 6 credit hours shall be selected from the list in Section 24.19.3.
3. Before submission of the thesis to the School of Graduate Studies for examination, the student must present a seminar on the topic of his/her thesis research.

### 24.19.2 24.19.3 Courses

A selection of the following graduate courses will be offered to meet the requirements of candidates, as far as the resources of the Department will allow.

- 6000 Condensed Matter Physics I
- 6001 Condensed Matter Physics II
- 6002 Superconductivity
- 6003 Path Integral Techniques in Condensed Matter Physics
- 6010-19 Special Topics in Condensed Matter Physics
- 6040 Biophysics
- 6060-69 Special Topics in Interdisciplinary Areas
- 6200 Nonlinear Dynamics
- 6308 Ocean Dynamics I
- 6309 Ocean Dynamics II
- 6310 Physical Oceanography
- 6313 Physical Fluid Dynamics
- 6314 Field Oceanography
- 6315 Polar Oceanography
- 6316 Ocean Measurements and Data Analysis
- 6317 Ocean Acoustics
- 6318 Numerical Modelling
- 6319 Climate Dynamics
- 6320 Turbulence
- 6321 Coastal Oceanography
- 6322 Stratified Fluids
- 6323 Stability Theory
- 6324 Models in Ocean Ecology
- 6360-69 Special Topics in Physical Oceanography (excluding 6363)
- 6363 Laboratory Experiments in Geophysical Fluid Dynamics
- 6400 Statistical Mechanics
- 6402 Theory of Phase Transitions
- 6403 Stochastic Processes, Time-Dependent and Non-equilibrium Statistical Mechanics
- 6413 Soft Matter Physics
- 6502 Electrodynamics
- 6720 Theory of Molecules
- 6721 Molecular Spectroseopy
- 6722 Light Scattering Spectroscopy
- 6730 Molecular Theory of Liquids and Compressed Gases
- 6740 Physies of Atomic Collisions-
- 6760-69 Special Topics in Atomic and Molecular Physics
- 6800 Group Theory
- 6810-19 Special Topics in Theoretical and Mathematical Physics
- 6850 Quantum Mechanics I
- 6851 Quantum Mechanics II
- 6900 Techniques in Experimental Condensed Matter Physics
- 6910-19 Special Topics in Experimental and Applied Physics

Table of Gredit Restrictions - Physies and Physical-Oeeanography
(Gredit may be obtained for only one course from each of the pairs of courses listed in this table.)

| Present Course- | Former Course | Present Course- | Former Course |
| :--- | :--- | :--- | :--- |
| 6001 | 6051 | 6321 | 6303 |
| 6002 | 6822 | 6321 | 6304 |
| 6003 | 6820 | 6323 | 6303 |
| 6200 | 6821 | 6402 | 6401 |
| 6308 | 6312 | 6403 | 6401 |
| 6309 | 6311 | 6403 | 6824 |
| 6313 | 6301 | 6502 | 6500 |
| 6316 | 6302 | 6502 | 6501 |
| 6317 |  |  | 6790 |

Members of the Department carry out research in several areas of experimental and theoretical physies, including atomic and molecular physics, condensed matter physics, physical oceanography, theoretical geophysies, and applied nuclear physies. In atomic and molecular physies, there are experimental programs in collision-induced infrared absorption spectroscopy, electron emission spectroscopy of simple molecules, molecular ions and free radicals, laser-induced fluoreseence spectroscopy, and Raman spectroscopy, and theoretical work on atomic and molecular collisions. The work in condensed matter physies includes experimental programs in solid state nuelear magnetic resonance on systems of biophysical interest, Raman spectroseopy of lipid bilayers and membranes, studies of phase tramsitions using Brillowin and Raman spectroseopy, studies of instabilities and pattern formation in simple fluid dynamieal systems, and spectroseopic studies of molecular crystals. Theoretieal condensed matter
physies research involves studies of magnetism, superconductivity, and the statistical mechanies of polymers and lipid bilayers. The physical oceanography group carries out field and laboratory research on several projects which take advantage of Newfoundland's unique oceanographic environment, using acoustic and other remote sensing teehniques. These inelude studies of cireulation on the Newfoundland and Labrador shelves, Labrador current dymamies, fjord dynamies, submarine camyonsand sediment transport dynamies in the nearshore zone and on the shelf. Theoretieal oceanographicstudies involve the modelling of ocean cireulation, gravity wave phenemena and other aspects of ocean dynamies. Researeh in theoretieal geophysies is coneentrated on whole-Earth dynamies, with speciah emphasis on the physies of the liquid core (the Earth's "third ocean") as inferred from its wave spectrum and the associated momentum transfer to the deformable solid parts of the Earth. In nuelear physies, research is done on the atmospheric concentrations of radioactive elements and on dosimetry for medieal applications.
Note:
For Geophysics, see Earth Sciences

### 24.19 Physics and Physical Oceanography

www.mun.ca/science
www.mun.ca/physics

## Professor and Head of the Department

## J. Lagowski

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5. Candidates are normally required to take a minimum of 12 credit hours in graduate level courses, of which at least 6 credit hours shall be selected from the list in Section 24.19.3.
6. Before submission of the thesis to the School of Graduate Studies for examination, the student must present a seminar on the topic of his/her thesis research.

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- 6317 Ocean Acoustics
- 6318 Numerical Modelling
- 6319 Climate Dynamics
- 6320 Turbulence
- 6321 Coastal Oceanography
- 6322 Stratified Fluids
- 6323 Stability Theory
- 6324 Models in Ocean Ecology
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- 6413 Soft Matter Physics
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- 6760-69 Special Topics in Atomic and Molecular Physics
- 6800 Group Theory
- 6810-19 Special Topics in Theoretical and Mathematical Physics
- 6850 Quantum Mechanics I
- 6851 Quantum Mechanics II
- 6900 Techniques in Experimental Condensed Matter Physics
- 6910-19 Special Topics in Experimental and Applied Physics


## Note:

For Geophysics, see Earth Sciences


[^0]:    Dr. Suzanne Dufour
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    Department of Biology
    Memorial University of Newfoundland
    St. John's, NL
    A1B 3X9
    Canada

[^1]:    "See Regulations for the Honours Degree of Bachelor of Science. As a component of the Degree Requirements for the General Degree of Bachelor of Science, the following courses are required:"

[^2]:    *Psychology Majors are required to complete Mathematics 1000 or two of 1090, 1050, 1051 (or equivalent). An Elective or Humanities and Social Sciences requirement can be taken if Mathematics 1000

