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, October 15, 2014, at 1 p.m. in C-2045.

AGENDA

1. Regrets

2. Adoption of the Minutes of September 17, 2014

3. Business Arising from the Minutes

4. Correspondence:
   a. Call for consultations, Firearms on Campus regulation review

5. Reports of Standing Committees:
   A. Undergraduate Studies Committees:
      a. Department of Chemistry, revisions to Computation Chemistry major and honours major programs, paper 5.A.a (11 pages).
   B. Graduate Studies Committee: None
   C. Nominating Committee:
      a. Approval of committee matrix, paper 5.C.a (2 pages).
   D. Library Committee: None

6. Reports of Delegates from Other Councils

7. Report of the Dean

8. Question Period

9. Adjournment

Mark Abrahams
Dean of Science
FACULTY OF SCIENCE
FACULTY COUNCIL OF SCIENCE
MINUTES OF MEETING OF SEPTEMBER 17, 2014

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, September 17, 2014, at 1:00 p.m. in room C-2045.

FSC 2270 Present
Biochemistry
Booth, V. Cheema, S.

Biology
Innes, D.

Chemistry
Bottaro, C. Merschrod, E. Pickup, P.

Computer Science
Banzhaf, W. Bungay, S. Wareham, T.

Earth Sciences
Hanchar, J.

Mathematics & Statistics
Loredo-Osti, J.C. Pike, D. Sullivan, S.

Ocean Sciences
Fletcher, G.

Physics & Physical Oceanography
Curnoe, S. Morrow, M.

Psychology
Martin, G.

Dean of Science Office
Abrahams, M. Foss, K. Rideout, J. Surprenant, A.

Geography
Catto, N.
**DELTS**
Todd, A.

**Engineering**
Zhang, B.

**Registrar's Office**
Burry, J.

**School of Music**
Cook, N.

**Undergraduate Studies**
Doyle, K. Southall, T.

**FSC 2271**
**Regrets**
Mark Berry Erin Alcock

**FSC 2272**
**Adoption of Minutes**

**FSC 2273**
**Business Arising:** None

**FSC 2274**
**Correspondence:** None

**FSC 2275**
**Reports of Standing Committees:**

A. **Undergraduate Studies Committee**
Report was presented by Shannon Sullivan, acting on behalf of the Faculty of Science Undergraduate Studies Committee.

Council was informed that the previous provost initiated a change to procedure and wanted to approve all resource implications for new courses. The Interim Provost has discontinued this process. Items will now go directly to Faculty Council after being approved by the appropriate committee.

a. Response to Senate Committee on Undergraduate Studies, Proposal for Prior Learning Assessment Recognition. Approved by the Executive Committee of the Faculty of Science Faculty Council and included for information only.

b. Moved: Department of Computer Science, proposal for new course, COMP 1400, Computing in the 20th Century and Beyond (Sullivan/Banzhaf). Carried. One abstention.
c. **Moved:** Department of Mathematics and Statistics, calendar changes, MATH 439 A/B, Pure Mathematics Honours Project, STAT 459 A/B, Statistics Honours Project (Sullivan/Loredo-Osti). **Carried.**

d. **Moved:** Department of Psychology, calendar change, cross-list PSYC 4770 and BIOL 4770 (Sullivan/Martin). **Carried.**

**B. Graduate Studies Committee**
Report was presented by J.C. Loredo-Osti, on behalf of the Faculty of Science Graduate Studies Committee.

a. Department of Chemistry, special topics course, CHEM 6590, Renewable Chemicals and Materials. Approved by the committee and presented to council for information only.

b. Department of Mathematics and Statistics, special topics course, MATH 6348, Graph Colouring. Approved by the committee and presented to council for information only.

c. Department of Mathematics and Statistics, special topics course, STAT 6564, Experimental Design. Approved by the committee and presented to council for information only.

d. Department of Biology, special topics course, BIOL 7947, Molecular Ecology. Approved by the committee and presented to council for information only.

e. Department of Earth Sciences, approval for new course, EASC 6105, Advanced Field Course in Applied Geophysics. Approved by the Executive Committee of the Faculty of Science Faculty Council and included for information only.

**C. Nominating Committee:**
Report presented by Aimée Surprenant, Interim Associate Dean (Undergraduate and Administration)

a. **Moved:** Approval of provisional committee matrix (Surprenant/Sullivan). **Carried.**

**D. Library Committee:** None

**FSC 2276**
**Reports of Delegates from Other Councils:** None

**FSC 2277**
**Report of the Dean**
Presented by Mark Abrahams, Dean.

The Dean welcomed faculty and students back to the beginning of a new academic term. The Dean advised that during the summer, Dr. David Wardlaw resigned from his position as Provost, and Dr. Noreen Golfman is currently the Acting Provost. A search committee is being struck to recruit a new Provost. An email seeking nominees from the Faculty of Science was previously distributed to
all departments. If anyone is interested in being nominated, please put your name forward.

The annual Dean’s Awards ceremony will be held next week on September 23 from 5 to 7 pm in the Bruneau Innovation Centre, Room 2001. This event honours the achievements of our faculty, staff, and students and the Dean invites you all to attend and participate in the celebration.

Work on the core sciences building is progressing on schedule. Following a public consultation, the basic design was finalized. We are seeking final approval from the government on the overall space allocation and have now begun the detail design work for interior layout. We expect the first tenders for the building to go out in a couple of months with excavation to begin in the Spring.

The Dean, throughout his time in the position, has attended departmental meetings by invitation. He is hoping to do a full round of departmental visits in the near future. He will be discussing this with department heads and is hoping that departments will be able to provide approximately one hour for these meetings.

FSC 2278  Question Period

FSC 2279  Adjournment
The meeting adjourned at 1:16 p.m.
September 17, 2014

TO: Faculty Councils, Departmental Undergraduate Studies Committees, and the Academic Council of the School of Graduate Studies

FROM: Dr. Evan Simpson, Chair, Ad hoc Committee - Firearms on Campus

SUBJECT: Call for consultations, Re: Firearms on Campus regulation review

At its meeting on November 12, 2013, the Senate approved changes to subsection 8.4 Firearms on Campus of Section 8 Student Affairs and Services, which resulted in the replacement of this entry with a new entry in the Non-Academic Regulations section.

The 2013-2014 8.4 Firearms on Campus from the General Information, Student Affairs and Services section reads as follows:

"8.4 Firearms on Campus

Students are reminded that firearms (including air rifles, air-guns and sling shots) may not be brought into, or used in, any part of the University except the rifle range."

The 2014-2015 8.2 Firearms on Campus from the Non-Academic Regulations section reads as follows:

"8.2 Firearms on Campus

Memorial University prohibits the possession, storage, or use of firearms, ammunition, or weapons on any property of the University without written permission of the Manager of Campus Enforcement and Patrol. Police officers enrolled in a course who may need to attend classes while on active duty in uniform shall, at the start of classes for each semester/session, present to the course instructor a copy of their written permission."

At its meeting on April 22, 2014, the Senate discussed concerns raised by the University
community over this new regulation. It was decided that Senate instruct the Senate Committee on Elections and Committees to create Terms of Reference and a membership list for an ad hoc committee (the Committee) to review the issue of sidearms in classrooms. The members of the Committee have now been selected and have begun deliberations, adhering to the following Terms of Reference:

"To confirm the current Regulation 8.2 Firearms on Campus or propose alternate wording together with a rationale for the decision. In reaching a decision, the ad hoc committee will

- Consult broadly with the University community and its stakeholders
- Document practices at other Canadian universities
- Review relevant documents"

In keeping with its Terms of Reference, the Committee is now issuing a formal call for consultation. We are asking that you add the issue of firearms on campus as an item for discussion to your next agenda. Please advise the Committee of any concerns raised or reflections from instructors who might have experiences with uniformed police officers in a classroom setting. We would appreciate feedback by October 24, 2014. Comments may be forwarded to Mr. Brian Hammond, Office of the Registrar, bhammond@mun.ca.

Sincerely,

[Signature]

for Dr. Evan Simpson,
Chair,
Ad hoc Committee to review Firearms on Campus Regulation

ES/bjh
October 6, 2014

TO: All Members, Faculty Council of Science

FROM: Joan Burry, Secretary
Committee on Undergraduate Studies, Faculty of Science

SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on September 26, 2014, the Undergraduate Studies Committee of the Faculty of Science agreed that the following new program proposals and Calendar changes be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Revisions to Computation Chemistry major and honours major programs

2. Department of Ocean Sciences
   (i) New minor program in Oceanography
   (ii) New minor program in Sustainable Aquaculture and Fisheries Ecology

Joan Burry
Associate Registrar and
Secretary: Committee on Undergraduate Studies,
Faculty of Science
Proposal
Calendar Change(s) to Existing Program(s)

Resource Implications: Instructional Costs

None. The course (CHEM 4305) that is being added to the program is already offered by existing faculty. This course is already supported by the Department of Chemistry.

Resource Implications: 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: ________________________________
RATIONALE FOR CHANGES

B.Sc. and B.Sc. (Hons) programs in Computational Chemistry were introduced in 2012. Since that time, a new course, Advanced Statistical Thermodynamics (CHEM 4305), has been added by the Department of Chemistry. This course is highly relevant to the field of computational chemistry and is an important subject for computational chemists to study. This course will be added as a program requirement, replacing an unspecified 4000 level course in chemistry.

To balance for this added course, Computer Science 3719 (Theory of Computation and Algorithms) and its prerequisite, MATH 2302 (Discrete Mathematics), will be removed from the degree requirements. To simplify and broaden the degree options for students, we have changed the requirements for the Honours program so that students may take any course in physics, chemistry, mathematics, computer science, or biochemistry to complete their credit hour requirements rather than choosing from a list of courses. Students will also be allowed to take any 3000 level chemistry course instead of CHEM 3211 specifically. Students will also be allowed to take Mathematics 3132 (Numerical Analysis) instead of Computer Science 3731, which will make it possible to complete a minor in mathematics as part of their degrees.

This change will ensure students in this program receive instruction in statistical thermodynamics, a critical division of computational chemistry. The corresponding reduction in required courses will make it easier for students the 2nd and 3rd years of their programs to schedule their courses and complete their degrees without incurring a heavier course load. This change will also make it easier for students in other programs to transfer to the computational chemistry programs and still complete their degrees in 4 years.

A survey of recent job postings in the field of computational chemistry indicate a high level of demand for molecular simulation, which is part of the curriculum of Advanced Statistical Thermodynamics and would be added to the program through this change. No postings mentioned Theory of Computation or Discrete Mathematics, which would be deleted from the program in this change.

CONSULTATIONS

Grenfell
Marine Institute
Mathematics and Statistics
Computer science
Physics
Biochemistry
Biology
Psychology
Ocean Sciences
Earth Sciences
Pharmacy
Engineering
Human Kinetics
Library
COURSE DELETIONS AND ADDITIONS

9.3.6 General Degree - Major in Computational Chemistry
9.3.6.1 Required Courses
Add:
Chemistry 4305
Computer Science 2500 or 2711
3 additional credit hours in chemistry at the 3000 level or above.
Computer Science 3731 or Mathematics 3132

Delete:
Computer Science 2711
Computer Science 3731
Mathematics 2320
Computer Science 3719
4000 level course in chemistry
Chemistry 3211

9.3.7 Honours Degree in Computational Chemistry
9.3.7.1 Required Courses
Add:
Chemistry 4305
Computer Science 2500 or 2711
Computer Science 3731 or Mathematics 3132.
3 additional credit hours in chemistry at the 3000 level or above.
3 additional credit hours in chemistry, mathematics, computer science, biochemistry, or physics at the 2000 level or above.

Delete:
Computer Science 2711
Computer Science 3731
4000 level course in chemistry
Mathematics 2320
Chemistry 3211
Computer Science 3719
Two of the recommended courses.

CHANGES TO CALENDAR REGULATIONS

None.

CALENDAR REVISIONS

9.3.6 General Degree - Major in Computational Chemistry
Students wishing to take a Major in Computational Chemistry should consult those regulations of the Calendar dealing with Regulations for the General Degree of Bachelor of Science.

9.3.6.1 Required Courses
1. Chemistry 1050 and 1051 (or 1010, 1011 and 1031) or equivalent, 2100, 2210, 2301 (or 2300), 2302, 2400, 2401, 3211, 3303, 4304, 4305, and 3 credit hours in chemistry at the 3000 level or above.
2. Physics 1050 (or 1020 and 1021), 1051, and 2820.
3. Mathematics 1000, 1001, 2000, 2050, 2051, 2260 (or 3260), 2320, and 3202.
4. Computer Science 1510, 1710, and 2710, and 2711, 3719, and 3731.
5. Computer Science 2500 or 2711.
6. Computer Science 3731 or Mathematics 3132.
7. English 1080 and English 1110 or equivalent.
8. A sufficient number of elective courses to bring the degree up to a total of 120 credit hours must also be completed.

Recommended courses: Mathematics 3161, 3240, 2320, Chemistry 3110, 3210, 3410, 3411, Computer Science 2500, 3550, 3719, 4XXX.
Recommended electives: Biochemistry 2101, Physics 3800.

9.3.6.2 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. English 1080 and English 1110 or equivalent.
   2. Chemistry 1050 and 1051 (or 1010, 1011 and 1031) or their equivalents.
   3. Physics 1050 (or 1020 and 1021), and 1051.
   4. Mathematics 1000 and 1001
   5. Computer Science 1510 and 1710

9.3.7 Honours Degree in Computational Chemistry
Students wishing to take Honours in Computational Chemistry should consult those sections of the Calendar dealing with Regulations for the Honours Degree of Bachelor of Science. The Honours program in Computational Chemistry consists of a minimum of 42 credit hours in Chemistry, a minimum of 24 credit hours in Mathematics, and a minimum of 18 credit hours in Computer Science. An additional 6 credit hours in recommended Chemistry, Mathematics or Computer Science courses are also required in addition to the minimum credit hour requirements.

9.3.7.1 Required Courses
   1. Chemistry 1050 and 1051 (or 1010, 1011 and 1031) or equivalent, 2100, 2210, 2301 (or 2300), 2302, 2400, 2401, 3211, 3303, 4304, 4305, and 3 credit hours in chemistry at the 3000 level or above.
   2. Physics 1050 (or 1020 and 1021), 1051, and 2820.
   3. Mathematics 1000, 1001, 2000, 2050, 2051, 2260 (or 3260), 2320, and 3202.
   4. Computer Science 1510, 1710, 2710, and 2711, 3719.
   5. Computer Science 2500 or 2711
   6. Computer Science 3731 or Mathematics 3132.
   7. Chemistry 490A/B.
   8. English 1080 and English 1110 or equivalent.
   9. 3 additional credit hours in chemistry, mathematics, computer science, biochemistry, 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.

Recommended courses: Mathematics 3161, 3240, 2320,
Chemistry 3110, 3210, 3410, 3411, Computer Science 2500, 3550, 3719, 4XXX.
Recommended electives: Biochemistry 2101, Physics 3800.
SUMMARY PAGE FOR SENATE

Approval Form

Program Title

General Degree - Major in Computational Chemistry
Honours Degree in Computational Chemistry

Summary of Changes

A course in advanced statistical thermodynamics (CHEM 4305) is added as a requirement to these programs. Discrete Mathematics and Theory of Computation and Algorithms are deleted from the program and replaced a science elective credit at the 2000 level or above. The list of courses that can be used as electives to complete the required credit hours is expanded.

Consultations Sought From

Grenfell
Marine Institute
Mathematics and Statistics
Computer Science
Physics
Biochemistry
Biology
Psychology
Ocean Sciences Centre
Earth Sciences
Pharmacy
Engineering
Human Kinetics and Recreation

Comments Received

Yes
Yes
No
Yes
Yes
No
Yes
No
Yes
Yes
No

Library Report Received

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice-President

Yes/No

Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair: ________________________________
Initial consultation email sent by chemistry: October 20, 2014

Hello everyone,

Please indicate whether or not you support the proposed changes to the computational chemistry program as indicated on the attachment.

sincerely,

Chris Flinn
Deputy Head, Undergraduate Studies
MUN Chemistry Department

Consultation email responses

1. Psychology: 22/08/2014 12:01 PM

From: Chris Flinn <cgflinn@mun.ca>

Subject: Consultation on proposed change to the computational chemistry program

Date: 20 August, 2014 10:40:47 AM NDT

To: vpoffice@grenfell.mun.ca, miugconsultations@mi.mun.ca, pdavis@mun.ca, pmarino@mun.ca, cs-chair@mun.ca, jhanchar@mun.ca, mathconsult@mun.ca, fletcher@mun.ca, bdeyoung@mun.ca, psychology.head@mun.ca, engrconsult@mun.ca, pharinfo@mun.ca

Hi Chris,

Psychology supports your proposed changes.

Chuck Malsbury

Deputy Head, Psychology

The library:

Collection Development Division
Queen Elizabeth II Library

28 August 2014
To: Chris Flinn, Department of Chemistry

From: Erin Alcock, Science Research Liaison Librarian

Subject: Chemistry Calendar Changes

The proposed calendar changes, turning Advanced Statistical Thermodynamics, CHEM 4305, into a requirement for the Computational Chemistry major streams, will have no impact on library holdings. CHEM 4305 is an existing course, and as such, should be being supported adequately by the Queen Elizabeth II Library.

2. Pharmacy:

Hello Dr. Flinn
The School of Pharmacy has no concerns with the Chemistry departments' proposed changes to the Computational Chemistry program.

Regards,
Csop Glew

CSOP GLEW, Hor. 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  709 777 6963  I  F  709 777 7044
www.mun.ca/pharmacy

-----Original Message-----
From: Bugler, Heather
Sent: August 20, 2014 7:41 PM
To: Dillon, Carla; Glew, Csop; Marra, Carlo
Subject: FW: Consultation on proposed change to the computational chemistry program

For your response.

Heather

3. Physics:

Chris

We have reviewed the proposed change in the Computation Chemistry program, the addition of the course 4305 and support this change. It seems like a good course for the program.

Brad deY
Professor and Head
Physics and Physical Oceanography
4. Grenfell

Hello Dr. Flinn.

The only comment the Division of Science has regarding the proposed changes to the computational chemistry program (circulated August 20) is that the proposal lists Math 3202 (which is Vector Calculus) but we think you mean to list Math 2320 (Discrete Mathematics).

R. Gallant  
Head of Division of Science, Grenfell Campus, Memorial University

5. Marine Institute

Chris,

Thank you for the opportunity to review the proposed changes to the Computation Chemistry Program.

These changes will have no impact on the programs at the Marine Institute.
We are happy to support these changes as presented.

Sincerely,

Derek Howse

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

6. Computer Science

Hi Chris,

the department of Computer Science is in favor of adjusting the program to make it more flexible and relevant. We agree that a course in Theory of Computing and Algorithms should not be a requirement for Computational Chemistry.

I would, however, point out that our course on "Data Analysis with Scripting Languages" might be of use to Computational Chemists to warrant recommendation.

Best regards,
Wolfgang Banzhaf, Head  
Department of Computer Science

7. Engineering
Dear Dr. Flinn,

At its regular meeting of 2014 Sep. 17, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science determined that the proposed Calendar changes to Computational Chemistry have no impact on this Faculty.

We wish you well in the development 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
October 6, 2014

TO: All Members, Faculty Council of Science

FROM: Joan Burry, Secretary
Secretary, Committee on Undergraduate Studies, Faculty of Science

SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on September 26, 2014, the Undergraduate Studies Committee of the Faculty of Science agreed that the following new program proposals and Calendar changes be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Revisions to Computation Chemistry major and honours major programs

2. Department of Ocean Sciences
   (i) New minor program in Oceanography
   (ii) New minor program in Sustainable Aquaculture and Fisheries Ecology

Joan Burry
Associate Registrar and Secretary, Committee on Undergraduate Studies, Faculty of Science
Proposal for a New Program
Minor in Oceanography

Resource Implications: Instructional Costs

There are resource implications for the Departments of Chemistry, Earth Sciences and Physics and Physical Oceanography which are offering new courses cross-listed for this minor. However for Ocean Sciences the proposed program does not require any new instructional costs beyond those associated with the practical component of OCSC 4000: Scientific Diving Methods. The five core courses for the minor: OCSC 1000 Exploration of the World Ocean, OCSC 2000 Introductory Biological Oceanography, OCSC 2100/CHEM 2610 Introductory Chemical Oceanography, OCSC 2200/EASC 2919 Introductory Geological Oceanography and OCSC 2300/PHYS 2300 Introductory Physical Oceanography have all been approved at least up to level of the Council of the Faculty of Science on or before 19 March 2014.

Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

The costs associated with new program/courses can be met from within the existing budget allocation.

Signature of Unit Head (if appropriate):

Date:

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

Date:
EXECUTIVE SUMMARY

Oceanography is the scientific exploration and study of the ocean and its phenomena. It is an interdisciplinary science incorporating the basic principles of biology, chemistry, geology and physics. The minor curriculum is designed to complement the strong disciplinary training of MUN basic science majors by providing a broad interdisciplinary perspective in each of oceanography's four subdisciplines:

- Biological Oceanography examines the processes governing distributions, abundances, and production of life in the ocean.
- Chemical Oceanography examines sources, distribution, and transformations of elements and compounds in the ocean.
- Geological Oceanography examines formation, transport, and deposition of marine sediments, ocean basin formation, processes governing shoreline formation, and the origin, structure, and history of the oceanic crust and upper mantle.
- Physical Oceanography examines the properties of seawater, ocean circulation, tides and shoreline processes as well as ocean coupling with the atmosphere, geosphere and ice and its implications for climate change.

DEMAND FOR PROGRAM

This minor will support MUN’s goal of becoming Canada's oceans university. It will allow MUN basic science majors to discover more about the world around them and the systems that regulate it and to contribute to the future use and care of the world ocean.

BENEFITS TO STUDENTS

This minor will help our graduates gain employment in ocean related university research departments, government departments and agencies, non-governmental organizations, industries concerned with inshore and offshore work and marine instrumentation, private consulting companies, and navies.
CONSULTATIONS

The original version of this document was circulated on 29 April 2014. The e-mail sent to other academic units seeking consultation as well as those received back from units consulted are appended at the end of this document.

PROGRAM TITLE: Minor in Oceanography

COURSE ADDITIONS

The five core courses for the minor: OCSC 1000 Exploration of the World Ocean, OCSC 2000 Introductory Biological Oceanography, OCSC 2100/CHEM 2610 Introductory Chemical Oceanography, OCSC 2200/EASC 2919 Introductory Geological Oceanography and OCSC 2300/PHYS 2300 Introductory Physical Oceanography have all been approved at least up to level of the Council of the Faculty of Science on or before 19 March 2014.

CALENDAR ENTRY

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
4. The remaining credit hours 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, 4000, 4122, 4601, and Physics and Physical Oceanography 3300, 3340, 4300, 4340.

Course prerequisites stipulated in the course descriptions shall apply to a minor in Ocean Sciences.
SUMMARY PAGE FOR SENATE
Approval Form

Program Title

Minor in Oceanography

Summary of Changes
This proposal organizes a series of new Ocean Sciences courses which have been approved at least up to level of the Council of the Faculty of Science into a minor. This interdisciplinary program is to be administered by the Department of Ocean Sciences in cooperation with the Departments of Chemistry, Earth Sciences and Physics and Physical Oceanography. It is intended primarily for any student in the Faculty of Science but would be open to students in other faculties.

Consultations Sought on 29 April 2014 From

<table>
<thead>
<tr>
<th>Consultations Sought</th>
<th>Comments Received</th>
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<tbody>
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<td>Marine Institute</td>
<td>Yes</td>
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<td>Grenfell campus</td>
<td>Yes</td>
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<tr>
<td>Department of Biochemistry</td>
<td>No</td>
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<td>Department of Biology</td>
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<td>Department of Psychology</td>
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Library Report Received

Yes

Approved by Dean, Associate Vice-President (Academic) or Vice-President

Yes/No

Name
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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:
Appendix 1: Courses for the Minor

There are five core courses for the minor:

**OCSC 1000 Exploration of the World Ocean.**
Exploration of the World Ocean is an introductory course covering the major ocean sciences (biology, chemistry, geology, physics) at a level sufficient for science majors but accessible to non-science majors. It explores phenomena occurring from the shoreline to the abyss and from equatorial to polar regions. It also examines principles of marine ecology as well as how the marine environment affects humans and vice versa. The course is offered in a blended format that combines face-to-face lectures and online interactive activities in the form of virtual oceanographic expeditions.

**OCSC 2000 Introductory Biological Oceanography.**
This course provides a general understanding of the biological processes that occur in coastal and oceanic environments. It introduces students to the major groups of bacteria, phytoplankton, invertebrates and fish, emphasizing the biotic and abiotic factors controlling primary production and marine biomass. It shows how the physical, chemical, and geological environments interact with biology to define processes and patterns affecting nutrients and life in marine ecosystems.

PR: OCSC1000

**OCSC 2100/CHEM 2610 Introductory Chemical Oceanography.**
This course will provide an introduction to the fundamental chemical properties of seawater and the processes governing the concentrations of elements and compounds in the oceans. It is an introduction to the sources, distribution, and transformations of chemical constituents of the ocean, and their relation to biological, chemical, geological, and physical processes. Topics include: controls on average concentration of chemicals in the ocean; vertical and horizontal distributions of ocean constituents; air-sea interactions; production, export, and remineralization of organic matter; the ocean carbon cycle; human-induced changes; stable isotopes; and trace elements.

CR: CHEM 2610

PR: CHEM 1011 OR CHEM 1051 which may be taken concurrently OR CHEM 1001

**OCSC 2200/EASC 2919: Introductory Geological Oceanography.**
The formation and evolution of oceans are discussed, including plate tectonics, mid-ocean ridges (birth place of oceans), subduction zones (where oceans are consumed), sedimentary environments such as estuaries, deltas, beaches and barrier islands, continental shelves, slopes and deep abyssal plains and special topics, including anoxic events, evolution of tides, atmosphere-ocean interactions, formation of banded iron formations, snowball Earth, black and white smokers, and how Earth modulates its climate through atmosphere, hydrosphere, biosphere and lithosphere interactions.

PR: EASC1000

**OCSC 2300/PHYS 2300: Introductory Physical Oceanography.**
Introductory Physical Oceanography will provide an introduction to the physical ocean. Ocean characteristics studied will include: the properties of seawater, key features of ocean circulation, wind-forcing in the ocean, tides and shoreline processes as well as ocean coupling with the atmosphere, geosphere and cryosphere (ice) and new approaches to ocean sampling and numerical modelling. The course will take an integrated earth systems approach to the study of upwelling zones, open ocean ecosystems and climate change.

CR: ENVS 2371
PR: Any two first-year courses in Physics.

There are six elective courses from the Department of Ocean Sciences:

OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture

This course introduces students to the breadth of aquaculture and fisheries science and the variety of animal species cultured and harvested. Basic aspects of aquaculture and fisheries and the links between the two are covered, including production systems, capture fisheries, environmental interactions, and the physiology, ecology and reproduction of finfish and shellfish in the context of their culture and harvest.

PR: OCSC1000 or BIOL 1002 Principles of Biology

OCSC 3000: Aquaculture Principles and Practices

This course will emphasize the techniques and methods used to culture finfish and shellfish, with a primary focus on Canadian aquaculture species. Basic aspects of aquaculture will be covered, including the design and maintenance of production systems, culture techniques, and the nutrition, health, physiology and reproduction of finfish and shellfish. The laboratory portion of this course will provide students with practical experience in the maintenance of land-based aquaculture production systems and in the husbandry/culture of aquatic organisms.

PR: OCSC 2001, or OCSC 1000 and BIOL 1002.

OCSC 3002: Aquaculture and Fisheries Biotechnology

Aquaculture and Fisheries Biotechnology is an introduction to biotechnology and genetics as they are applied to aquaculture and fisheries. Topics covered include genetic variation; genetic structure of fish and shellfish populations; the genetic basis of aquaculture traits; finfish and shellfish genomic research; marker-assisted selection in aquaculture; manipulation of ploidy; genetic engineering in aquaculture; and techniques used to study the responses of aquatic animals to external stressors such as hypoxia, temperature stress, acidification, and pathogens.

PR: Biology 2250, 2060

OCSC 4000: Scientific Diving Methods

Scientific Diving Methods is an in-depth study and application of methods routinely employed for data collection in underwater scientific research. Aspects covered include habitat mapping; installation and use of Instrumentation; still and video camera techniques; planning and execution of surveys and experiments in major subtidal habitats; as well as data analysis and interpretation. Participants are
trained in accordance with Memorial University of Newfoundland’s Guide for Diving Safety and the Canadian Association for Underwater Science (CAUS) standards to meet the criteria for Scientific Diver I rating. This course is normally offered at the Bonne Bay Marine Station in a special 2-week session at the beginning or end of the spring semester depending on station’s availability.

PR: BIOL 2122, BIOL 2600, STAT 2550 (or approval by instructor), nationally recognized advanced level SCUBA certification with diver rescue and accident management techniques.

OCSC 4122: Advanced Studies in Marine Animal Diversity (same as BIOL 4122)
Advanced Studies in Marine Animal Diversity provides an in-depth examination of cellular, physiological, behavioural and ecological adaptations in marine animals. Lectures will be combined with discussions of relevant papers from the primary literature on topics of current interest which may relate morphology, ecology, evolution, natural history, species interactions and practical applications. Students will also gain hands-on experience by designing and conducting research projects involving live or preserved animals.
PR: BIOL 2122, 2600 and 2500

OCSC 4601: Functional Biology of Fish (same as BIOL 4601)
Functional Biology of Fish is an introduction to anatomical physiological and cellular processes in the life cycle of fishes.
PR: Biology 2060, 2210, and 3401

Choices from Biology:
3014 Biology and Ecology of Boreal and Arctic Seaweeds
3709 Field Course in Marine Principles and Techniques
3711 Principles of Marine Biology
3712 Benthic Biology
3714 Estuarine Fish Ecology Field Course
3715 Ecology and Evolution of Fishes
4122 Advanced Topics in Marine Invertebrates (same as OCSC 4122)
4601 Functional Biology of Fish (same as OCSC 4601)
4710 Experimental Marine Ecology of Newfoundland Waters
4750 Fisheries Ecology
4810 Field Course in Marine Biology

Choices from other departments:
CHEM 2100 Analytical Chemistry I
CHEM 3110 Analytical Chemistry II
CHEM 4151 Analytical Separations and Organic Mass Spectrometry
CHEM 4156 Analytical Method Development and Sampling

EASC 4302 Advanced Marine Geology (This course covers geology and geophysics as well as more general oceanography and has only a 1st year EASC course as a specific prerequisite: EASC 1001 or 1002 and completion of any 15 credit hours in core courses at the 3000 and/or 4000 levels in Biology, Biochemistry, Chemistry, Earth Sciences, Physics, or Geography).

ENVS 3072 Comparative Marine Environments
ENVS 3210 Environmental Analytical Chemistry I
ENVS 3211 Environmental Analytical Chemistry II
ENVS 4230 Aquatic Chemistry

GEOG 3120 Climatology is an introduction to climatology and has considerable material that is relevant to oceanography (prerequisites: GEOG 2102 and MATH 1000).

GEOG 3510 Geography of the Seas (An introductory course in marine science and management. It has two 2nd year GEOG prerequisites or “permission of instructor”).

GEOG 4190 Coastal Geomorphology (An advanced course in geomorphology of coastal regions in all climate zones. It has one 3rd year GEOG prerequisite or “permission of instructor”).

GEOG 4300 World Fisheries: Current Discourse and Future Directions (A seminar course on the key concepts, principles, and challenges in fisheries resources worldwide. The prerequisites are two 3rd year GEOG courses or permission of Head of Department).

PHYS 3300 Intermediate Physical Oceanography (PHYS 2053 and MATH 2000 are prerequisites)
PHYS 3340 Principles of Environmental Physics
PHYS 4300 Advanced Physical Oceanography
PHYS 4340 Modelling in Environmental Physics

Scheduling and prerequisites
The minor needs to be established in a manner that facilitates access to students in the three partner departments delivering the majors as well those in other science departments. One way is to deliver 2nd year introductory oceanography courses in the winter semester with co-requisite 1st year partner department science courses, so that these 2nd year courses are available in the first year.

The following courses are required to major in Biochemistry, Biology, Chemistry, Earth Sciences, Physics and Psychology (Behavioural Neuroscience):
Mathematics 1000, two first year Chemistry courses and two first year Physics courses.

Thus requiring oceanography students to take four 1st year Chemistry and Physics courses will not increase the course load outside of the major or minor for Biochemistry, Biology, Chemistry, Earth Sciences Physics and Psychology (Behavioural Neuroscience) majors. For some students scheduling may be difficult, so putting a 2nd first year course as a co-requisite may help.

For Biochemistry, Biology, Chemistry, Physics and Psychology (Behavioural Neuroscience) majors there will be an extra Earth Sciences course required: EASC 1000 (Earth Systems). This will count towards the minor.

In this way we are adding a maximum of only one cognate course beyond the requirement for a disciplinary major in science and the interdisciplinary Oceanography minor. It adds a maximum of one course for Biochemistry, Biology, Chemistry and Physics and Psychology (Behavioural Neuroscience) majors. There is no additional cognate course load for Earth Sciences majors.

Course requirements for the minor for each of the partner departments: Chemistry, Earth Sciences, and Physics and Physical Oceanography

OCSC 1000 Exploration of the World Ocean.

EASC 1000 Earth Systems.

OCSC 2000 Introductory Biological Oceanography. PR: OCSC1000

OCSC 2100/CHEM 2610 Introductory Chemical Oceanography. CO: CHEM1051

OCSC 2200/EASC 2919 Introductory Geological Oceanography. PR: EASC1000


Two 2nd - 4th year electives.
Appendix 2: Consultations

Comments from Biology
From: Karen Morris [mailto:morrisk@mun.ca]
Sent: June-06-14 3:05 PM
To: Fletcher, Garth
Cc: Marino, Paul
Subject: Proposal for a New Program- Minor in Oceanography

Hi Garth,

The Proposal for a New Program Minor in Oceanography was reviewed at a departmental meeting May 22, 2014.

1. It was noted that, for reasons unknown, Biology has been excluded from the list of cooperating department of this interdisciplinary program. We certainly did work on this proposed program for a number of months.

2. In terms of overall content we would like to suggest that (page 2) under Calendar entry #4 Biology 4810 (Field Course in Marine Biology) be added to the list of Biology courses; this was an oversight on our part when our suggestion was sent regarding this minor.

3. On Page 3 under OCSC 2000 Introductory Biological Oceanography a credit restriction needs to be added under the PR 1000: ‘CR BIOL 3710’

   a. In making the above calendar change it also needs to be added to BIOL 3710 Biological Oceanography: CR OCSC 2000

4. On page 4 under OCSC 3002, PR it may be a good idea to add CHEM 2440 as it is required as a prerequisite or co-requisite for Biology 2250.

5. On page 5 under 4122 the course title is incorrect it should read:

   a. ‘Advanced Studies in Marine Animal Diversity (same as OCSC 4122)’

6. A slight change to:

   a. 4601 Functional Biology of Fish (same as OCSC 4601)

7. As noted under the calendar description addition of:

   a. ‘4810 Field Course in Marine Biology’

If you have any questions please let me know.

Thanks
Karen
Karen Morris  
Undergraduate Officer  
Dept. of Biology  
Memorial University of Newfoundland  
St. John’s, NL A1B 3X9  
709-864-8021  

Responses to Biology  
From: Fletcher, Garth  
Sent: Monday, July 28, 2014 3:04 PM  
To: Karen Morris  
Cc: Parrish, Chris  
Subject: RE: Proposal for a New Program- Minor in Oceanography

Thanks Karen: We have now received and collated comments from most of the units we consulted. As to Biology’s comments,

(1) Partner departments are those offering new courses cross-listed for this minor. We requested that Biology modify one of your courses for this minor. However this offer was declined.

(2) 4810 (Field Course in Marine Biology) has been added to the list of Biology courses.

(3) An excellent alternative to putting a credit restriction would be to allow oceanography students to take BIOL 3710 as an advanced course. In any case we will let you file the paper work.

(4) This is true but we are investigating simplifying our prerequisites to maximize availability to science students.

(5) - (7) Done.

Best regards  

Garth

Comments from Geography

From: Charles Mather [mailto:cmather@mun.ca]  
Sent: Monday, May 26, 2014 12:52 PM  
To: Roche, Marsha  
Subject: Minor in Oceanography

Dear Marsha

Faculty involved in ocean related research and teaching in our Department have looked at the proposal for a Minor in Oceanography and are happy to support it. We have added three additional courses that
we teach on a regular basis in Geography that are relevant to this proposal. I have attached the relevant document - the new additions are highlighted in yellow.

Best wishes

Charles Mather, Head

Response to Geography

-----Original Message-----
From: Fletcher, Garth
Sent: Monday, July 28, 2014 3:09 PM
To: cmath@mun.ca
Cc: Parrish, Chris
Subject: RE: Minor in Oceanography

Thanks Charles: We have now received and collated comments from most of the units we consulted. We now include all the GEOG courses suggested and have also included GEOG 4300: World Fisheries: Current Discourse and Future Directions as an alternative to BIOL 4750: Fisheries Ecology in our other proposed minor in Sustainable Aquaculture and Fisheries Ecology. We look forward to further programming collaboration with Geography.

Best regards

Garth

Comments from Engineering

From: Engineering Consultations [mailto:engrconsult@MUN.CA]
Sent: May-22-14 9:32 AM
To: Fletcher, Garth
Cc: Fisher, Andrew; Edmunds, Jayde; Glyn George
Subject: Re: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Thank you for the opportunity to comment on the proposed Calendar changes for the introduction of
1) a Minor in Oceanography and
2) a Minor in Sustainable Aquaculture and Fisheries Ecology

At its regular meeting of 2014 May 21 the Committee on Undergraduate Studies for the Faculty of Engineering and Applied Science found no impact on our programs from either of these two sets of proposed Calendar changes.

I wish you well in the development of these two minors.

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
http://www.engr.mun.ca/~ggeorge

Comments from the Queen Elizabeth II Library
19 May 2014

To: Garth Fletcher Department of Ocean Sciences

From: Erin Alcock, Science Research Liaison Librarian

Subject: Minor in Oceanography

I have reviewed the proposal for the minor in Oceanography, and have determined that the Memorial University Library system has more than sufficient resources to support this program.

The summary of library holdings below indicates numerous monograph titles in the four subdisciplines of oceanography. The resources will be held both in the Queen Elizabeth II Library and the C.R. Barrett Library. Additionally, there is more than sufficient coverage from article indexes. Any additional resources required could be purchased under allocations for biology, physics and physical oceanography, the Marine Institute Library and other appropriate funds. The major journals in this area are well covered.

Library Holdings Summary

Table One: General Programme Subject Themes

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<thead>
<tr>
<th>Course Topic</th>
<th>LCSH</th>
<th>Keywords</th>
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</thead>
<tbody>
<tr>
<td>Oceanography</td>
<td>3049</td>
<td>5425</td>
</tr>
<tr>
<td>AND Biol$</td>
<td>275</td>
<td>324</td>
</tr>
<tr>
<td>AND Chem$</td>
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<td>AND Geol$</td>
<td>2</td>
<td>515</td>
</tr>
<tr>
<td>AND Phys$</td>
<td>228</td>
<td>752</td>
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*as of date of memo

Table Two: Selected Article Indexes and Databases

<table>
<thead>
<tr>
<th>Article Indexes and Databases</th>
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</thead>
<tbody>
<tr>
<td>Applied Science and Technology Index</td>
</tr>
<tr>
<td>ASFA: Aquatic Science and Fisheries Abstracts</td>
</tr>
<tr>
<td>Scopus</td>
</tr>
<tr>
<td>Web of Science</td>
</tr>
</tbody>
</table>

Comments from the Marine Institute

From: Fletcher, Garth
Sent: May-16-14 1:09 PM
To: 'MIUG Consultations'  
Subject: RE: Proposed Minor in Oceanography

Thank you Derek. I'm hoping we can all work together on this so that your and our programs are harmonious.

Best regards

Garth

From: Dawn King [mailto:Dawn.King@mi.mun.ca] On Behalf Of MIUG Consultations  
Sent: May-16-14 1:06 PM  
To: Fletcher, Garth  
Cc: Derek Howse  
Subject: RE: Proposed Minor in Oceanography

Garth,

Thank you for the opportunity of reviewing the Proposed Minor in Oceanography. We have identified some areas of overlap with our own programs but these areas are not significant enough to cause any concern or conflicts between programs.

We are happy to support this proposal as presented.

Sincerely,

Derek Howse

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

Comments from Chemistry

-----Original Message-----
From: Peter Pickup [mailto:chemhead@mun.ca]  
Sent: May-13-14 10:22 AM  
To: Alisarale, Laleh; 'Bob Davis'; 'Bob Helleur'; 'Chris Flinn'; 'Chris Kozak'; 'Chris Rowely'; 'Christina Bottaro'; cora.young@mun.ca; 'Dave Thompson'; 'Erica Merschrod'; 'Fran Kerton'; 'Graham Bodwell'; 'Karen Hattenhauer'; 'Kristin Poduska'; 'Paris Georgiou'; 'Paul Mezey'; 'Peter Warburton'; 'Ray Poirier'; 'Rosalind Collins'; 'Sunil Pansare'; 'Travis Fridgen'; 'Yuming Zhao'
Cc: Fletcher, Garth  
Subject: FW: Oceanography minor proposal
Dear Colleagues,

Please review the attached documents and let me know if you have any comments, and whether you support this program or not. Since this is not our program, I don’t think that we need to discuss it at a department meeting, but we can if you wish. Depending on your responses by 26 May, I will either inform the Department of Ocean Sciences of our support (with further modifications if required), or bring this to a department meeting.

Thanks,

Peter

Comments from CUGS: collected via email 13 May 2014

The chemical oceanography course number is Chem 2610 not Chem 2600.

Brandon Furlong (UG student rep): Gave enthusiastic support for the program.

John MacInnes (GS student rep): Gave strong support for students taking Chem 4156 as part of the minor. He suggested that some of the oceanography courses could be offered in the spring semester to alleviate scheduling problems.

Travis Fridgen pointed out errors in the required first year courses for Biochemistry, Chemistry and Physics. He also pointed out that more work needs to be done on scheduling.

Ideally, a student wanting to do a Chemistry major and an Oceanography minor should start their first year with

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chem 1050</td>
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<tr>
<td>Math 1000</td>
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<tr>
<td>Physics 1050</td>
<td>Physics 1051</td>
</tr>
<tr>
<td>English 1080</td>
<td>English 1110 or equivalent</td>
</tr>
<tr>
<td>EASC 1000</td>
<td>OCSC 1000</td>
</tr>
</tbody>
</table>

Chris Flinn has edited the proposal to reflect needed changes. He suggested that at least some oceanography courses need to be offered in several semesters to accommodate scheduling.

Karen Hattenhauer also wondered about majors in various departments being able to schedule their major and minor courses easily in 4 years.
The following prerequisites are common to majors in Biochemistry, Biology, Chemistry, Earth Sciences, and Physics and Psychology.

Mathematics 1000 and 1001 Chemistry 1040 1050 and 1041 1051 (or equivalent) and or Physics 1020 1050 and 1021 1051 (or equivalent). Biochemistry majors can take Physics 1020 and Physics 1021.

The following prerequisites are common to majors in Biochemistry, Biology, Chemistry, Earth Sciences, Physics and Psychology.

Mathematics 1000 and Chemistry 1010 and 1011 (or equivalent) or Physics 1020 and 1021 (or equivalent).

However, in order to graduate with a major in Biology, Chemistry, Earth Sciences and Physics all 5 or 6 of the above specified math, chemistry and physics courses are required courses. Thus requiring oceanography students to take all four 1st year Chemistry and Physics courses will not increase the course load outside of the major or minor for Biology, Chemistry, Earth Sciences and Physics majors. For some students scheduling may be difficult, so putting a 2nd first year course as a co-requisite may help.

For Biology, Chemistry and Physics majors there will be an extra Earth Sciences course required for the minor: EASC 1000 (Earth Systems). This will count towards the minor.

Response to Chemistry

-----Original Message-----
From: Fletcher, Garth
Sent: Monday, July 28, 2014 3:31 PM
To: Peter Pickup
Cc: Parrish, Chris
Subject: RE: Oceanography minor proposal

Thanks Peter.. We have now received and collated comments from most of the units we consulted. Many thanks for the extensive editorial suggestions which have led us to greatly simplify the language under Scheduling and Prerequisites.

Best regards
Garth

Comments from Earth Sciences

From: Michelle Miskell [mailto:mmiskell@mun.ca]
Sent: May-12-14 9:44 PM
To: Fletcher, Garth
Cc: jhanchar@mun.ca; 'George Jenner'; 'Dr Alison Leitch'; 'Robbie Hicks'; 'Penny Morrill'; 'Luke Beranek'
Subject: RE: Proposed Minor in Oceanography - comments from Earth Sciences

Sorry Garth, I just discovered one more:

On page 5, under the heading “Course requirements for the minor in each...”, under the heading “Earth Sciences”, it states 3 electives. As EASC 1000 will count toward their minor in Oceanography, Earth Sciences students will only have two electives.
Thanks,
Michelle

Ms. Michelle Miskell
Manager of Academic Programs
Department of Earth Sciences
Memorial University of Newfoundland
St. John’s, NL  A1B 3X5
(709) 864-4464
mmiskell@mun.ca
www.mun.ca/earthsciences

From: Michelle Miskell [mailto:mmiskell@mun.ca]
Sent: May-12-14 9:41 PM
To: ‘fletcher@mun.ca’
Cc: ‘jchanchar@mun.ca’; ‘George Jenner’; ‘Dr Alison Leitch’; ‘Robbie Hicks’; ‘Penny Morrill’; ‘Luke Beranek’
Subject: Proposed Minor in Oceanography - comments from Earth Sciences

Hello Garth,

We discussed the proposal from the Department of Ocean Sciences for a minor in Oceanography at our recent Undergrad Matters Committee in Earth Sciences. Generally we thought the proposal was fine, and the program itself looks great. We do have one concern to share, and a couple of minor comments. Please see below.

Good luck with it! Give me a call if you wish to discuss this (4464).
Michelle

(1) On page 1, under the heading “Resource implications”, it states that the proposed program does not require any new instructional costs beyond the new scientific diving course. We feel this is an inaccurate statement. OCSC is seeking instructors from other units to teach OCSC minor courses. In Earth Sciences, this means that one of our faculty members is unavailable to teach one course in the EASC program each year so that OCSC teaching requirements are met. This is a cost to us in that it is reducing our available teaching resources, at a time when we are already stretched to, or past, our limit. Furthermore, should the situation arise sometime that we are unable to provide an instructor, OCSC would be potentially faced with having to hire a sessional to teach the course. I imagine that these issues apply to the other units as well?

(2) On page 4, under the last heading on the page “Choices from other departments”, EASC 4302 is listed as a choice. The statement in parentheses that follows, while accurate, could be misleading. (In fact it tripped me up the first time I read it and I know this program inside out.) It states that this course has only a 1st year EASC course as a specific prerequisite. Again, while this is true, the word “specific” is kind of lost in there. Another sentence here about the 15 credit hours required in core sciences at the 3000 and/or 4000 levels in any of Biol, Biochem, Chem, Earth Sciences, Physics or Geography would offer clarification and help the reader understand that this is an easily accessible course to most science students.
(3) On page 5, under the heading "Scheduling and prerequisites"

a. First sentence – why is the Dept of Biology set apart in this sentence? Not a big deal, just confusing.

b. Second sentence – it appears that it states that 2nd year introductory oceanography courses could/should be delivered in the winter semester so that 1st year prerequisites can be taken as co-requisites, enabling 2000 level OCSC courses to be taken in the student’s first year. We thought it would be worthwhile pointing out that while have no issue with offering OSCS 2200 in the winter semester (and plan to do so), the prerequisite EASC 1000 is just that, a prerequisite, not a corequisite. It will be up to the course instructor to agree to admit students to OCSC 2200 if the prerequisite has not been met. And truthfully, it is doubtful that the instructor would.

c. Furthermore, it may be very difficult for many science students to take 2000-level OCSC courses in their first year as their programs are already chock-a-block full with the major program requirements. EASC students for example would not be able to take any OCSC courses in their first year at all, due to the program requirements.

Ms. Michelle Miskell  
Manager of Academic Programs  
Department of Earth Sciences  
Memorial University of Newfoundland  
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(709) 864-4464  
miskell@munn.ca  
www.mun.ca/earthsciences

Responses to Earth Sciences

From: Fletcher, Garth
Sent: Monday, July 28, 2014 3:36 PM
To: Michelle Miskell
Cc: Parrish, Chris
Subject: RE: Proposed Minor in Oceanography - comments from Earth Sciences

Hi Michelle:
We have now received and collated comments from most of the units we consulted. As to Earth Sciences concerns and comments,

(1) EASC 2919/OCSC 2200 is an Earth Sci course, but your point is well taken and this is a concern shared by Chemistry. We now specify the implications for each of the partner departments as well as for Ocean Sciences: “There are resource implications for the Departments of Chemistry, Earth Sciences and Physics and Physical Oceanography which are offering new courses cross-listed for this minor. However for Ocean Sciences . . .”

(2) We’ve put in the exact phraseology from the current calendar.

(3) a. Partner departments are those offering new courses cross-listed for this minor. We requested that Biology modify one of their courses for this minor – they declined.

   b. Yes, this is focusing on Physics and Chemistry where two first year courses are required. EASC 1000 Earth Systems is the only prerequisite and is offered in the fall so there is no issue here.

   c. This is true for Earth Sciences; however, not all departments require as many first year courses as does Earth Sciences.
Best regards

Garth

Comments from Physics & Physical Oceanography

-----Original Message-----
From: Brad deYoung [mailto:bdeycung@mun.ca]
Sent: May-02-14 9:20 AM
To: Fletcher, Garth
Cc: Mike Morrow; Rick Goulding
Subject: Minor in Oceanography

Garth

Our undergraduate studies committee looked at the minor and are happy with the integrated structure with one challenge, one that I already mentioned - the requirement for EASC 1000. We are very doubtful that our students will take that and will only really note the need to do so late in their programs and will therefore be very unlikely to take it. That is why that course was not in our list when we all had separate regulations.

We would like to suggest that a phrase be added

Students majoring in Physics will take Physics 3300 in place of EASC 1000.

If that can be added then we fully support the program and are on board.

Let me know how this seems.

thanks

Brad

Brad deYoung
Professor and Head
Memorial University
St. John’s NL
709-864-8738
bdeyoung@mun.ca

Responses to Physics & Physical Oceanography

From: Fletcher, Garth
Sent: Monday, July 28, 2014 3:40 PM
To: Brad deYoung
Cc: Parrish, Chris
Subject: RE: Minor in Oceanography

Thanks Brad.
We have now received and collated comments from most of the units we consulted. As to Earth Sciences 1000, it is actually a prerequisite to OCSC 2200/EASC 2919: Introductory Geological Oceanography. It seems unlikely they would accept PHYS 3300 as an alternative to EASC 1000 as we received the following from them in response to our original proposal:

“We thought it would be worthwhile pointing out that while we have no issue with offering OCSC 2200 in the winter semester (and plan to do so), the prerequisite EASC 1000 is just that, a prerequisite, not a corequisite. It will be up to the course instructor to agree to admit students to OCSC 2200 if the prerequisite has not been met. And truthfully, it is doubtful that the instructor would.”

Best regards
Garth

Comments from Grenfell

From: Gunther, Georg [mailto:ggunther@grenfell.mun.ca]
Sent: May-05-14 1:32 PM
To: Fletcher, Garth
Subject: FW: Proposed Minor in Oceanography

Dear Dr. Fletcher

Please see the email below from Dr. Don-Roger Parkinson, Program Chair of the Environmental Science Program Unit at Grenfell Campus.

All the best

Georg Gunther,
Head, Division of Science

From: Parkinson, Don-Roger
Sent: April-30-14 9:59 AM
To: Gunther, Georg
Subject: RE: Proposed Minor in Oceanography

HI,

The proposal seems to be an apt one and should enable Earth Science to entice an few students.

Comments on Proposed Minor in Oceanography:

1) I am not aware of Chem 2600. Is this a new course not listed in the MUN 2013-2014 calendar or do they mean the old Chem 3600 (inactive Marine Chemistry)?
2) Choices from Biology should also include (from Grenfell): ENVS 2371 (Oceanography), ENVS 3072 (Comparative Marine Environments)
3) Choices from other depts section should also include (from Grenfell): ENVS 3210 (Environmental Analytical Chemistry I), ENVS 3211
(Environmental Analytical Chemistry II) and perhaps ENVS 4230
(Aquatic Chemistry)

Regards,

Don-Roger
Chair of ENVS

**Response to Grenfell**

*From:* Fletcher, Garth  
*Sent:* Monday, July 28, 2014 3:42 PM  
*To:* Gunther, Georg  
*Cc:* Parrish, Chris  
*Subject:* RE: Proposed Minor in Oceanography

Thanks Georg.
We have now received and collated comments from most of the units we consulted. We now include all the ENVS courses suggested and look forward to further programming collaboration with Grenfell.
Best regards
Garth

**Math & Stats**

*From:* Math Consult  
*Sent:* April-30-14 12:09 PM  
*To:* Fletcher, Garth  
*Subject:* Re: Proposed Minor in Oceanography

The Department of Mathematics and Statistics has no objection to this proposal.

*H. Johnson*

Engineering: Proposed Minor in Oceanography
*From:* Engineering Consultations  
*Sent:* April-30-14 11:43 AM  
*To:* Fletcher, Garth  
*Cc:* Fisher, Andrew; Edmunds, Jayde; Glyn George  
*Subject:* Re: Proposed Minor in Oceanography

Thank you for the invitation to comment on Calendar proposals for two minors in Ocean Sciences (SAFE and Oceanography).

Neither the associate dean (Andy Fisher) nor I can see any impact on our programs from these minors. However, I shall add them to the agenda of the next regular meeting of our Committee on Undergraduate Studies on May 18.

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

Education
From: Gerald Galway [mailto:ggalway@mun.ca]
Sent: April-29-14 7:32 PM
To: Fletcher, Garth
Subject: Re: Proposed Minor in Oceanography

Dear Garth,

We have reviewed the proposal for a minor in Oceanography and from the perspective of the Faculty of Education there are no concerns with the proposal. Congratulations and good luck with the new option.

Gerald

Gerald Galway
Associate Dean

Sent from my iPad

On Apr 29, 2014, at 4:49 PM, "Fletcher, Garth" <fletcher@mun.ca> wrote:

Colleagues: I have attached the Department of Ocean Sciences proposal for a Minor in Oceanography for you to review prior its submission to the Faculty of Science Undergraduate Studies Committee. Please send me your thoughts on this proposal as soon as you are able.
Best regards
Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
0 Marine Lab Road
St John’s NL
Canada
A1C 5S7

Tel: 709-864-3276
Fax: 709-864-3220
October 6, 2014

TO: All Members, Faculty Council of Science
FROM: Joan Burry, Secretary
        Committee on Undergraduate Studies, Faculty of Science
SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on September 26, 2014, the Undergraduate Studies Committee of the Faculty of Science agreed that the following new program proposals and Calendar changes be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Revisions to Computation Chemistry major and honours major programs

2. Department of Ocean Sciences
   (i) New minor program in Oceanography
   (ii) New minor program in Sustainable Aquaculture and Fisheries Ecology

Joan Burry
Associate Registrar and
Secretary, Committee on Undergraduate Studies,
Faculty of Science
Proposal for a New Program

Minor in Sustainable Aquaculture and Fisheries Ecology

Resource Implications: Instructional Costs

The proposed program does not require any new instructional costs beyond those associated with the laboratory component of OCSC 3000: Aquaculture Principles and Practices. The five core courses for the minor: OCSC 1000 Exploration of the World Ocean, OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture, OCSC 3000 Aquaculture Principles and Practices, OCSC 3002 Aquaculture and Fisheries Biotechnology, and BIOL 4750 Fisheries Ecology have all been approved at least up to level of the Council of the Faculty of Science on or before 19 March 2014.

Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

The costs associated with new program/courses can be met from within the existing budget allocation.

Signature of Unit Head (if appropriate):

Date:

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

Date:
EXECUTIVE SUMMARY

Fisheries and aquaculture play a key role in providing food and livelihoods worldwide. The science surrounding these linked activities has become an ever more challenging and varied field of study as their management has become increasingly diverse. Fisheries science, for example, now aims to incorporate a much broader understanding of not only the fished species, but also the effects of fisheries on ecosystems and the economic and social implications of the activity. Aquaculture, which continues to be the fastest growing food sector, has also evolved in terms of technological innovation and adaptation to meet changing requirements. There is much scope to improve the management of fisheries and aquaculture and the way we utilize the marine environment. This minor in Sustainable Aquaculture and Fisheries Ecology (SAFE) will expose students to aquaculture and fisheries management practices and help prepare them for a career as a developer, technologist, or researcher. This is an interdisciplinary minor program to be administered by the Department of Ocean Sciences in consultation with the Marine Institute. It is intended primarily for any student in the Faculty of Science but would be open to students in other faculties.

DEMAND FOR PROGRAM

Capture fisheries and aquaculture production are important contributors to the world’s food supply. Capture fisheries require management to avoid decline, while aquaculture must be effectively managed to increase production. Aquaculture production is expanding faster than agriculture or fisheries production and it has been identified as an important social and economic priority for the federal and provincial governments. There is a large demand for leaders, managers, researchers and highly skilled workers in the aquaculture sector across Canada and around the world. As we domesticate aquatic animals in the process of transiting from hunting to farming, aquaculture is increasingly interacting with fisheries at both a biological and socio-economic level. For example, about a third of the landings from fisheries are used for the production of fishmeal and fish oil which provide essential feed ingredients for many aquaculture species. This program aims to provide a broad understanding of not only the fished or farmed species, but also the effects of fisheries and aquaculture on ecosystems.
BENEFITS TO STUDENTS

This minor will provide the student with the biological underpinnings to understand the interactions between aquaculture and fisheries and their importance in terms of food security, environmental sustainability and resource use efficiency. Students will also learn the theory and applications of biotechnology in aquaculture and fisheries research and they will acquire hands-on experience with fish husbandry. With this minor, students will be well positioned to participate in the fishing and rapidly expanding aquaculture industries in Newfoundland and Labrador and beyond and to enter graduate programs in these fields.

CONSULTATIONS

The e-mail sent to other academic units seeking consultation as well as those received back from units consulted are appended at the end of this document.

PROGRAM TITLE: Minor in Sustainable Aquaculture and Fisheries Ecology

COURSE ADDITIONS

The five core courses for the minor: OCSC 1000 Exploration of the World Ocean, OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture, OCSC 3000 Aquaculture Principles and Practices, OCSC 3002 Aquaculture and Fisheries Biotechnology, and BIOL 4750 Fisheries Ecology (or GEOG 4300: World Fisheries: Current Discourse and Future Directions) have all been approved at least up to level of the Council of the Faculty of Science on or before 19 March 2014.

CALENDAR ENTRY

Students who take a minor in Aquaculture and Fisheries 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, 4000, 4122, 4601
4. One of Biology 2122, 3401, 3640, 3715, 4251, 4605
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.
Program Title

Minor in Sustainable Aquaculture and Fisheries Ecology

Summary of Changes

This proposal organizes a series of new Ocean Sciences courses which have been approved at least up to level of the Council of the Faculty of Science into a minor. This interdisciplinary minor program is intended primarily for any student in the Faculty of Science but would be open to students in other faculties.

Consultations Sought on 23 April 2014 From

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Library Report Received

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 1: Courses for the Minor

There are five compulsory courses

OCSC 1000: Exploration of the World Ocean
Exploration of the World Ocean is an introductory course covering the major ocean sciences (biology, chemistry, geology, physics) at a level sufficient for science majors but accessible to non-science majors. It explores phenomena occurring from the shoreline to the abyss and from equatorial to polar regions. It also examines principles of marine ecology as well as how the marine environment affects humans and vice versa. The course is offered in a blended format that combines face-to-face lectures and online interactive activities in the form of virtual oceanographic expeditions.

OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture
This course introduces students to the breadth of aquaculture and fisheries science and the variety of animal species cultured and harvested. Basic aspects of aquaculture and fisheries and the links between the two are covered, including production systems, capture fisheries, environmental interactions, and the physiology, ecology and reproduction of finfish and shellfish in the context of their culture and harvest.
PR: OCSC 1000 or BIOL 1002 Principles of Biology

OCSC 3000: Aquaculture Principles and Practices
This course will emphasize the techniques and methods used to culture finfish and shellfish, with a primary focus on Canadian aquaculture species. Basic aspects of aquaculture will be covered, including the design and maintenance of production systems, culture techniques, and the nutrition, health, physiology and reproduction of finfish and shellfish. The laboratory portion of this course will provide students with practical experience in the maintenance of land-based aquaculture production systems and in the husbandry/culture of aquatic organisms.
PR: OCSC 2001, or OCSC 1000 and BIOL 1002.

OCSC 3002: Aquaculture and Fisheries Biotechnology
Aquaculture and Fisheries Biotechnology is an introduction to biotechnology and genetics as they are applied to aquaculture and fisheries. Topics covered include genetic variation; genetic structure of fish and shellfish populations; the genetic basis of aquaculture traits; finfish and shellfish genomic research; marker-assisted selection in aquaculture; manipulation of ploidy; genetic engineering in aquaculture; and techniques used to study the responses of aquatic animals to external stressors such as hypoxia, temperature stress, acidification, and pathogens.
PR: Biology 2250, 2060 [we will request to have this changed to Biology 2250 or Biochemistry 2100]
BIOL 4750: Fisheries Ecology (taught by Ocean Sciences Faculty)
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.
PR: BIOL 2600 [the request to have this changed to BIOL 2600 or OCSC1000 and OCSC 2001 has been denied by Biology so we are supplying an alternative below]

Alternatively -

GEOG 4300: World Fisheries: Current Discourse and Future Directions
World Fisheries is a seminar course on the 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.
PR: 6 credit hours in Geography at the 3000-level or permission of Head of Department. It is strongly recommended that GEOG 3222 and 3226 be completed before registration in 4000-level courses.

There are four elective courses from Ocean Sciences

OCSC 2000 Introductory Biological Oceanography
Introductory Biological Oceanography provides a general understanding of the biological processes that occur in coastal and oceanic environments. It introduces students to the major groups of bacteria, phytoplankton, invertebrates and fish, emphasizing the biotic and abiotic factors controlling primary production and marine biomass. It shows how the physical, chemical, and geological environments interact with biology to define processes and patterns affecting nutrients and life in marine ecosystems.
PR: OCSC1000

OCSC 4122: Advanced Studies in Marine Animal Diversity (same as BIOL 4122)
Advanced Studies in Marine Animal Diversity provides an in-depth examination of cellular, physiological, behavioural and ecological adaptations in marine animals. Lectures will be combined with discussions of relevant papers from the primary literature on topics of current interest which may relate morphology, ecology, evolution, natural history, species interactions and practical applications. Students will also gain hands-on experience by designing and conducting research projects involving live or preserved animals.
PR: Biology 2122, 2600 and 2900

OCSC 4601: Functional Biology of Fish (same as BIOL 4601)
Functional Biology of Fish is an introduction to anatomical physiological and cellular processes in the life cycle of fishes.
OCSC 4000: Scientific Diving Methods

Scientific Diving Methods is an in-depth study and application of methods routinely employed for data collection in underwater scientific research. Aspects covered include habitat mapping; installation and use of instrumentation; still and video camera techniques; planning and execution of surveys and experiments in major subtidal habitats; as well as data analysis and interpretation. Participants are trained in accordance with Memorial University of Newfoundland’s Guide for Diving Safety and the Canadian Association for Underwater Science (CAUS) standards to meet the criteria for Scientific Diver I rating. This course is normally offered at the Bonne Bay Marine Station in a special 2-week session at the beginning or end of the spring semester depending on station’s availability.

PR: Biology 2122, Biology 2600, STAT 2550 (or approval by instructor), nationally recognized advanced level SCUBA certification with diver rescue and accident management techniques.

Choices from Biology

2122 Biology of Invertebrates
PR: BIOL 1001 and 1002

3401 Comparative Animal Physiology
PR: BIOL 2060 and 2210 and Biochemistry 3106

3640 Environmental Physiology of Animals
PR: BIOL 2060 and 2210; Biochemistry 3106

3715 Ecology and Evolution of Fishes
PR: BIOL 2600 and 2900

4251 Genomics
PR: BIOL 2060, 2250

4605 Quantitative Methods
PR: Statistics 2550

3715 Ecology and Evolution of Fishes
PR: BIOL 2600 and 2900

Note: All Biochemistry Majors need to take Biochemistry 3106 as well as Biology 1001 and 1002
Choices from Biochemistry

3107 Nucleic Acid Biochemistry and Molecular Biology
PR: BIOC 2101; and BIOC 2100 or Biology 2250

3402 Food Chemistry
PR: BIOC 2005; BIOC 2101; Chemistry 2440 or Chemistry 2401

4002 Biochemical Regulation
PR: BIOC 2100 or Biology 2250; BIOC 3106

4101 Proteins
PR: BIOC 3105

4104 Eukaryotic Gene Regulation and Developmental Biology
PR: BIOC 3107 or 3108

4105 Immunology
PR: BIOC 2101, and either BIOC 311B or Medicine 310B

4200 Bioenergetics and Biological Oxidation
PR: BIOC 3106

4201 Membranes - Structure and Function
PR: BIOC 3105

Note: All Biology Majors need to take Biology 2250 as well as Biochemistry 2101 and 3106.
Appendix 2: Consultations

Comments from Biology
From: Karen Morris [mailto:morrisk@mun.ca]
Sent: June-19-14 9:35 AM
To: Fletcher, Garth
Cc: Marino, Paul
Subject: New Program Proposal . Minor in Sustainable Aquaculture and Fisheries Ecology

Hi Garth,

The Proposal for a New Program Minor in Oceanography was reviewed at a departmental meeting May 22, 2014.

It was felt by many that the proposal should be broken down into two separate minors; one in Sustainable Aquaculture and the other in Fisheries Ecology, as they are conceptually somewhat different.

If there was a separation then it may also be easier to see a rational for the choice of courses from Biology as listed under “calendar entry” # 3 and suggest other courses that are offered by Biology that may be a better fit than the ones suggested. It may also lead to additional course suggestions such as Biology 3715 (Ecology and Evolution of Fishes) and others related to Fisheries Ecology.

Another concern that was raised relates to the Biology courses required and suggested (some of which are cross-listed with OCSC) and the prerequisites required.

Since all Biology courses require at a minimum Biology 1001 and 1002 this needs to be reiterated as well as an advisory to check the prerequisites for all Biology course that are suggested and/or required. This includes Biology 4750 (a course that has been offered by Biology for more than 20 years). The prerequisites for this course are Biology 2600 (Biology 1001 & 1002 are prerequisites for Biology 2600). There will be no change in this prerequisite requirement. Indeed, all upper level ecology courses in Biology have Biology 2600 (General Ecology) as their prerequisite and there is no logical reason as to why this course should be different. Moreover, the two upper level Ocean Sciences courses in the general area of ecology (OCSC 4122 and OCSC 4000) both have BIOL 2600 listed as their prerequisite thus, students in the program will be taking BIOL 2600 anyway as well as its associated prerequisites of BIOL 1001 and BIOL 1002.

If you have any questions please let me know.
Thanks
Karen

Karen Morris
Undergraduate Officer
Dept. of Biology
Memorial University of Newfoundland
St. John’s, NL A1B 3X9
709-864-8021
Responses to Biology
From: Fletcher, Garth
Sent: Monday, July 28, 2014 2:51 PM
To: Karen Morris
Cc: Parrish, Chris

Hi Karen:

We have now received and collated comments from about half the units we consulted. The suggestion about splitting the minor is reasonable, but for the moment we prefer to keep the two fields together as they are linked at several levels. We will nonetheless include Biology 3715 as you suggest. As to the prerequisite issue, it is unfortunate that once again Biology will not consider revising the prerequisites in order to make the course accessible to students other than biology students. Again this is a course taught by Ocean Sciences faculty and again we discussed it with the instructor first. As a consequence we have added an alternative to Fisheries Ecology for the moment. In addition, on the advice of a long time instructor in the Biology department we will be increasing prerequisite flexibility in OCSC courses.

Best regards

Garth

Comments from Engineering
From: Engineering Consultations [mailto:engrconsult@MUN.CA]
Sent: May-22-14 9:32 AM
To: Fletcher, Garth
Cc: Fisher, Andrew; Edmunds, Jayde; Glyn George
Subject: Re: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Thank you for the opportunity to comment on the proposed Calendar changes for the introduction of 1) a Minor in Oceanography and 2) a Minor in Sustainable Aquaculture and Fisheries Ecology

At its regular meeting of 2014 May 21 the Committee on Undergraduate Studies for the Faculty of Engineering and Applied Science found no impact on our programs from either of these two sets of proposed Calendar changes.

I wish you well in the development of these two minors.

Dr. Glyn George, Chair
Committee on Undergraduate Studies
Faculty of Engineering and Applied Science Memorial University of Newfoundland
http://www.engr.mun.ca/~ggeorge

Comments from the Queen Elizabeth II Library
19 May 2014

To: Garth Fletcher  Department of Ocean Sciences

From: Erin Alcock,  Science Research Liaison Librarian

Subject: Minor in Sustainable Aquaculture and Fisheries Ecology

I have reviewed the proposal for the minor in Sustainable Aquaculture and Fisheries Ecology, and have determined that the Memorial University Library system has ample resources to support this program.

The summary of library holdings below indicates monograph titles in this subject areas, held both in the Queen Elizabeth II Library and the C.R. Barrett Library, as well as, more than sufficient coverage from article indexes. Any additional resources required could be purchased under allocations for biology, physics and physical oceanography, the Marine Institute Library and other appropriate funds. The major journals in this area are well covered.

Library Holdings Summary

Table One: General Programme Subject Themes

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*as of date of memo

Table Two: Selected Article Indexes and Databases

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<tr>
<td>ASFA: Aquatic Science and Fisheries Abstracts</td>
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<tr>
<td>Biological Abstracts</td>
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</table>
Comments from the Marine Institute
From: Dawn King [mailto:Dawn.King@mi.mun.ca] On Behalf Of MIUG Consultations
Sent: May-15-14 12:12 PM
To: Fletcher, Garth
Cc: Derek Howse
Subject: RE: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Dr. Fletcher,

Thank you for the opportunity to review the proposed Minor in Sustainable Aquaculture and Fisheries Ecology. We believe the proposed curriculum will provide a good foundation for an actual Minor program in science, as we see it.

One of the Rationales given is to provide insight that may pique the interest of students to continue into fisheries or aquaculture graduate programs, and we feel this is a strong point of this particular proposed Minor program.

The Executive Summary and Rationale portions were written somewhat in an awkward fashion, and contained some inaccuracies / inconsistencies, so we have provided recommendations therein using track changes, for consideration by the OSC. We feel these edits will much improve the program proposal to Senate, and so we are happy to support it.

You will find in the attached our suggested edits to the document, including some formatting changes for consistency.

We wish you every success with this program.

Derek Howse

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

Fisheries and aquaculture play a key role in providing food and livelihoods worldwide. The science surrounding these linked activities has become an ever more challenging and varied field of study as their management has become increasingly diverse. Fisheries and aquaculture science, for example, now aims to incorporate a much broader understanding of not only the fished or farmed species, but also the effects of fisheries and aquaculture on ecosystems and the economic and social implications of these activities. There is opportunity to improve the management of fisheries and aquaculture and the way we utilize the marine environment. This
minor in Sustainable Aquaculture and Fisheries Ecology will help expose students to many important aspects of aquaculture or fisheries management and may spur interest in a career as a developer, technologist, or researcher.

Capture fisheries and aquaculture production are important contributors to the world’s food supply. Capture fisheries require management to avoid decline, while aquaculture must be effectively managed to increase production. Aquaculture production is expanding faster than agriculture or fisheries production and has been identified as an important social and economic priority for the federal and provincial governments of Canada, and indeed the United Nations. There is a large demand for leaders, managers, and researchers in the aquaculture sector across Canada and around the world. As it expands, aquaculture is increasingly interacting with fisheries at both a biological and socio-economic level. This minor will provide the student with the biological underpinnings to understand the interactions between aquaculture and fisheries and their importance in terms of food security, environmental sustainability and resource use efficiency. Students will also learn the theory and applications of biotechnology in aquaculture and fisheries research and they will acquire hands-on experience with fish husbandry. With this minor, students will be well positioned to either participate in the aquaculture and fishing industries in Newfoundland and Labrador and beyond or to search out graduate study opportunities in these exciting and innovative fields.

**Responses to the Marine Institute**

**From:** Fletcher, Garth  
**Sent:** Monday, July 28, 2014 3:00 PM  
**To:** MIUG Consultations  
**Cc:** Parrish, Chris  
**Subject:** RE: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Thanks for your comments Derek: We have now received and collated the comments from about half the units we consulted. We are grateful for the extensive editing by the Marine Institute. We have carefully considered all the suggestions in the Executive Summary and Rationale and have incorporated many of them.

Best regards

Garth

**Comments from Biochemistry**

-----Original Message-----

**From:** Biochemistry Head  
**Sent:** May-05-14 3:03 PM  
**To:** Fletcher, Garth  
**Subject:** RE: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Garth,
With the understanding that entry into the biochemistry courses in your list would necessitate completion of 1-3 other biochemistry courses, we would be OK with this proposed program. The numbers will not likely cause us any problem.

Phil

Philip J. Davis
Professor and Head
Department of Biochemistry
Memorial University

Responses to Biochemistry
-----Original Message-----
From: Fletcher, Garth
Sent: May-05-14 3:18 PM
To: Biochemistry Head
Subject: RE: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Thanks Phil. I'm assuming you mean Biochem's prerequisites. Yes of course.

Best regards
Garth

Education
From: Galway, Gerald J.
Sent: April-24-14 11:35 AM
To: Fletcher, Garth
Subject: Re: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Dear Garth

We have reviewed your note and there are no obvious implications for the Faculty of Education related to the proposal for a Minor in Sustainable Aquaculture and Fisheries Ecology. Best wishes for a successful implementation.

In reading the proposal it occurs to me that our science and social studies education students would benefit from some exposure to this study area. Perhaps we could arrange a seminar on Aquaculture and visit to the Ocean Sciences Centre at some point.

Best regards,
Gerald

**
Dr. Gerald Galway
Associate Dean (Undergraduate Programs)
Associate Professor
Faculty of Education
Memorial University
St. John's, NL Canada, A1B 3X8
Tel 709.864.3315

ggalway@mun.ca
www.mun.ca/edc

**Math and Stats**
**From:** Math Consult [mailto:mathconsult@mun.ca]
**Sent:** April 23, 2014 4:03 PM
**To:** Fletcher, Garth
**Subject:** Re: Proposed Minor in Sustainable Aquaculture and Fisheries Ecology

Hello Dr. Fletcher:

The Department of Mathematics and Statistics has no objection to this proposal.

Harold Johnson, Undergraduate Officer in Mathematics
Department of Mathematics and Statistics

On 4/23/2014 1:43 PM, Fletcher, Garth wrote:
Colleagues: I have attached the Department of Ocean Sciences proposal for a Minor in Sustainable Aquaculture and Fisheries Ecology for you to review prior to its submission to the Faculty of Science Undergraduate Studies Committee. Please send me your thoughts on this proposal as soon as you are able.

Best regards

Garth

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
0 Marine Lab Road
St John's NL
Canada
A1C 5S7

Tel: 709-864-3276
Fax: 709-864-3220
## Committees

### COMMITTEES OF SCIENCE FACULTY COUNCIL

<table>
<thead>
<tr>
<th>Department</th>
<th>Undergraduate Studies</th>
<th>Graduate Studies</th>
<th>Nominating</th>
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### FACULTY OF SCIENCE AWARDS COMMITTEE

Tom Chapman (C), Christina Bottaro, Jie Xiao
# Representatives

**Representatives from Other Councils**

<table>
<thead>
<tr>
<th>Faculty/Institute</th>
<th>Name</th>
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<tr>
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<td>Sharon Penney</td>
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<td>Faculty of Business</td>
<td>Donna Stapleton</td>
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<td>Faculty of Engineering</td>
<td>Baiyu Zhang</td>
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<td>Amy Todd</td>
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<td>Nathan Cook</td>
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**Student Unions Representatives to Faculty Council**

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<tr>
<td>Faculty of Arts</td>
<td>Julissa Roncal</td>
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<td>Dawn Marshall</td>
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<td>J.C. Loredo-Osti, Kapil Tahlan</td>
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