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, March 19, 2014, at 1 p.m. in C-2045.

AGENDA

1. Regrets
2. Adoption of the Minutes of February 19, 2014
3. Business Arising from the Minutes
4. Correspondence: None
5. Reports of Standing Committees:
   A. Undergraduate Studies Committees:
   B. Graduate Studies Committee:
      a. Department of Biology, BIOL 7946, Field Sampling Approaches and Applied Statistical Philosophy, paper 5.B.a (4 pages). Approved by the committee and presented to council for information only.
   C. Nominating Committee: None
   D. Library Committee: None
6. Reports of Delegates from Other Councils
   Anna Hicks, DELTS Representative
7. Faculty of Science Strategic Plan - Annual Approval, paper 7 (5 pages).
8. Commemorating WWI: Bert Riggs, paper (19 pages)
   http://www.mun.ca/science/faculty_staff/faculty_council/agendas_minutes.php
10. Question Period
11. Adjournment
FACULTY OF SCIENCE
FACULTY COUNCIL OF SCIENCE
MINUTES OF MEETING OF FEBRUARY 19, 2014

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, February 19, 2014, at 1:00 p.m. in room C-2045.

FSC 2246

Present
Biochemistry
Mulligan, M.

Biology
Innes, D. Marino, P.

Chemistry
Flinn, C.

Computer Science
Banzhaf, W. Chen, Y.

Earth Sciences
Hanchar, J. Hodych, J.

Mathematics & Statistics
Loredo-Osti, J.C.

Physics & Physical Oceanography
de Young, B. Morrow, M.

Psychology
Malsbury, C. Martin, G.

Dean of Science Office
Abrahams, M. Foss, K. Rideout, J. Zedel, L.

Library
Alcock, E.

Undergraduate Students
Grant, D. Kennedy, S. Murphy, R.
FSC 2247  Regrets
Shannon Sullivan  Andy Foster
Norm Catto  Donna Stapleton
Nathan Cook  Dorothy Vaandering
Kayode Balogun

FSC 2248  Adoption of Minutes
It should be noted that Mike Morrow was present at the last meeting but was not listed as being present. Also, Brad de Young’s name was shown in the minutes as “de Young, D.” but should have been “de Young, B.” Moved: Minutes of the January 15 meeting be adopted as amended. (Sullivan/Fletcher). Carried. One abstention.

FSC 2249  Business Arising: None

FSC 2250  Correspondence: None

FSC 2251  Reports of Standing Committees:

A.  Undergraduate Studies Committee:
Report was presented by Charles Malsbury.


b.  Moved: Department of Ocean Sciences, proposal for new course, CHEM 2600/OCSC 2200, Introductory Chemical Oceanography (Malsbury/Marino). Carried.

B.  Graduate Studies Committee:
Report was presented by J.C. Loredo-Osti, Chair, Graduate Studies Committee.

a.  Moved: Department of Ocean Sciences, calendar changes, Marine Biology Graduate Program (Loredo-Osti/Marino). Carried. One abstention.

b.  Interdisciplinary Programs, special topics course, ENVS 6204, Forest Sector Transformation. Approved by the committee and included for information only.

C.  Nominating Committee: None

D.  Library Committee: None

FSC 2252  Reports of Delegates from Other Council:
Anna Hicks, DELTS Representative, was not able to attend so this item has been moved to the next meeting of council.
FSC 2253  **Faculty of Science Strategic Plan - Annual Approval**  
The Dean requested that this item be deferred to the next meeting of Council since attendance was low due to the midterm break. Some discussion did occur with comments made about the section on “Current Strengths and Emerging Opportunities in Research” and the need to expand the wording in the second paragraph to include other areas of emerging opportunity. Mention was also made of the section on engagement and what is meant by this term. The Dean confirmed that the Faculty defines it as the integration of the Faculty of Science with the public.

FSC 2254  **Faculty of Science Awards Committee**  
An ad-hoc committee has been established to assist with increasing the number of Science faculty members recognized by awards at the University, national and international levels. Committee members are Tom Chapman, Jie Xiao, and Christina Bottaro, representing the areas of Life, Formal, and Physical Sciences. A question was raised by a Graduate student representative of whether a graduate student could be added to the membership. The Dean wondered whether membership on this committee would benefit students but agreed that if there was interest then membership would not be denied.

FSC 2255  **Report of the Dean:**  
Presented by Mark Abrahams, Dean.

The Dean provided updates on a number of items that were discussed at our last council meeting. The first was teaching equivalency. As described, it was the Dean’s hope to move to a single teaching equivalency model for the Faculty of Science as opposed to the departmental based models that we are currently using. However, to do so requires modification of the current collective agreement that, it is understood, is not up for negotiation in the current round of collective bargaining. For that reason, we will remain with the existing model.

The proposal for the public education facility at Logy Bay was developed but, at the request of the university, was not submitted. The issue was that the university currently has no dedicated budget with which to support such an initiative. The Dean is continuing discussions with Hebron on this proposal to determine the best way forward.

The Dean had a town hall meeting with Science students. Primary discussions were about their participation in assisting fund raising for a Science Endowment Fund. This fund would be used to provide regular support for upgrades of equipment within our undergraduate teaching labs. Also discussed were the overall concepts for the core sciences building. At the request of the students, another student town hall meeting is planned for one week today (February 26) at 1 pm in the Science building, Room 3042.
FSC 2256 Question Period

FSC 2257 Adjournment:
The meeting adjourned at 1:15 p.m.
February 11, 2014

TO: All Members, Faculty Council of Science

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

SUBJECT: New Course Proposals

At a meeting held on February 7, 2014, the Undergraduate Studies Committee of the Faculty of Science agreed that the following new course proposals be forwarded to Faculty Council for approval:

1. Department of Ocean Sciences
   (i) OCSC 2000: Introductory Biological Oceanography
   (ii) OCSC 2001: Introduction to Sustainable Fisheries Aquaculture
   (iii) OCSC 3000: Aquaculture Principles and Practices

2. Department of Chemistry and Department of Ocean Sciences
   CHEM 2600/OCSC 2200: Introductory Chemical Oceanography

Joan Burry
Assistant Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal
New Course
OCSC 2000 Introductory Biological Oceanography

Executive Summary

This new course, Introductory Biological Oceanography, will be taught as one of the five core courses for the proposed Minor in Oceanography.

Resource Implications: Instructional Costs

This course will use the teaching resources currently available in the Department of Ocean Sciences.

No additional instructional resources are required. The course could be taught by members of the Department of Ocean Sciences, including Pat Gagnon, Iain McGaw, Richard Rivkin, Paul Snelgrove and others.

Library Holdings and/or Other Resources Required

The library already owns the supplementary textbooks, although sometimes in older editions, and has access to all of the major journals relevant to this discipline (see list under Library Holdings).

The costs associated with the proposed new course can be met by the existing budget allocation.

Signature of Unit Head: ________________________________

Date: ________________________________

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

Date: ________________________________
Sample Course Outline and Method of Evaluation

The proposed new course will be taught as a regular lecture course, with no laboratories. The first third of the course introduces students to the biology of marine organisms providing the groundwork for the subsequent more in-depth study of biological processes that occur in oceanic and coastal environments. The course outline is given below:

<table>
<thead>
<tr>
<th>Week</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ecological and evolutionary principles of marine biology.</td>
</tr>
<tr>
<td>2</td>
<td>Marine organisms: Function and environment.</td>
</tr>
<tr>
<td>3</td>
<td>Life in a fluid medium.</td>
</tr>
<tr>
<td>4</td>
<td>Reproduction, dispersal, and migration.</td>
</tr>
<tr>
<td>5</td>
<td>Food chains, energy flow, and the microbial loop.</td>
</tr>
<tr>
<td>6</td>
<td>Upwelling, nutrient and mineral cycling, planktonic food webs.</td>
</tr>
<tr>
<td>7</td>
<td>Phytoplankton dynamics and biogeography</td>
</tr>
<tr>
<td>8</td>
<td>Marine primary productivity.</td>
</tr>
<tr>
<td>9</td>
<td>Zooplankton morphology, physiology and population dynamics.</td>
</tr>
<tr>
<td>10</td>
<td>Zooplankton systematics and biogeography</td>
</tr>
<tr>
<td>11</td>
<td>Fisheries oceanography and production.</td>
</tr>
<tr>
<td>12</td>
<td>Benthic community ecology.</td>
</tr>
<tr>
<td>13</td>
<td>Global climate change and biological oceanography.</td>
</tr>
</tbody>
</table>
Evaluation:
Individual or small group projects 25%
Mid-term test 15%
Final examination 60%

Individual or small group projects (25%)
Describe the functional morphology, systematics, biogeography, and management issues of a family or superfamily of marine organisms. Five page summaries and five minute presentations.

Texts


Supplementary Texts (on reserve)


Instructors

SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title          OCSC 2000  Introductory Biological Oceanography
Abbreviated Course Title         Intro Biological Oceanography

Calendar Description

OCSC 2000 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

Rationale

The Department of Ocean Sciences requires the introduction of a new course as one of the five core courses in the proposed new Minor in Oceanography programme. The course builds directly on material covered in OCSC1000 and should provide an excellent background for students wishing to take BIOL3710 Biological Oceanography and/or BIOL3711 Principles of Marine Biology. We propose to include the latter two courses as electives in the Oceanography Minor programme.

Consultations Sought From                     Comments Received

Marine Institute                           No
Grenfell Campus                             No
Department of Biochemistry                  No
Department of Biology                       Yes
Department of Chemistry                     No
Department of Computer Sciences             No
Department of Economics                      No
Department of Geography                      No
Department of Mathematics and Statistics    No
Department of Ocean Sciences                 No
Department of Physics and Physical Oceanography No
Department of Psychology                     No
Faculty of Engineering and Applied Science   Yes
Faculty of Education                        No
Faculty of Arts                              No

Library Report Received                     Yes
Signature:  Dean, Associate Vice-President (Academic) or Vice-President

Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary:
Date:
Hi Karen: For the record here is our response to the Department of Biology’s concerns regarding our proposed Biological Oceanography course OCSC 2000.

Points 1 and 2: The description of the biological oceanography course is a standard description that would be common to any such second level course taught across North America. It introduces the student to the various groups of marine organisms and then shows how they interact with their environment. We cannot make this course any more basic because it builds on OCSC 1000 in which Modules 9 (Cradle of life) and 10 (Marine biodiversity) will have already introduced the students to microorganisms, seaweeds and marine animals and their classification. We have nonetheless now broadened our calendar description to include bacteria and nutrients which are not in the 3710 description:

OCSC 2000 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.

Points 3 and 4: Introductory Biological Oceanography builds on OCSC 1000 Exploration of the World Ocean in exactly the same way that Introductory Geological Oceanography builds on EASC 1000 Earth Systems. The prerequisite for OCSC 2000 Introductory Biological Oceanography is OCSC 1000 only; similarly that for OCSC 2200/EASC 2919 Introductory Geological Oceanography is EASC 1000 only. The reason for the physical and chemical oceanography courses having their respective first year courses as prerequisites is that they are common to majors in Biochemistry, Biology, Chemistry, Earth Sciences, Physics and Psychology (behavioural neuroscience). All require Mathematics 1000 and Chemistry 1010 and 1011 (or equivalent) or Physics 1020 and 1021 (or equivalent).

Proposals

Points 1 and 2:

The Dean has already indicated that he would prefer that 2nd and 3rd students not take the same oceanography lectures for credit simultaneously. Maintaining BIOL 3710 as is but cross-listing as OCSC 3710 with different prerequisites (OCSC 1000 and BIOL 2120 only) is certainly an option but this would introduce two extra labs for the minor. All the other 2nd year introductory oceanography classes have no labs. In addition we hope soon to start developing joint majors with biology and so having an upper level biological oceanography course will be essential to the Biology and Oceanography program. Our discussions with the Ocean Sciences faculty currently teaching BIOL 3710 indicate their willingness to raise the level of the content of this course.

Best regards

Garth
Hi Garth,

I am sorry that the response to the new course proposal for OCSC 2000 Biological Oceanography is so late. It was just discovered late yesterday afternoon at our BUGS meeting that this had been sent to Biology but it was missed and did not get to the committee until yesterday hence the very late response. So sorry.

Due to the lateness of the response I have also copied Joan Burry so she would have it for the Faculty of Science Undergraduate Studies Committee meeting tomorrow.

The Biology Undergraduate Studies Committee has reviewed the new course proposal for OCSC 2000 - Introductory Biological Oceanography. The committee has major concerns with the proposal.

1. The Calendar description as proposed:

   ...provides a general understanding of the biological processes that occur in coastal and oceanic environments. It introduces students to major groups of marine 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 in marine ecosystems.

   Is similar or the same as the one for Biology 3710:

3710 Biological Oceanography

is an introductory course in biotic and abiotic factors controlling marine biomass and primary production, emphasizing plankton and fishes. It introduces students to major groups of marine phytoplankton, zooplankton, and fishes, emphasizing how the physical, chemical, and geological environments interact with biology to define processes and pattern in marine organisms.

2. The course content as outlined in the course proposal covers much of the same material as the course content for Biology 3710.

3. The prerequisite proposed for the course (OCSC 1000) does not include first year Biology (Biology 1001 and 1002). We are concerned that students will not have the necessary background to be able to succeed in such a course.

4. OCSC 2000 Introductory Biological Oceanography is one of the 5 core courses being proposed for a minor in Oceanography it only makes sense that the prerequisites include Biology 1001 & 1002 as the other 2000 level introductory courses for the physical, chemical and geological oceanography all have their respective first year courses as prerequisites.

Please note that B1001/1002 are prerequisite to all Biology courses, including many that many that may be used to fulfill the other 3 courses for the minor in Oceanography.
The Biology Department proposes the following two options:

1. BIOL 3710 and OCSC 2000 could be offered together, with students enrolled in both courses attending the same lectures, but only BIOL 3710 students taking the lab. Prerequisites for OCSC 2000 could be BIOL 1001 & 1002 and OCSC 1000 while those for BIOL 3710 would remain as BIOL 2122 and 2600. A credit restriction would need to be added to each course if OCSC 2000 is approved.

With the credit restrictions, Biology 3710 could be used to satisfy the OCSC 2000 requirement for the minor.

2. Alternatively, if the intent for OSCS 2000 is to provide a basic coverage of biological oceanography for non biology students, then it could be designated as such and offered as a completely separate course from BIOL 3710 [similar to the existing BIOL 2120 (Biology for students of earth sciences), which has a credit restriction for BIOL 1001 and 1002]. Biology students taking the oceanography minor could be required to take BIOL 3710 instead of OCSC 2000.

I regret that this is so late.
Thanks
Karen

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

-----Original Message-----
From: Engineering Consultations [mailto:engrconsult@mun.ca]
Sent: November-29-13 2:33 PM
To: Fletcher, Garth
Cc: Edmunds, Jayde; Fisher, Andrew; Glyn George; Geoff Rideout
Subject: Re: Consultation Requests OCSC 2000, 2001, 2300 & 3000

Thank you Dr. Fletcher for the opportunity to comment on the proposed Calendar changes for the four new courses OCSC 2000, 2001, 2300 and 3000.

As Chair of the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, I can report that these proposed changes have no impact on the Faculty.

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: Fletcher, Garth
Sent: Monday, November 25, 2013 1:46 PM
To: bdeyoung@mun.ca; Biochemistry Head; Burry, Joan; chemhead@mun.ca; cs-chair@mun.ca; Engineering; Geography; gjenner@mun.ca; Library; Marino, Paul; mathconsult@mun.ca; miugconsultations@mi.mun.ca; Parrish, Chris; Psychology.Head@mun.ca; Taylor-Harding, Dianne; vpoffice@grenfell.mun.ca
Cc: Parrish, Chris; Burry, Joan; Dean of Science
Subject: New course proposal
Colleagues, please find attached a new course proposal for OCSC 2000 Introductory Biological Oceanography. This course has been developed as one of the five core courses in a new Minor in Oceanography. Please review and forward comments to me at your earliest convenience.

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
AI C 5S7

Tel: 709-864-3276
Fax: 709-864-3220
10 February 2014

To: Garth Fletcher Department of Ocean Sciences

From: Erin Alcock, Science Research Liaison Librarian

Subject: New Course Proposal, OCSC 2000

Upon review of the new course proposal for OCSC 2000 – Introductory Biological Oceanography, I have determined that Memorial University Library system has more than sufficient resources to support the objectives of this course.

The summary of library holdings below indicates numerous appropriate monograph titles, held both in the Queen Elizabeth II Library and the C.R. Barrett Library, as well as, more than sufficient coverage from article indexes. As stated in the proposal, the library has many of the supplemental textbooks, and while some of them might be older editions, they could easily be updated under existing budget allocations. Additional resources 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 Course Subject Themes

<table>
<thead>
<tr>
<th>Course Topic</th>
<th>LCSH</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biol$ AND coastal</td>
<td>79</td>
<td>877</td>
</tr>
<tr>
<td>Biol$ AND ocean$</td>
<td>414</td>
<td>2873</td>
</tr>
<tr>
<td>Marine AND phytoplankton</td>
<td>111</td>
<td>238</td>
</tr>
<tr>
<td>Marine AND invert$</td>
<td>174</td>
<td>357</td>
</tr>
<tr>
<td>Marine AND fish$</td>
<td>1308</td>
<td>7616</td>
</tr>
<tr>
<td>Marine AND primary production</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Marine AND biomass</td>
<td></td>
<td>108</td>
</tr>
</tbody>
</table>

*as of date of memo

Table Two: Selected Article Indexes and Databases

<table>
<thead>
<tr>
<th>Article Indexes and Databases</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASFA: Aquatic Science and Fisheries Abstracts</td>
</tr>
<tr>
<td>Biological Abstracts</td>
</tr>
<tr>
<td>CAB Abstracts</td>
</tr>
<tr>
<td>Scopus</td>
</tr>
<tr>
<td>Web of Science</td>
</tr>
</tbody>
</table>
February 11, 2014

TO: All Members, Faculty Council of Science

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

SUBJECT: New Course Proposals

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   (iii) OCSC 3000: Aquaculture Principles and Practices

2. Department of Chemistry and Department of Ocean Sciences
   CHEM 2600/OCSC 2200: Introductory Chemical Oceanography

Joan Burry
Assistant Registrar and
Secretary, Committee
on Undergraduate Studies,
Faculty of Science
Proposal
New Course
OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture

Executive Summary

This new course, Introduction to Sustainable Fisheries and Aquaculture, will be taught as one of the four core courses for the Minor in Aquaculture and Fisheries.

Resource Implications: Instructional Costs

This course will use the teaching resources currently available in the Department of Ocean Sciences.

No additional instructional resources are required. The course will be taught by members of the Department of Ocean Sciences, including Ian Fleming and Iain McGaw, and others.

Library Holdings and/or Other Resources Required

The library already owns the supplementary textbooks and has access to all of the major journals relevant to this discipline. We are investigating whether the publisher will put together a mixed text book for us.

The costs associated with the proposed new course can be met by the existing budget allocation.

Any other costs associated with new program/course(s) can be met from within the existing budget allocation or authorized new funding for the Faculty of Science.

Signature of Dean/Director/
Principal/Executive Director:

Date:
Course Outline and Method of Evaluation
The course covers sustainable methods for wild fisheries and sustainable aquaculture programs. Starting with the fundamental basis of overfishing and stock conservation, the course explores the various aspects and the ecological implications of creating a sustained fishery. The second part of the course explores the basic principles of aquaculture in different environments and looks at a few case studies of successful operations in detail.

Upon completion of the course students should have an understanding of basic principles of conserving existing fisheries and different sustainable methods of fish farming.

There will be two, 1.25 hour lectures per week. Course evaluation will come in the form of three or four written tests and a class paper.

A tentative schedule of the topics to be covered in class is listed below.

<table>
<thead>
<tr>
<th>Week</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fisheries of the world</td>
</tr>
<tr>
<td>2</td>
<td>Fish production</td>
</tr>
<tr>
<td>3</td>
<td>Fishing methods</td>
</tr>
<tr>
<td>4</td>
<td>Environmental impacts of fishing</td>
</tr>
<tr>
<td>5</td>
<td>Sustainability and fisheries</td>
</tr>
<tr>
<td>6</td>
<td>Fish stock assessment &amp; socioeconomics</td>
</tr>
<tr>
<td>7</td>
<td>Fishery management</td>
</tr>
<tr>
<td>8</td>
<td>Environmental effects of aquaculture</td>
</tr>
<tr>
<td>9</td>
<td>Sustainable marine aquaculture</td>
</tr>
<tr>
<td>10</td>
<td>Sustainable rural aquaculture</td>
</tr>
<tr>
<td>11</td>
<td>Sustainable urban aquaculture</td>
</tr>
<tr>
<td>12</td>
<td>Case study - carp and tilapia</td>
</tr>
<tr>
<td>13</td>
<td>Case study crayfish and bivalves</td>
</tr>
</tbody>
</table>
Evaluation:
Mid term test 1 20%
Mid-term test 2 20%
Mid term test 3 20%
Final examination 25%
Take home paper 15%

Texts

Custom designed text on “Sustainable fisheries and aquaculture” from J Wiley Publishers

Supplementary Texts (on reserve)


Principles of Sustainable Aquaculture by Stuart W. Bunting 302 pages


Instructors

Joint teaching: Dr. Ian Fleming and Dr. Iain McGaw with guest lectures by Marine Institute instructors.
SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title 2001 Introduction to Sustainable Fisheries and Aquaculture
Abbreviated Course Title Intro Fisheries & Aquaculture

Calendar Description

OCSC 2001 Introduction to Sustainable Fisheries and Aquaculture 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 Biology 1002

Rationale

The Department of Ocean Sciences requires the introduction of a new course as one of the four core courses in the proposed new Minor in Aquaculture and Fisheries Programme.

Consultations Sought From

<table>
<thead>
<tr>
<th>Marine Institute</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grenfell campus</td>
<td>No</td>
</tr>
<tr>
<td>Department of Biochemistry</td>
<td>No</td>
</tr>
<tr>
<td>Department of Biology</td>
<td>Yes</td>
</tr>
<tr>
<td>Department of Chemistry</td>
<td>No</td>
</tr>
<tr>
<td>Department of Computer Sciences</td>
<td>No</td>
</tr>
<tr>
<td>Department of Economics</td>
<td>No</td>
</tr>
<tr>
<td>Department of Earth Sciences</td>
<td>No</td>
</tr>
<tr>
<td>Department of Geography</td>
<td>No</td>
</tr>
<tr>
<td>Department of Mathematics and Statistics</td>
<td>No</td>
</tr>
<tr>
<td>Department of Ocean Sciences</td>
<td>No</td>
</tr>
<tr>
<td>Department of Physics and physical Oceanography</td>
<td>No</td>
</tr>
<tr>
<td>Department of Psychology</td>
<td>No</td>
</tr>
<tr>
<td>Faculty of Engineering</td>
<td>Yes</td>
</tr>
<tr>
<td>Faculty of Business Administration</td>
<td>No</td>
</tr>
<tr>
<td>Faculty of Education</td>
<td>No</td>
</tr>
<tr>
<td>Faculty of Arts</td>
<td>No</td>
</tr>
</tbody>
</table>

Library Report Received

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

Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:
Marine Institute Correspondence

-----Original Message-----
From: Fletcher, Garth
Sent: January-23-14 1:48 PM
To: Derek Howse
Subject: RE: Two new course proposals

Dear Derek. Here is our response to Cyr's comments.

"The purpose of this introductory course is to introduce students to the breadth of issues surrounding sustainable fisheries and aquaculture. It is not the intention to delve into depth on these subjects, many of which are covered quantitatively in BIOL4750 Fisheries Ecology. It would seem a disservice to the students not to introduce them to the diversity that constitutes fisheries and aquaculture. Dr. Fleming, while at Oregon State University (2001-04), co-taught two courses covering fisheries management (touching on socioeconomic issues as well) – FW 420/520 Ecology and Management of Marine Fishes and FW 426/526 Coastal Ecology and Resource Management. He also has direct experience working with fisheries management issues – e.g., he worked for nearly 10 years as a research scientist for the Norwegian Institute of Nature Research (a semi-independent research arm of the Norwegian government; http://www.nina.no/ninaenglish/Start.aspx) that has the mandate to provide science for management. While at Oregon State University, Dr. Fleming was part of the Coastal Oregon Marine Experiment Station, which focuses on marine fisheries management, resource dynamics, ecology, economics, genetics, marketing and sustainability (see http://marineresearch.oregonstate.edu/). He has also recently sat on an expert panel and co-authored a report for the Royal Society of Canada entitled Sustaining Canadian Marine Biodiversity: responding to the challenges posed by climate change, fisheries, and aquaculture (http://rscsrc.ca/sites/default/files/pdf/RSC_MBD_1_3_25_Twenty-Five_EN_FORMAT.pdf), co-writing chapters on Canadian aquaculture and fisheries."

Best regards

Garth

-----Original Message-----
From: Derek Howse [mailto:Derek.Howse@mi.mun.ca]
Sent: January-23-14 6:50 AM
To: Fletcher, Garth
Cc: Cyr Couturier
Subject: FW: Two new course proposals

Garth,

I would invite you to review the further response from Cyr below. Perhaps further consultation between our Aquaculture unit and your own group would be in order to resolve any outstanding issues?

Derek

From: Cyr Couturier <Cyr.Couturier@mi.mun.ca<mailto:Cyr.Couturier@mi.mun.ca>>
Date: Wednesday, 22 January, 2014 4:16 PM
To: Derek Howse <derek.howse@mi.mun.ca<mailto:derek.howse@mi.mun.ca>>
Cc: Cyr Couturier <Cyr.Couturier@mi.mun.ca@mailto:Cyr.Couturier@mi.mun.ca>>
Subject: RE: Two new course proposals

Still does not address the content issues in OSC 2001....the inclusions of fisheries management and socioeconomics in an intro course on fisheries and aquaculture science still seems a little odd in my view.
.........and unless they have expertise in socioeconomics and fisheries management, I am fairly certain the proposed profs do not have actual FM backgrounds ....yes, Dr. Fleming has some experience teaching on the ecological aspects of fisheries biology, but fisheries management per se? I don't know as I have not seen a recent CV but that is my sense. Regardless, this content piece just seems out of place for this course, as I tried to indicate in my first note.

So, I think the course will be much better and more focused if they stick to the basics for this second year course, and not move into areas that are somewhat out of context for an Intro course in Fisheries and Aquaculture anyway.

For OSC 3000, the course “outline” was developed by one MI faculty member with one OSC faculty, and not a real joint effort.....to date. However, all I was pointing out was the need to clarify the content a bit and not focus on non-commercial species and to provide a good transition from year 1 and 2 level biology courses, that are prerequisites. In other words, the general outline looks fine but the actual course syllabus needs to be developed a bit more.

Feel free to pass these comments along to Dr. Fletcher and the UGSC.

Cyr

Cyr Couturier
Research Scientist and Chair, Aquaculture Programs Marine Institute of Memorial University Box 4920, St. John’s, NL Canada A1C 5R3
Tel: 1.709.778.0609
Cel: 1.709.691.9139
Fax: 1.709.778.0535
E-mail: cyr@mi.mun.ca@mailto:cyr@mi.mun.ca>

This electronic communication is governed by the terms and conditions at http://www.mun.ca/cc/policies/electronic_communications_disclaimer_2012.php

From: Derek Howse
Sent: Wednesday, January 22, 2014 3:29 PM
To: Cyr Couturier
Subject: FW: Two new course proposals

Cyr,

Do you feel any further response is required on this matter?

Derek

From: <Fletcher>, Garth <fletcher@mun.ca@mailto:fletcher@mun.ca>>
Date: Wednesday, 22 January, 2014 3:24 PM
To: Derek Howse <miugconsultations@mi.mun.ca><mailto:miugconsultations@mi.mun.ca>>
Cc: Derek Howse <derek.howse@mi.mun.ca><mailto:derek.howse@mi.mun.ca>>, "Parrish, Chris" <cparrish@mun.ca><mailto:cparrish@mun.ca>>
Subject: RE: Two new course proposals

Dear Derek: Thank you for forwarding Mr. Couturier's comments on OCSC2001 & 3000 which we see as being two of the required courses in the minor in Aquaculture and Fisheries that we are developing in consultation with the Marine Institute. The purpose of the 2nd year course is to introduce students to the breadth of sustainable fisheries and aquaculture, and Dr. Fleming has direct experience both teaching and working on fisheries management issues. The proposal for OCSC 3000 has already been developed in collaboration with the Marine Institute. We would also welcome MI participation in the OCSC 2001 course in the form of guest lectures.”

Best regards

Garth

From: Dawn King [mailto:Dawn.King@mi.mun.ca] On Behalf Of MIUG Consultations
Sent: December-23-13 10:30 AM
To: Fletcher, Garth
Cc: Derek Howse
Subject: RE: Two new course proposals

Dr. Fletcher,

Thank you for the opportunity to review the two proposed new courses OCSC2001 and 3000. I forwarded the course outlines for comment to our Aquaculture department here at the Marine Institute. The following are the comments received from Mr. Couturier and I would suggest follow up conversation directly with him.

Cyr Couturier
Research Scientist and Chair, Aquaculture Programs Marine Institute of Memorial University Box 4920, St. John’s, NL Canada A1C 5R3
Tel: 1.709.778.0609
Cel: 1.709.691.9139
Fax: 1.709.778.0535
E-mail: cyr@mi.mun.ca<mailto:cyr@mi.mun.ca>.

"Hi Derek,

You will find my comments on the two proposed new courses from the OSC in each of the attached, and summarized below:

OCSC2001:

- This is an introductory course to sustainable fisheries and aquaculture. However, there is a very broad range of topics proposed to be covered over 2 lectures per week for 13 weeks.
Topics 6 and 7 (stock assessment and socioeconomics, and fishery management) seem out of place in this course. This is not appropriate for a second year science course in my view.

These topics are actually covered in the Master of Marine Studies – Fishery Resource Management program. Moreover, under the Memorial University Act, I believe the MI is accorded the obligation and right to deliver applied fishery research AND program delivery, so these topics should be covered by MI personnel.

In addition, the proposed instructors do not have backgrounds in these topics from what I can discern, either in socioeconomics or fishery management. If they wish to include these topics in the syllabus, it would be advisable to have someone from MI School of Fisheries (CFER, aquaculture or fishery management) deliver these topics.

Some of this proposed course content is offered by MI diploma and advanced diploma programs and masters programs, so how do we deal with this?

OCSC3000:

Outline of the course looks good...

Some of the topics however, need to be developed ....for example, topic 1 covers history and economics, and one of the prerequisites is a Biology course. So, theoretically, a student with no background on the scope of aquaculture production globally or in Canada, will not get this from this course. The first topic would be much better covering production, economics, marketing and history.

Several of the topics covered in the proposed outline, are already covered in a variety of AQUA courses at the MI, and this applies to the labs as well (about 324 of those). Would it not be better to have students in this course / program take those sections offered at the MI in the MISA program, rather overlap?

It is not clear from the proposed outline of topics that the course will focus on Canadian species of commercial importance or not?.....The course description suggests it will but I could see it easily go into marine finfish production which with one exception, is relegated to BC (sablefish). The emphasis in these topics (broodstock and finfish culture) should be the salmonids, followed by say sturgeon, and then one small example of a marine finfish – sablefish, for example. It would be inappropriate to use cod for most examples in this course as it is not commercial nor is it being pursued as such most anywhere in the world.

So, in short, there are some overlaps in our programs with both OCSC2001 and OCSC3000, but I think if the MI faculty are included in the teaching of OCSC 3000 lectures and labs mostly, this would cover this concern.

For the OCSC2001 course, some structure changes are needed, and I am not certain the faculty proposed to teach the outline as it is now, are able to deliver some of the content they propose, and primarily the management and socioeconomic aspects."

Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0586
FAX: 709-778-0394
Colleagues please find attached proposals for OCSC 2001 and OCSC 3000. These courses have been developed as two of the four core courses for a Minor in Aquaculture and Fisheries. Please send any comments you may have to me at your earliest convenience.

Best regards

Garth

PS my apologies for forgetting to include the attachments in my last email on this subject.

Garth L. Fletcher
Head and Professor Emeritus
Department of Ocean Sciences
Ocean Sciences Centre
0 Marine Lab Road
St John’s NL
Canada
AiC 557

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

Department of Biology Correspondence

Dear Karen,

Thank you for your comments on our proposal for OCSC 2001 & 3000. We have discussed the request for a credit restriction with Biology 4750 with the Ocean Sciences faculty member who delivers the course. Joe Wroblewski feels there is only minimal overlap between the courses and that in fact, OCSC 2001 would make an excellent preparatory course for Biology 4750. In addition we are hoping to have Biology 4750 as an important required course in the Minor in Aquaculture and Fisheries that we are developing and so credit restriction would eliminate it from the minor. Therefore we do not agree to putting a credit restriction on BIOL 4750 for OCSC 2001.

Best regards

Garth
Hi Garth,

The Biology Undergraduate Studies Committee reviewed the two new course proposals for inclusion in the planned new minor in Aquaculture and Fisheries. We have no issues or concerns regarding the proposal for OCSC3000, we do however note that the topics to be covered in OCSC 2001- Introduction to Sustainable Fisheries and Aquaculture are for the most part, ones that are covered in Biology 4750 Fisheries Ecology.

Based on the information contained in the proposal for OCSC2001- Introduction to Sustainable Fisheries and Aquaculture we request that a credit restriction of Biology 4750 be added to the calendar description for OCSC 2001.

Thanks
Karen

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

On 26/11/2013 1:26 PM, Marino, Paul wrote:

From: Fletcher, Garth
Sent: November 25, 2013 4:31 PM
To: Marland, Alex; Biochemistry Head; 'Brad de Young'; Business Undergrad Help; 'cs-chair@mun.ca'; Economics (wlocke@mun.ca); Galway, Gerald J.; Engineering; Alcock, Erin; Geography; 'glenner@mun.ca'; 'Ian Neath'; Marino, Paul; 'mathconsult@mun.ca'; 'miugconsultations@mi.mun.ca'; 'Peter Pickup, Chemistry'; Taylor-Harding, Dianne; 'vpoffice@grenfell.mun.ca'
Cc: Parrish, Chris; Dean of Science
Subject: Two new course proposals

Colleagues please find attached proposals for OCSC 2001 and OCSC 3000. These courses have been developed as two of the four core courses for a Minor in Aquaculture and Fisheries. Please send any comments you may have to me at your earliest convenience.

Best regards

Garth

Faculty of Engineering Correspondence
-----Original Message-----
From: Engineering Consultations [mailto:engrconsult@mun.ca]
Sent: November-29-13 2:33 PM
To: Fletcher, Garth
Cc: Edmunds, Jayde; Fisher, Andrew; Glyn George; Geoff Rideout
Subject: Re: Consultation Requests OCSC 2000, 2001, 2300 & 3000

Thank you Dr. Fletcher for the opportunity to comment on the proposed Calendar changes for the four new courses OCSC 2000, 2001, 2300 and 3000.

As Chair of the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science, I can report that these proposed changes have no impact on the Faculty.

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: Fletcher, Garth
Sent: Monday, November 25, 2013 1:46 PM
To: bdeyoung@mun.ca; Biochemistry Head; Burry, Joan; chemhead@mun.ca; cs-chair@mun.ca; Engineering; Geography; gjenner@mun.ca; Library; Marino, Paul; mathconsult@mun.ca; miugconsultations@mi.mun.ca; Parrish, Chris; Psychology.Head@mun.ca; Taylor-Harding, Dianne; vpooffice@grenfell.mun.ca
Cc: Parrish, Chris; Burry, Joan; Dean of Science
Subject: New course proposal

Colleagues, please find attached a new course proposal for OCSC 2000 Introductory Biological Oceanography. This course has been developed as one of the five core courses in a new Minor in Oceanography. Please review and forward comments to me at your earliest convenience.

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
AiC 5S7

Tel: 709-864-3276
Fax: 709-864-3220
10 February 2014

To: Garth Fletcher  Department of Ocean Sciences

From: Erin Alcock,  Science Research Liaison Librarian

Subject: New Course Proposal, OCSC 2001

Upon review of the new course proposal for OCSC 2001 – Introduction to Sustainable Fisheries and Aquaculture, I have determined that Memorial University Library system has sufficient resources to support the course objectives.

The summary of library holdings below indicates a large number of monograph titles in this subject area, 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 Course Subject Themes

<table>
<thead>
<tr>
<th>Course Topic</th>
<th>LCSH</th>
<th>Keywords</th>
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<tbody>
<tr>
<td>Fish AND production</td>
<td>16</td>
<td>1120</td>
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<tr>
<td>Fish AND method$</td>
<td>200</td>
<td>2238</td>
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<tr>
<td>Environ$ AND Fish$</td>
<td>803</td>
<td>4857</td>
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<tr>
<td>Sustain$ AND Fish$</td>
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<td>1024</td>
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<tr>
<td>Fish$ AND stock assess$</td>
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<td>1901</td>
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<td>35</td>
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<tr>
<td>Sustain$ AND aquacult$ AND urban</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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<tbody>
<tr>
<td>ASFA: Aquatic Science and Fisheries Abstracts</td>
</tr>
<tr>
<td>Biological Abstracts</td>
</tr>
<tr>
<td>CAB Abstracts</td>
</tr>
<tr>
<td>Scopus</td>
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<tr>
<td>Web of Science</td>
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</tbody>
</table>
Request for Approval of a Graduate Course

Adobe Reader, minimum version 8, is required to complete this form. Download the latest version: http://get.adobe.com/reader; (1) Save the form by clicking on the diskette icon on the upper left side of the screen; (2) Ensure that you are saving the file in PDF format; (3) Specify where you would like to save the file, e.g. Desktop; (4) Fill in the required data and save the file; (5) Submit the completed form to:

School of Graduate Studies: Memorial University of Newfoundland; IIC-2012 (Bruneau Centre for Research and Innovation); St. John’s, NL A1C 5S7 Canada  Fax: 709.864.4702  eMail: sgs@mun.ca

To: Dean, School of Graduate Studies
From: Faculty/School/Department/Program
Subject: □ Regular Course  ☑ Special/Selected Topics Course

Course No.: Biology 7946
Course Title: Field sampling approaches and applied statistical philosophy

I. To be completed for all requests:

A. Course Type: □ Lecture course  □ Lecture course with laboratory
   □ Laboratory course  □ Undergraduate course
   □ Directed readings  □ Other (please specify) field/lecture

B. Can this course be offered by existing faculty?  ☑ Yes  □ No

C. Will this course require new funding (Including Payment of instructor, labs, equipment, etc.)?  ☑ Yes  □ No

D. Credit hours for this course: 3

E. Estimated number of contact hours per semester: 63

F. Course description (reading list required):
   see attached

G. Method of evaluation: Percentage

<table>
<thead>
<tr>
<th>Class tests</th>
<th>Written</th>
<th>Oral</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>35</td>
<td>10</td>
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<tr>
<td>Other (specify):</td>
<td>20 (see attached)</td>
<td></td>
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<tr>
<td>field/lecture</td>
<td></td>
<td></td>
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<tr>
<td>Final examination:</td>
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<tr>
<td>Total</td>
<td>100</td>
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1 Must specify the additional work at the graduate level
II. To be completed for special/selected topics course requests only

For special/selected topics courses, there is no evidence of:

<table>
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<tr>
<th>Instructor's initials</th>
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1. duplication of thesis work
2. double credit
3. work that is a faculty research product
4. overlap with existing courses

Recommended for offering in the

- Fall
- Winter
- Spring 2014

Length of session if less than a semester:

June 2014 - mostly during 2 weeks at the BBMS

III. This course proposal has been prepared in accordance with General Regulations governing the School of Graduate Studies

Craig Ruck
Course Instructor

[Signature]

Approval of the head of the academic unit

[Signature]

Date: Jan 20/14
Date: 2 Feb 2014

IV. This course proposal was approved by the Faculty/School/Council

Julie Riedert
Secretary, Faculty/School/Council

[Signature]

Date: Mar. 7/14

Updated October 2011
GRADUATE COURSE (Lecture & Field)

Field sampling approaches and applied statistical philosophy

Instructor:
Dr. Craig Purchase

Contact time:
3 hours of preparation meetings, then ~6 hours field/lecture per day from June 16-28 (total ~ 63 hours).

Course description:
This class is designed to teach students how to conduct field research well. It combines physical methods of gathering data with statistical philosophy to identify benefits of different approaches for even slightly differing hypotheses. It is field intensive, hands-on, and applied. The major focus will be on practical techniques and tradeoffs between data quality, quantity, costs, and ethical/environmental considerations. You will gain experience in critical thinking and field techniques; the biology of the organisms sampled will not be evaluated.

Topics:
Nuances of hypothesis testing, implications of precision & accuracy, pseudoreplication, statistical power, hierarchical database design, field note taking, survey design, and use of various biological sampling equipment/techniques (e.g., map/compass, GPS, boats, traps, nets, electrofishing, tissue sampling, animal anesthetics and tagging, hydroacoustics, scientific photography).

Evaluation:
- Large relational database hierarchical design and construction = 25%
- Field participation/initiation = 10%
- Field notebooks = 10%
- Data collection proposal on assigned topic = 10%
- Class presentation = 10%
- Final exam = 35%

Schedule (2014):
- May 12 to June 7: there will be three meetings on the St. John’s campus (teleconference possible) to introduction course goals, assign readings, and assign proposal topics.
- June 15 – arrive at the Bonne Bay Marine Station (BBMS)
- June 16 – 27
  - Days: field work based at the BBMS (boat time shared with that of Biology3714)
  - Evenings: lectures at the BBMS
- June 28 – final exam and submission of research proposals
Hello Gail,

Course has 6 votes in favour (SK Cheema, G Bodwell, T Andrews, T Bell, C Purchase, myself) none against. Please, inform the Council and unit of its approval.

On 03/04/2014 01:50 PM, Kenny, Gail wrote:
> Hi JC,
> 
> Any news on this course? The instructor is inquiring as they have
decisions to make regarding the Spring courses. Thanks.
>
> Gail
>
>
--
JC Loredo-Osti, Associate professor
Department of Mathematics and Statistics Memorial University
Phone: +(709) 864 8729

"Alas! all music jars when the soul's out of tune"
--Miguel de Cervantes
Strategic Plan for the Faculty of Science

Memorial University of Newfoundland
Fall 2011

The province of Newfoundland and Labrador, and Memorial University are currently undergoing a period of rapid change. As the province's role within the country has changed, so too has the role of Memorial University and the Faculty of Science. The purpose of this document is to anticipate and plan for research, teaching, and service in this environment and to provide guidance to the Faculty of Science for the next decade.

Anticipated Challenges for the Faculty of Science from 2011 to 2021

- Memorial University will continue to shift its focus to become a more research-intensive university.
- Tri-council (NSERC, CIHR, SSHRC) funding will continue to be a basic operating resource for many faculty members. However, competition for these sources will only increase in the future. While tri-council funding will be fundamental to the research mission of the Faculty of Science, other agencies such as The Atlantic Canada Opportunities Agency, the Atlantic Innovation Fund, Canada Foundation for Innovation, Genome Canada, Genome Atlantic and the Newfoundland and Labrador Research and Development Council will continue to provide the financial resources that will allow us to significantly transform research. For the Faculty of Science to thrive in the next decade, we must pre-position ourselves to take full advantage of these and other opportunities.
- Graduate student numbers will continue to increase.
- Undergraduate student numbers will remain stable or increase modestly. This student population will become more ethnically diverse. Engagement of faculty in undergraduate recruitment activities will need to be increased.
- The numbers of students registering for distance education courses will continue to increase. With this growth, we will need to reconsider the blend of on-campus and distance courses acceptable for a MUN degree, and the extent to which the Faculty of Science should be offering courses to other institutions and accepting courses from other institutions.
- We will continue to be challenged by our infrastructure, but a revitalized provincial economy means that it is reasonable to assume that significant new construction will take place within the next 10 years.
- The Faculty of Science has not fully engaged its alumni. They are a critical resource for this Faculty so establishing this connection will be a major new undertaking.

Vision

A research-intensive Faculty that is renowned both for the caliber of our research and the quality of our graduates
Mission

Consistent with the mission of Memorial University, the Faculty of Science is dedicated to international excellence in research, teaching and engagement to the benefit of people locally, nationally, and internationally.

Mandate

Research

The Faculty of Science is responsible for the provision of a broad spectrum of basic science knowledge and as such serves as the foundation upon which more applied disciplines are based. It is our responsibility to further knowledge within specific science disciplines, as well as to create the conditions that facilitate interdisciplinary research.

Teaching

The Faculty of Science is intended to be widely accessible to students. Emphasis is placed on creating an environment that encourages and supports the learning process, while also challenging our students to achieve goals they might not have thought possible.

The Plan

Research Goals:

The Faculty of Science will enhance its stature globally as a leading research-intensive faculty that advances knowledge and produces high calibre graduates. Research within the Faculty of Science is primarily devoted to questions of fundamental importance, but also includes applied research relevant locally, nationally, and internationally. To achieve this we will:

1. Support and promote basic and applied research excellence in areas of established strength and emerging opportunity while recognizing the freedom of the faculty to pursue individual research interests based on their judgement, skill, and curiosity. The hiring of faculty will be primarily driven by our research agenda.
2. Attract and retain world-class faculty, students, postdoctoral fellows and staff to engage in cutting edge research activity.
3. Foster an intellectual environment conducive to research excellence and to the training and mentoring of highly qualified personnel.
4. Provide the infrastructure and services essential to support the training of undergraduate and graduate students and leading-edge research.
5. Engage with partners within and outside of Memorial to promote and support interdisciplinary research, research networking, and research collaborations.
6. Promote the high caliber of our research. This can be achieved by more aggressively preparing and nominating our faculty and graduate students for national and international awards.
Current Strengths and Emerging Opportunities in Research

The Faculty of Science currently has substantial and diverse research strength, the greatest being our faculty, staff, and students. Within academic departments research agendas are driven by the discipline-specific departmental strategic plans. Beyond those, the Faculty of Science engages in interdisciplinary research that crosses individual departments and serves to synergize the research endeavor in the Faculty as a whole. The current research strengths include Marine Sciences; Natural Resources; Biomedical Sciences and Health; Materials Science; and Mathematical and Computational Sciences.

While the Faculty of Science is committed to maintaining its core areas, there are also particular areas of emerging opportunity generated by the expertise of our faculty, our research infrastructure, and our geographical position with its associated climate, resources, and ecology that distinguish us from other faculties of Science. We therefore provide diverse opportunities that will draw researchers and students here in preference to other universities in Canada or internationally. The areas also crosscut most of the departments and are consistent with the priority and strategic areas that federal and provincial government agencies target for funding as well as Memorial's special obligation to the people of Newfoundland and Labrador. They also reflect areas in which we have made recent new hires. For the Faculty of Science, these strategic research areas are:

Marine Sciences

Research activities in this area includes, for example: biological, chemical, physical, and geological oceanography and oceanographic modeling; ocean acoustics; ocean data visualization; ocean sensor and instrumentation development; physiology, molecular biology, and biochemistry of aquatic species; aquaculture and fisheries science; marine ecology; cognitive and behavioural ecology of marine species; conservation and climate change; glacial climate systems; harsh environments.

Natural Resources and Energy

Research activities in this area include the discovery, production and monitoring of nonrenewable and renewable natural resources as well as traditional and alternative sources of energy. Some examples are: petroleum reservoir characterization and modeling; mineralogy; stratigraphy; sedimentology; exploration geophysics; tectonics; environmental impact and monitoring of resource extraction; biofuels and materials; energy sustainability, cognitive and behavioural ecology; landscape ecology and conservation; plant ecology; environmental geology; sustainable/green chemistry; alternative energy sources; geochemistry; biogeochemistry; contaminant hydrology; environmental chemistry.

Teaching Goals:

The Faculty of Science is dedicated to providing our undergraduate and graduate students with the best possible educational experience, acknowledging the needs and interests of our province.
1. All decisions involving the education of our students will be designed to uphold the value of a Memorial University Science degree.

2. Students will be provided with the highest quality of instruction. To ensure this, faculty members will receive constructive feedback, and be provided with the opportunity and the means to improve and enhance their teaching and to develop innovations in teaching. Graduate students will have opportunities for developing their teaching skills.

3. We will maintain an infrastructure appropriate for contemporary learning. Undergraduate laboratory equipment will have technology consistent with that used in the modern research environment.

4. Undergraduate students will be involved in the research environment. Our undergraduates will be given the opportunity to participate in research and such experience should be credited on their transcripts. Undergraduate students will be encouraged to present their research findings at regional and national scholarly conferences.

5. We will incorporate technological advancements into our curricula whenever it is appropriate to do so. In particular, an increase in the scope of distance course offerings here and elsewhere will create challenges and opportunities.

6. Teaching excellence will be recognized and rewarded by actively nominating faculty for local and national teaching awards.

Current Strengths and Emerging Opportunities in Teaching

The Faculty of Science has a strong reputation of excellence in teaching that is a consequence of the skill and dedication of our faculty and staff. Our instruction ranges from the traditional lecture format, to learning opportunities that place greater emphasis on experiential learning (e.g., field schools and courses and clinical training), to award winning distance education courses. While the Faculty of Science includes a diverse range of disciplines, we are committed to providing students with both the opportunity to learn and the opportunity to apply their knowledge. Coop programs are a relatively small component of our programs within the Faculty of Science, and they provide a learning opportunity that should grow in the future. Likewise, there are also opportunities for expanding the range of options for our students through partnerships with other faculties (e.g., life science and engineering science).

Priorities for most of our undergraduate and graduate programs are provided by our departmental strategic plans. The Faculty of Science is home to our interdisciplinary graduate programs (Aquaculture, Cognitive and Behavioural Ecology, Computational Science, Environmental Science, and Theoretical Physics). As our graduate programs reflect our research expertise, we expect growth in our graduate programs to be fueled by growth in our research programs.

Engagement:

As one of the largest academic units at Memorial University, we tend to be modest about our achievements. However, such modesty means that most outside the Faculty of Science do not know who we are, what we do, and how we contribute to both the university and the province. We therefore do not get the recognition we deserve in terms of the excellence of our teaching programs, and the accomplishments of our students, faculty and staff.
1. We will better engage with the community to make clear our contribution to society and our contribution to the success of the province.

2. We will make a strong connection with our alumni so that they remain engaged with the Faculty of Science after they graduate.

3. The Faculty of Science at Memorial will establish a national profile that distinguishes it from science at other universities in Canada. This will be informed by our research and teaching goals.

4. We will be proactive in our use of technology in order to have a presence in a variety of different media.

5. Our faculty are encouraged to be more engaged with the media and they will be assisted with media training.

6. Students will be encouraged to participate in national and international competitions to both inform ourselves and others of the strengths of our programs.