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, November 16, 2016, at 1 p.m. in C-2045.

AGENDA

1. Regrets
2. Adoption of the Minutes of October 19, 2016
3. Business Arising from the Minutes
4. Correspondence: None
5. Reports of Standing Committees:
   A. Undergraduate Studies Committee:
      a. Department of Chemistry, calendar changes, paper 5.A.a (43 pages).
      b. Department of Chemistry, proposal for new major program, general and honours BSc in Chemistry (Biological), paper 5.A.b (15 pages).
      c. Department of Chemistry, calendar change, paper 5.A.c (14 pages).
      d. Department of Ocean Sciences, proposal for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems), paper 5.A.d (22 pages).
      e. Department of Ocean Sciences, proposal for new course, OCSC 2500, Practical Introduction to Ocean Sciences, paper 5.A.e (27 pages).
   B. Graduate Studies Committee:
      a. Department of Mathematics and Statistics, calendar changes, paper 5.B.a (7 pages).
      b. Department of Computer Science, calendar changes, paper 5.B.b (19 pages).
      e. School of Graduate Studies, Degree Outcomes proposal, paper 5.B.e (12 pages).
   C. Nominating Committee: None
   D. Library Committee: None
6. Reports of Chair in Teaching & Learning and Embedded DELTS Teaching Consultant
7. Reports of Delegates from Other Councils
8. Report of the Dean
9. Question Period
11. Adjournment

Mark Abraham
Dean of Science
FACULTY OF SCIENCE
FACULTY COUNCIL OF SCIENCE
MINUTES OF MEETING OF OCTOBER 19, 2016

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, October 19, 2016, at 1:00 p.m. in room C-2045.

**FSC 2454 Present**
Biochemistry
Booth, V. Mulligan, M.E.

Biology
Jones, I. Leroux, S. Roncal, J. Staveley, B.

Chemistry
Botaro, C. Kerton, F. Kozak, C.

Computer Science
Batten, D. Bungay, S. Chen, P. Wareham, T.

Earth Sciences
Hanchan, J.

Math & Stats
Loredo-Osti, J. Merkli, M. Sullivan, S.

Physics & Physical Oceanography
Curnoe, S. Morrow, M. Munroe, J. Plumer, M.

Psychology
Courage, M. Neath, I.

Dean of Science
Abrahams, M. Foss, K. Foster, A. Mackenzie, T. Rideout, J. Zedel, L.

Geography
Catto, N. Edinger, E.
CITL
Todd, A.

Library
Ambi, A.

Medicine
Kendall, E.

Registrar's Office
Burry, J.

School of Music
Cook, N.

Undergraduate Students
Lacey, K.

FSC 2455
Regrets
Gubhinder, K.  Duan, X.  Dyer, D.  Farquharson, D.
Fletcher, G.  Dobbin-Williams, K.  Stordy, M.
Ismali, M.

FSC 2456
Adoption of Minutes
Moved: Minutes of the September 21, 2016, meeting be adopted (Sullivan/Neath). One correction was noted to the September minutes. Calendar changes for the 17/18 academic year were to be submitted to departmental committees by the end of October to ensure they were included on the December meeting of Faculty Council, not Senate. The Senate meeting is in February.
Carried. Two abstentions.

FSC 2457
Business Arising: None

FSC 2458
Correspondence:
Letter from Senate Committee on Undergraduate Studies regarding Date for Submission of Calendar Changes for 2017-2018. Shannon Sullivan reiterated that the important date for Faculty Council is that of December 13, 2016, the date by which all items must be received by the Secretary of the Committee in order to be included in the calendar for 2017-2018. The December meeting of Faculty Council will take place on December 7, 2016, in order to accommodate this deadline.

FSC 2459
Reports of Standing Committees:
A. Undergraduate Studies Committee:
Report presented by Shannon Sullivan, Chair, Undergraduate Studies Committee
a. Moved: Department of Physics and Physical Oceanography, calendar changes for 17 Physics courses (Sullivan/Plumer). Carried.


c. Moved: Department of Computer Science, proposal for new course, COMP 1401, Computing at the Movies (Sullivan/Wareham). Carried.

d. Moved: Department of Mathematics and Statistics, calendar change, program regulations (Sullivan/Loredo-Osti). Carried.

e. Moved: To not support the proposal in Senate Committee on Undergraduate Studies re: Proposal for Blended Learning Definition (Sullivan/Booth). There was some discussion regarding why a glossary term in the calendar has been described so specifically. Reasons provided were to encourage instructors to adopt different learning formats and also to clarify course expectations for students. Carried.

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

a. Moved: Department of Biochemistry, calendar changes including new courses (Loredo-Osti/Mulligan). Carried. One abstention.


c. & e. Moved: Department of Computer Science, proposal for new course, COMP 6933, and Department of Mathematics and Statistics, proposal for new course, MATH 6203, both cross-listed, Nonlinear and Linear Optimization (Loredo-Osti/Wareham). Carried. One abstention.

d. Moved: Department of Computer Science, proposal for new course, COMP 6907, Data Mining Techniques and Methodologies (Loredo-Osti/Wareham). Carried. Two abstentions.

C. Nominating Committee:

a. Moved: Committee matrix be approved as presented (Foster/Sullivan). Carried.

D. Library Committee: None

FSC 2460
Reports of Chair in Teaching & Learning and Embedded DELTS Teaching Consultant:
Report presented by Amy Todd, Embedded Teaching Consultant

The First Year Success Program will be presenting a report of their results from their first five years and future steps on Thursday, October 20, 2016. All are encouraged to attend.
The second brown bag lunch session on teaching in the Faculty of Science will be hosted by Biology on Thursday, October 27, 2016.

**FSC 2461 Reports of Delegates from Other Councils:**
Ed Kendall, representative from Medicine, commented on the issue of a potential reduction in the number of Senate seats for the Faculty of Science. He confirmed that the same issue was being faced by the Faculty of Medicine and the same concerns were being discussed. Faculty members are not in favor of the reduction.

**FSC 2462 Dean of Science Distinguished Teacher Award**
The Associate Dean (Undergraduate and Administration) presented information to Council about this newly established award. The award is open to any ASM in the Faculty of Science to recognize excellence in teaching. There will be a Call for Nominations in January with the selection being made in March of 2017. The award is meant to be a precursor for other awards such as the President’s Awards for Teaching and external awards for teaching. It is hoped that the award will contribute to overall teaching excellence in the Faculty of Science.

**FSC 2463 Report of the Dean**
Presented by Mark Abrahams, Dean.

The Dean talked about how we were all saddened by the sudden death of our VPR, Dr. Richard Marceau, in September. In addition to being a fine gentleman and a valued colleague, Dr. Marceau was an enthusiastic promoter of our research program and particularly proud of our accomplishment in the Canada First competition. His death has left a big hole within Memorial University, and the administration of the Canada First grant. Dr. Gosine has assumed the role of Interim VPR until the search for a new VPR is complete.

In addition to the loss of Dr. Marceau, another challenge facing the Canada First grant is space. The proposal will fund the creation of an Ocean Frontier Institute (OFI) within the Core Science Facility, but due to the tenders coming in beyond budget, the retendering process will delay opening by approximately one year. For that reason, the Dean is developing space for a temporary Ocean Frontier Institute. To do so, he has traded space in Coughlan College with the Faculty of Engineering in order to create space for the Department of Computer Science in the Engineering building. This will allow four offices in the Earth Science Department to be vacated that will become the temporary administrative offices for the OFI. He has also met with the Department of Earth Sciences to discuss the removal of surplus material to create high bay laboratory space that will function as a research space for OFI. Work has begun on this, and it is hoped that the administrative offices will be operational in the coming weeks or months. The laboratory space should be operational early in the new year.
As reported at our last Council meeting, there is a proposal for a change in representation on senate that will diminish the level of representation for large academic units and increase representation for small units. Vacant senate seats that are assigned to large academic units, often making it difficult for senate to meet quorum, are driving this change. Since that time, the Dean asked department heads to raise this issue and seek volunteers to fill those seats and he is pleased to report that the Faculty of Science will have all its seats filled for this term. The Dean intends to use that fact to argue against the change in representation in senate and to emphasize how important it is for faculty to be engaged in university issues.

The Dean has agreed to undertake an academic review of the interdisciplinary graduate programs within the Faculty of Science. It is not only important to review the academic content of these programs, but also to get clarity on the assignment of teaching resources and student support to these. It is hoped the review can be completed during this academic year.

Finally, a reminder that Science Fall convocation will take place October 20, 2016, at 3 pm in the Arts & Culture Centre. The Dean encouraged Council members to make time to celebrate the accomplishments of our graduating students, and Dr. Edgar Goodaire, who is being awarded professor emeritus status.

FSC 2464  Question Period
Shannon Sullivan raised the issue of communications with the Blunden Centre. Last winter, they moved to a temporary method of communicating with instructors via email which has proven to be onerous for instructors. There is often a delay receiving forms requesting separate testing, sometimes after the testing is completed. There was much discussion regarding possible reasons for the delayed communications. The Associate Dean (Undergraduate and Administration) will investigate the issue.

It was also noted that Sheila Singleton, the University Registrar, has announced her retirement. It will be a great loss of knowledge and experience in the university community.

FSC 2465  Adjournment
The meeting adjourned at 1:43 p.m.
November 7, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes, New programs and New Course Proposals

At a meeting held on October 25, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Changes to course descriptions, including some prerequisite changes, for seven Chemistry courses
   (ii) Proposal for new major program in Chemistry (Biological)
   (iii) Calendar change to amend biochemistry requirement in majors programs

2. Department of Ocean Sciences
   (i) Proposals for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems)
   (ii) Proposal for new course Ocean Sciences 2500: Practical Introduction to Ocean Sciences

Joan Burry

Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal:
Change to prerequisite for
Chemistry 2100

Executive Summary

This is a proposal for a minor change in the prerequisites for CHEM 2100. Students wishing to do these courses coming from CHEM 1001 (Grenfell campus) will be required to have to have a minimum mark of 65% in this course.

Resource Implications: Instructional Costs

There are no costs associated with this calendar change.

Library Holdings and/or Other Resources Required

There are no new library or other resources required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
Change to prerequisites for Chemistry 2100

SUMMARY PAGE FOR SENATE
Approval Form

Calendar Changes

Under 10.3 Chemistry

2100 Analytical Chemistry I is an introduction to analytical chemistry and includes preparation of samples and standards, calibration methods, statistical treatment of data, spectrophotometric trace analysis, gravimetric analysis and volumetric analysis including acid-based titrations, precipitation titrations, oxidation-reduction titrations, complexometric titrations and titrations in non-aqueous systems. Also introduced are liquid-liquid and other types of extraction, and chromatography with key methods of detection. Theoretical, practical and problem-solving aspects are covered.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: the former CHEM 3100
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051 (or a minimum 65% in either 1001 or the former 1031) with a grade of at least 60%

Clean Version

2100 Analytical Chemistry I is an introduction to analytical chemistry and includes preparation of samples and standards, calibration methods, statistical treatment of data, spectrophotometric trace analysis, gravimetric analysis and volumetric analysis including acid-based titrations, precipitation titrations, oxidation-reduction titrations, complexometric titrations and titrations in non-aqueous systems. Also introduced are liquid-liquid and other types of extraction, and chromatography with key methods of detection. Theoretical, practical and problem-solving aspects are covered.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: the former CHEM 3100
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051 or a minimum 65% in either 1001 or the former 1031
Change to prerequisites for Chemistry 2100

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The different requirements for entrance into CHEM 2100, CHEM 1051 (St. John's campus) and CHEM 1001 (Grenfell) reflect the difference in the content of the two first year programs. Students who wish to take CHEM 2100 on either campus will be required to have a minimum 60% in CHEM 1051 or 55% in CHEM 1001.
Change to prerequisites for Chemistry 2100

Consultations Sought From

- Grenfell
- Marine Institute
- Mathematics and Statistics
- Computer Science
- Physics
- Biochemistry
- Biology
- Psychology
- Ocean Sciences
- Earth Sciences
- Pharmacy
- Engineering
- Faculty of Education

Comments Received

- yes
- yes
- yes/no
- yes/no
- yes
- yes/no
- yes
- yes/no
- yes
- yes/no
- yes
- yes
- yes

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:

Consultation letter

Original Message-----
From: Chris Flinn [mailto:cf@mun.ca]
Sent: Monday, April 25, 2016 4:41 PM
To: crwinm@mun.ca; MIUG Consultations
    @mun.ca; Melior, Judith @mun.ca;
    mathconsult@mun.ca; cs-chair@mun.ca; Biochemistry Head @mun.ca; Karen
    Morris @mun.ca; Annie Mercier @mun.ca; psychology@mun.ca;
    Engineering Consultations @mun.ca; chemistry@mun.ca; Alison Leitch
Change to prerequisites for Chemistry 2100

salgitch@mun.ca; 'Lagowski, Jolanta' djlantile@mun.ca; Alcock, Erin
saka_alcock@mun.ca
Cc: Head of Chemistry chemhead@mun.ca
Subject: chemistry proposals for consultation, library review

Hello everyone,

We have six chemistry proposals for review mostly involving changes to course prerequisites which are more appropriate to the courses in question and course descriptions which should better reflect course content as they are being in recent years. A number of course prerequisite changes involve Grenfell campus courses which have resulted from direct discussions.

cheers,

Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry Department
MUN St.John’s campus
This email is governed by the Terms and Conditions found in our Disclaimer<http://www.mi.mun.ca/ict/disclaimer>.

Replies received

Library Report

Collection Development Division
Queen Elizabeth II Library

14 August 2016

To: Chris Flinn, Department of Chemistry

From: Erin Alcock, Science Research Liaison Librarian

Subject: Change to prerequisite for Chemistry 2100

I have reviewed the proposal to change the prerequisites for Chem 2100 to reflect the difference between the St. John’s and Grenfell campus programs. This change will have no impact on the Library system.

Biology

Hi Chris,

The Biology Undergraduate Studies Committee reviewed the proposed calendar changes for Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 2440, 3410 and 3411.
Change to prerequisites for Chemistry 2100

Biology supports the proposed minimum grade requirement that is required prior to admittance into the second year Chemistry courses but we would ask that students taking the course(s) be reminded of this minimum grade requirement as it could affect their timely progress through a science degree program.

We have no issues or concerns with the other minor wording changes.

Thanks
Karen

Marine Institute:

Chris,

Thank you for the opportunity to review and comment on the changes to Chemistry 2100.

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

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

Physics

Hello Chris,

Physics and Physical Oceanography Department looked over these chemistry proposals and, since they primarily deal with prerequisites for chemistry courses offered at Grenfell and St John’s campus, this does not affect our course offerings. We are fine with the proposals.

Jolanta

Jolanta B. Lagowski, Professor and Head
Physics and Physical Oceanography
Memorial University
St. John’s, NL, Canada A1B 3X7
Email: jolantai@mun.ca
Phone: (709) 864-8738

Education
Change to prerequisites for Chemistry 2100

Hello Chris:

We are pleased to support your calendar changes as outlined.

Judith
Judith Mellor
Co-ordinator, Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
T: 709.864.7554
F: 709.864.2623

Engineering

Dear Dr. Flinn,

Thank you for the opportunity to comment on the proposed set of minor Calendar changes to nine Chemistry courses.

At this afternoon's meeting, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs. The suggested changes are consistent with the new minors in Chemistry for Process Engineering Majors and in Applied Science-Process Engineering for Chemistry Majors and Honours.

However I note a recurring minor typographical error: "minimum" should be "minimum" in the prerequisite lists for CHEM 2301 and CHEM 2302 (both St. John's and Grenfell versions and both markup and clean versions, eight instances in all).

Yours sincerely,

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

Ocean Sciences

Dear Chris:

The proposed calendar changes were considered by our undergrad studies committee. While changes to these Chemistry courses, in particular Chemistry 2400, 2401 and 2440 (minimum grades), have implications for the programs we are currently developing, there were no major concerns expressed.

All the best,
Change to prerequisites for Chemistry 2100

Annie

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

Grenfell

Subject: changes to chem courses.
From: "Parkinson, Don-Roger" <dparkins@grenfell.mun.ca> Date:
29/04/2016 2:02 PM
To: Travis Fridgen <chemhead@mun.ca>
CC: "Gallant, Robert" <rgallant@grenfell.mun.ca>

Dear Travis,

I was looking through the package with changes to the chemistry courses sent around by Dr. C. Flinn.

We, Environmental Science Chemistry (ENVC), are willing to support those changes agreed upon in the January 2016 meeting at Grenfell regarding the courses: Chern 2301, Chern 2302, Chern 2210, Chern 2400, and Chern 2401. Further, we are willing to support the changes to Chern 2100 which we did not talk about.

The changes to Chern 2440 were not discussed at the January meeting. The view at Grenfell is that Chern 2440 by its very name "organic Chemistry for Biologists" is not a Chemistry course in a true sense as it is offered to the Biology/Biologists to conform to their program. Further the course is credit restricted and usage limited; it can not be used as a chemistry credit for a Chemistry or a Biochemistry program of study. The current MUN Calendar prerequisite requires Chern 1911, or Chern 1959 (or Chern 1001 at Grenfell) all with a pass. These are the only chemistry courses needed to enter into Chern 2440. If changes in prerequisites are to be made then there needs to be a wider discussion involving the Biology Dept. in St. John's and the Environmental Biologists at Grenfell. Changes to the Chern 2449 entry requirements have the most direct ramifications to their programs. As of yet, I have seen no discussion or email trail with those faculty involved.

After preliminary discussion with some ENVC colleagues, we suggest that you pull the course (Chern 2440) from the list of changes until Biology (St. John's), Environmental Biology (ENVB) Grenfell, Chemistry (St. John's), and Environmental Chemistry Grenfell (ENVC) can all agree; so that we can move ahead with the other changes to the chemistry courses.

Regards, D.R.P.

Dr. Don-Roger Parkinson,
Associate Professor in Analytical Chemistry,
Environmental Chemistry and Chemistry, AS237

Chair of Environmental Science,
Grenfell Campus,
Memorial University of Newfoundland,
Change to prerequisites for Chemistry 2100

P.o. Box 2900
Corner Brook, NL
A2H 6P9
Proposal
Edit to the calendar description and change in prerequisite for Chemistry 2210

Executive Summary

This is a proposal for a change to the calendar description for CHEM 2210 on both the St. John’s and Grenfell campuses to better reflect what is being taught in the course. The main change is an addition of molecular symmetry to the calendar description. A change in the prerequisite for this course is also being proposed.

Resource Implications: Instructional Costs

There are no costs associated with this calendar change.

Library Holdings and/or Other Resources Required

There are no new library or other resources required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
SUMMARY PAGE FOR SENATE
Approval Form

Calendar Change

Under **10.3 Chemistry** (St. John's)

2210 Introductory Inorganic Chemistry studies the chemistry of selected s, p, and d block elements. Introduction to crystal and molecular structures and to molecular orbital and crystal field theories, focuses on fundamental concepts in the chemistry of s, p, and d block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

LH: 3

PR: Science 1807; minimum 60% in CHEM 1051 (or a minimum 65% in either 1001 or the former 1031); Mathematics 1000

Under **12.5 Chemistry** (Grenfell)

2210 Introductory Inorganic Chemistry is structural chemistry of the solid state. Introduction to molecular orbital and crystal field theories. Chemistry of the s, p, and d block elements, focuses on fundamental concepts in the chemistry of s, p, and d block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

LH: 3

PR: minimum 65% in CHEM 1001 (or the former 1031) or a minimum 60% in CHEM 1051), Mathematics 1000
Clean version:

Under 10.3 Chemistry (St. John's)

**2210 Introductory Inorganic Chemistry** focuses on fundamental concepts in the chemistry of s, p, and d block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

LH: 3

PR: Science 1807; minimum 60% in CHEM 1051 or a minimum 65% in either 1001 or the former 1031; Mathematics 1000

Under 12.5 Chemistry (Grenfell)

**2210 Introductory Inorganic Chemistry** focuses on fundamental concepts in the chemistry of s, p, and d block elements and their compounds. Emphasis will be placed on periodic trends in physical and chemical properties, molecular symmetry, molecular orbital diagrams, simple crystal structures, Lewis acid/base theory, and introductory coordination chemistry.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

LH: 3

PR: minimum 65% in CHEM 1001 (or the former 1031) or a minimum 60% in CHEM 1051, Mathematics 1000

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

Given the recent and changes to our program (within 1st year and also in senior years), the calendar entry for Chem 2210 needs modifying to reflect these changes. For example, removal of Chem 3500 (Spectroscopic Analysis) as a required course in the Chemistry program means that symmetry must be considered an essential component of CHEM 2210. This change is consistent with what has actually been taught for many years in Chemistry 2210 and is also consistent with content at other Canadian Universities. The modification in the prerequisites simply reflects the differences in the first year courses at St. John's and Grenfell campuses. Students taking CHEM 2210 require a 60% coming from CHEM 1051 or 65% coming from CHEM 1001.
## Consultations Sought From

<table>
<thead>
<tr>
<th>Department</th>
<th>Comments Received</th>
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<tbody>
<tr>
<td>Grenfell</td>
<td>yes</td>
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<tr>
<td>Marine Institute</td>
<td>yes</td>
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<tr>
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## Library Report Received

- yes

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**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:**

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**Consultation letter**

**Original Message-----**

From: Chris Flinn [mailto:cf@mun.ca]
Sent: Monday, April 25, 2016 4:41 PM
To: assocvpmflinn@mun.ca; MIUG Consultations;
    cmconsultations@mun.ca; Mellor, Judith;
    mcg@mun.ca; mm@mun.ca; biochemistry@mun.ca;
    Karen Morris; morris@mun.ca; Annie Mercier; mericier@mun.ca; ryd@mun.ca;
    Engineering Consultations; engineering@mun.ca; echea@mun.ca; Alison Leitch
Hello everyone,

We have six chemistry proposals for review mostly involving changes to course prerequisites which are more appropriate to the courses in question and course descriptions which should better reflect course content as they are being in recent years. A number of course prerequisite changes involve Grenfell campus courses which have resulted from direct discussions.

cheers,

Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry Department
MUN St.John’s campus
This email is governed by the Terms and Conditions found in our Disclaimer<http://www.mi.mun.ca/ict/disclaimer>.

Replies received

Library report:

Collection Development Division
Queen Elizabeth II Library

15 August 2016

To: Chris Flinn, Department of Chemistry

From: Erin Alcock, Science Research Liaison Librarian

Subject: Edit to the Calendar description and change in prerequisite for Chemistry 2210

I have reviewed the proposal to change the prerequisites for Chemistry 2210 to better reflect the content of the course and to take into account the differences in the content of prerequisites in St. John’s and Grenfell campus. This change will have no impact on the Library system.

Biology

HI Chris,

The Biology Undergraduate Studies Committee reviewed the proposed calendar changes for Chemistry
2100, 2210, 2301, 2302, 2400, 2401, 2440, 3410 and 3411.

Biology supports the proposed minimum grade requirement that is required prior to admittance into the second year Chemistry courses. But we would ask that students taking the course(s) be reminded of this minimum grade requirement as it could affect their timely progress through a science degree program.

We have no issues or concerns with the other minor wording changes.

Thanks

Karen

**Marine Institute:**

Chris,

Thank you for the opportunity to review and comment on the changes to Chemistry 2210.

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

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

**Physics**

Hello Chris,

Physics and Physical Oceanography Department looked over these chemistry proposals and, since they primarily deal with prerequisites for chemistry courses offered at Grenfell and St John's campus, this does not affect our course offerings. We are fine with the proposals.

Jolanta

Jolanta B. Lagowski, Professor and Head
Physics and Physical Oceanography
Memorial University
St. John's, NL, Canada A1B 3X7
Email: jolantal@mun.ca
Phone: (709) 864-8738

**Education**
Hello Chris:

We are pleased to support your calendar changes as outlined.

Judith
Judith Mellor
Co-ordinator, Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
T: 709.864.7554
F: 709.864.2623

Engineering

Dear Dr. Flinn,

Thank you for the opportunity to comment on the proposed set of minor Calendar changes to nine Chemistry courses.

At this afternoon's meeting, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs. The suggested changes are consistent with the new minors in Chemistry for Process Engineering Majors and in Applied Science-Process Engineering for Chemistry Majors and Honours.

However I note a recurring minor typographical error: "minimum" should be "minimum" in the prerequisite lists for CHEM 2301 and CHEM 2302 (both St. John's and Grenfell versions and both markup and clean versions, eight instances in all).

Yours sincerely,

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

Ocean Sciences

Dear Chris:

The proposed calendar changes were considered by our undergrad studies committee. While changes to these Chemistry courses, in particular Chemistry 2400, 2401 and 2440 (minimum grades), have implications for the programs we are currently developing, there were no major concerns expressed.

All the best,
Subject: changes to chem courses.
From: "Parkinson, Don-Roger" <dparkins@grenfell.mun.ca> Date: 29/04/2016 2:02 PM
To: Travis Fridgen<chemhead@mun.ca>
CC: "Gallant, Robert" <rgallant@grenfell.mun.ca>

Dear Travis,

I was looking through the package with changes to the chemistry courses sent around by Dr. C. Flinn.

We, Environmental Science Chemistry (ENVC), are willing to support those changes agreed upon in the January 2016 meeting at Grenfell regarding the courses: Chern 2301, Chern 2302, Chern 2210, Chern 2400 and Chern 2401. Further, we are willing to support the changes to Chern 2100 which we did not talk about.

The changes to Chern 2440 were not discussed at the January meeting. The view at Grenfell is that Chern 2440 by its very name uorganic Chemistry for Biologists’ is not a Chemistry course in a true sense as it is offered to the Biology/Biologists to conform to their program. Further, the course is credit restricted and usage limited; it cannot be used as a chemistry credit for a Chemistry or a Biochemistry program of study. The current MUN Calendar prerequisite requires Chern 1911, or Chem 1959 (or Chern 1001 at Grenfell) all with a pass. These are the only chemistry courses needed to enter into Chern 2440. If changes in prerequisites are to be made then there needs to be a wider discussion involving the Biology Dept in St. John’s and the Environmental Biologists at Grenfell. Changes to the Chern 2449 entry requirements have the most direct ramifications to their programs. As of yet, I have seen no discussion or email trail with those faculty involved.

After preliminary discussion with some ENVB colleagues, we suggest that you pull the course (Chern 2443) from the list of changes until Biology (St. John’s), Environmental Biology (ENVB) Grenfell, Chemistry (St. John’s), and Environmental Chemistry Grenfell (ENVC) can all agree, so that we can move ahead with the other changes to the chemistry courses.

 Regards, D-R.P.

Dr. Don-Roger Parkinson,
Associate Professor in Analytical Chemistry,
Environmental Chemistry and Chemistry, AS237

Chair, Environmental Science,

Grenfell Campus,
Memorial University of Newfoundland,
Change to prerequisites for Chemistry 2301 and 2302

Proposal:
Change to prerequisite for
Chemistry 2301 and 2302

Executive Summary

This is a proposal for a minor change in the prerequisites for CHEM 2301 and 2302 on both the St. John’s and Grenfell campuses. Students wishing to do these courses coming from CHEM 1001 (Grenfell campus) will be required to have a minimum mark of 65% in this course.

Resource Implications: Instructional Costs

There are no costs associated with this calendar change.

Library Holdings and/or Other Resources Required

There are no new library or other resources required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
Change to prerequisites for Chemistry 2301 and 2302

SUMMARY PAGE FOR SENATE
Approval Form

Calendar Changes

Under 10.3 Chemistry (St. John’s)

2301 Thermodynamics and Kinetics builds upon knowledge of physical chemistry from first year. It covers the three laws of thermodynamics for ideal and real systems as well as chemical kinetics. Topics in thermodynamics include the thermodynamics of ideal and real gases, phases, and solutions, the Maxwell relations, equilibria between phases, and in electrolyte solutions. The integrated rate laws for simple and complex mechanisms, and the temperature dependence of reaction rates in terms of kinetic molecular theory are some of the topics discussed in the kinetics section of the course.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: CHEM 2300
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051, {or a minimum 65% in either CHEM 1001 or the former CHEM 1031}; Mathematics 1001. Physics 1051 or Physics 1021 is recommended.

2302 Quantum Chemistry and Spectroscopy examines the quantum mechanics of simple systems such as the particle in a box, the harmonic oscillator, linear rotor, and hydrogen-like atoms. Topics also include orbital quantum numbers, spin, many electron atoms, an introduction to quantum mechanical methods, the electronic structures of molecules, bonding, and symmetry. Furthermore, electronic, rotational, and vibrational spectroscopy will be discussed as well as modern applications of spectroscopy and lasers.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: the former CHEM 3301
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051, {or a minimum 65% in either CHEM 1001 or the former CHEM 1031}; Mathematics 1001 and Physics 1051 or Physics 1021
Change to prerequisites for Chemistry 2301 and 2302

Under 12.5 Chemistry (Grenfell)

2301 Thermodynamics and Kinetics builds upon knowledge of physical chemistry from first year. It covers the three laws of thermodynamics for ideal and real systems as well as chemical kinetics. Topics in thermodynamics include the thermodynamics of ideal and real gases, phases, and solutions, the Maxwell relations, equilibria between phases, and in electrolyte solutions. The integrated rate laws for simple and complex mechanisms, and the temperature dependence of reaction rates in terms of kinetic molecular theory are some of the topics discussed in the kinetics section of the course.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: CHEM 2300
LH: 3
PR: minimum 60% in CHEM 1051, {or a minimum 65% in either CHEM 1001 or the former CHEM 1031}; Mathematics 1001. Physics 1051 or Physics 1021 is recommended.

2302 Quantum Chemistry and Spectroscopy examines the quantum mechanics of simple systems such as the particle in a box, the harmonic oscillator, linear rotor, and hydrogen-like atoms. Topics also include orbital quantum numbers, spin, many electron atoms, an introduction to quantum mechanical methods, the electronic structures of molecules, bonding, and symmetry. Furthermore, electronic, rotational, and vibrational spectroscopy will be discussed as well as modern applications of spectroscopy and lasers.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: the former CHEM 3301
LH: 3
PR: minimum 60% in CHEM 1051, {or a minimum 65% in either CHEM 1001 or the former CHEM 1031}; Mathematics 1001 and Physics 1051 or Physics 1021
Clean Versions

Under 10.3 Chemistry (St. John’s)

2301 Thermodynamics and Kinetics builds upon knowledge of physical chemistry from first year. It covers the three laws of thermodynamics for ideal and real systems as well as chemical kinetics. Topics in thermodynamics include the thermodynamics of ideal and real gases, phases, and solutions, the Maxwell relations, equilibria between phases, and in electrolyte solutions. The integrated rate laws for simple and complex mechanisms, and the temperature dependence of reaction rates in terms of kinetic molecular theory are some of the topics discussed in the kinetics section of the course.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: CHEM 2300
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051, or a minimum 65% in either CHEM 1001 or the former CHEM 1031; Mathematics 1001. Physics 1051 or Physics 1021 is recommended.

2302 Quantum Chemistry and Spectroscopy examines the quantum mechanics of simple systems such as the particle in a box, the harmonic oscillator, linear rotor, and hydrogen-like atoms. Topics also include orbital quantum numbers, spin, many electron atoms, an introduction to quantum mechanical methods, the electronic structures of molecules, bonding, and symmetry. Furthermore, electronic, rotational, and vibrational spectroscopy will be discussed as well as modern applications of spectroscopy and lasers.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: the former CHEM 3301
LH: 3
PR: Science 1807; minimum 60% in CHEM 1051, or a minimum 65% in either CHEM 1001 or the former CHEM 1031; Mathematics 1001 and Physics 1051 or Physics 1021
Change to prerequisites for Chemistry 2301 and 2302

Under 12.5 Chemistry (Grenfell)

2301 Thermodynamics and Kinetics builds upon knowledge of physical chemistry from first year. It covers the three laws of thermodynamics for ideal and real systems as well as chemical kinetics. Topics in thermodynamics include the thermodynamics of ideal and real gases, phases, and solutions, the Maxwell relations, equilibria between phases, and in electrolyte solutions. The integrated rate laws for simple and complex mechanisms, and the temperature dependence of reaction rates in terms of kinetic molecular theory are some of the topics discussed in the kinetics section of the course.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: CHEM 2300
LH: 3
PR: minimum 60% in CHEM 1051, or a minimum 65% in either CHEM 1001 or the former CHEM 1031; Mathematics 1001. Physics 1051 or Physics 1021 is recommended.

2302 Quantum Chemistry and Spectroscopy examines the quantum mechanics of simple systems such as the particle in a box, the harmonic oscillator, linear rotor, and hydrogen-like atoms. Topics also include orbital quantum numbers, spin, many electron atoms, an introduction to quantum mechanical methods, the electronic structures of molecules, bonding, and symmetry. Furthermore, electronic, rotational, and vibrational spectroscopy will be discussed as well as modern applications of spectroscopy and lasers.

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CO: Mathematics 2000 is recommended
CR: the former CHEM 3301
LH: 3
PR: minimum 60% in CHEM 1051, or a minimum 65% in either CHEM 1001 or the former CHEM 1031; Mathematics 1001 and Physics 1051 or Physics 1021
Change to prerequisites for Chemistry 2301 and 2302

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The different requirements for entrance into CHEM 2301 and 2302 from CHEM 1051 (St. John’s campus) and CHEM 1001 (Grenfell) reflect the difference in the content of the two first year programs. Students who wish to take CHEM 2301 and 2302 on either campus will be required to have a minimum 60% in CHEM 1051 or 65% in CHEM 1001.
Change to prerequisites for Chemistry 2301 and 2302

Consultations Sought From

Grenfell
Marine Institute
Mathematics and Statistics
Computer Science
Physics
Biochemistry
Biology
Psychology
Ocean Sciences
Earth Sciences
Pharmacy
Engineering
Faculty of Education

Comments Received

yes
yes
yes/no
yes/no
yes
yes/no
yes
yes/no
yes/no
yes/no
yes
yes

Library Report Received
yes

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

Name

FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:

Consultation letter

Original Message-----
From: Chris Flinn [mailto:cflinn@mun.ca]
Sent: Monday, April 25, 2016 4:41 PM
To: sec@viceoffice@science.mun.ca; MIUG Consultations
    scienceconsultations@mu.mun.ca; Mellor, Judith [mailto:jmellor@mun.ca]
    mjg@mun.ca; cs-chair@mun.ca; Biochemistry Head [mailto:allicock@mun.ca]; Karen
    Morris [mailto:kmmorris@mun.ca]; Annie Mercier [mailto:amecier@mu.mun.ca]; Paul
    Linnard [mailto:plinnard@mun.ca]; Engineering Consultations
    sec@consult@mun.ca; chair@consult@mun.ca; Alison Leitch


Change to prerequisites for Chemistry 2301 and 2302

Saidi Alcock, Jolanta Lata, Alcock, Erin
Cc: Head of Chemistry, Schommer, C. H., M. P.
Subject: chemistry proposals for consultation, library review

Hello everyone,

We have six chemistry proposals for review mostly involving changes to course prerequisites which are more appropriate to the courses in question and course descriptions which should better reflect course content as they are being in recent years. A number of course prerequisite changes involve Grenfell campus courses which have resulted from direct discussions.

cheers,

Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry Department
MUN St. John's campus
This email is governed by the Terms and Conditions found in our Disclaimer:<http://www.mi.mun.ca/ict/disclaimer>.

Replies received

Library report

Collection Development Division
Queen Elizabeth II Library

15 August 2016

To:        Chris Flinn, Department of Chemistry
From:      Erin Alcock, Science Research Liaison Librarian
Subject:   Change to prerequisite for Chemistry 2301 and 2302

I have reviewed the proposal to change the prerequisites and grade requirements for Chem 2301 and Chem 2302 to reflect the difference between the St. John’s and Grenfell campus programs. This change will have no impact on the Library system.

Biology

Hi Chris,

The Biology Undergraduate Studies Committee reviewed the proposed calendar changes for Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 2440, 3410 and 3411.
Change to prerequisites for Chemistry 2301 and 2302

Biology supports the proposed minimum grade requirement that is required prior to admittance into the second year Chemistry courses, but we would ask that students taking the course(s) be reminded of this minimum grade requirement as it could affect their timely progress through a science degree program.

We have no issues or concerns with the other minor wording changes.

Thanks

Karen

Marine Institute:

Chris,

Thank you for the opportunity to review and comment on the changes to Chemistry 2301 and 2302.

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

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

Physics

Hello Chris,

Physics and Physical Oceanography Department looked over these chemistry proposals and, since they primarily deal with prerequisites for chemistry courses offered at Grenfell and St John's campus, this does not affect our course offerings. We are fine with the proposals.

Jolanta

Jolanta B. Lagowski, Professor and Head
Physics and Physical Oceanography
Memorial University
St. John's, NL, Canada A1B 3X7
Email: jolantal@mun.ca
Phone: (709) 864-8738

Education
Change to prerequisites for Chemistry 2301 and 2302

Hello Chris:

We are pleased to support your calendar changes as outlined.

Judith
Judith Mellor
Co-ordinator, Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
T: 709.864.7554
F: 709.864.2623

Engineering

Dear Dr. Flinn,

Thank you for the opportunity to comment on the proposed set of minor Calendar changes to nine Chemistry courses.

At this afternoon’s meeting, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs. The suggested changes are consistent with the new minors in Chemistry for Process Engineering Majors and in Applied Science-Process Engineering for Chemistry Majors and Honours.

However I note a recurring minor typographical error: "minimum" should be "minimum" in the prerequisite lists for CHEM 2301 and CHEM 2302 (both St. John’s and Grenfell versions and both markup and clean versions, eight instances in all).

Yours sincerely,

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

Ocean Sciences

Dear Chris:

The proposed calendar changes were considered by our undergrad studies committee. While changes to these Chemistry courses, in particular Chemistry 2400, 2401 and 2440 (minimum grades), have implications for the programs we are currently developing, there were no major concerns expressed.

All the best,

Annie
Change to prerequisites for Chemistry 2301 and 2302

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

Grenfell

Subject: changestochemcourses.
From: "Parkinson, Don-Roger" <dparkins@grenfell.mun.ca> Date:
29/04/2016 2:02 PM
To: Travis Fridgen<chemhead@mun.ca>
CC: "Gallant, Robert" <rgallant@grenfell.mun.ca>

Dear Travis,

I was looking through the package with changes to the chemistry courses sent around by Dr. C. Flinn.

We, Environmental Science Chemistry (ENVC), are willing to support those changes agreed upon in the January 2016 meeting at Grenfell regarding the courses: Chern 2301, Chern 2302, Chern 2210, Chern 2400, and Chern 2401. Further, we are willing to support the changes to Chern 2100 which we did not talk about.

The changes to Chern 2440 were not discussed at the January meeting. The view at Grenfell is that Chern 2440 by its very name uorganic Chemistry for Biologists is not a Chemistry course in a true sense as it is offered to the Biology/Biologists to conform to their program. Further the course is credit restricted and usage limited; it can not be used as a chemistry credit for a Chemistry or a Biochemistry program of study. The current MUN Calendar prerequisite requires Chern 1911, or Chern 1959 (or Chern 1001 at Grenfell) all with a pass. These are the only chemistry courses needed to enter into Chern 2440. If changes in prerequisites are to be made then there needs to be a wider discussion involving the Biology Dept in St. John's and the Environmental Biologists at Grenfell. Changes to the Chern 2449 entry requirements have the most direct ramifications to their programs. As of yet, I have seen no discussion or email trail with those faculty involved.

After preliminary discussion with some ENVB colleagues, we suggest that you pull the course (Chern 2440) from the list of changes until Biology (St. John's), Environmental Biology (ENVB) Grenfell, Chemistry (St. John's), and Environmental Chemistry Grenfell (ENVC) can all agree so that we can move ahead with the other changes to the chemistry courses.

Regards, D-R.P.

Dr. Don-Roger Parkinson,
Associate Professor in Analytical Chemistry,
Environmental Chemistry and Chemistry, A5237
Chair, Environmental Science,
Grenfell Campus,
Memorial University of Newfoundland,
P.O. Box 2900
Corner Brook, NL A2H 6P9
Change to prerequisites for Chemistry 2301 and 2302
Proposal:
Change to prerequisite for
Chemistry 2400 and house-keeping in 2400, 2401, and 2440

Executive Summary

This is a proposal for a minor change in the prerequisites for CHEM 2400. Students wishing to do these courses coming from CHEM 1051 (SJ campus) will be required to have a minimum mark of 60% in this course. There are also some minor housekeeping changes.

Resource Implications: Instructional Costs

There are no costs associated with this calendar change.

Library Holdings and/or Other Resources Required

There are no new library or other resources required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
Calendar Changes

Under 10.3 Chemistry (St. John’s)

2400 Introductory Organic Chemistry I is a course on bonding involving carbon; conformations and stereochemistry; introduction to functional groups and nomenclature; properties, syntheses and reactions of hydrocarbons, alkyl halides, and alcohols, and ethers.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 1051
CR: CHEM 2440
LH: 3
PR: Science 1807; a minimum 60% in CHEM 1050 and 1051; or the former 1031; or CHEM 1010 and 1011 with a grade of at least 80% in each; or CHEM 1011 with a grade of at least 85%; or CHEM 1001 (or the former 1031) with a grade of at least 65%

2401 Introductory Organic Chemistry II is an introduction to the interpretation of mass, infrared, $^1$H and $^{13}$C NMR spectra; properties, syntheses and reactions of ethers, simple aromatic and heterocyclic compounds, ketones, aldehydes, amines, carboxylic acids and their derivatives; aldol and related reactions.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: the former CHEM 2420, 2440, and the former 240A/B
LH: 3
PR: Science 1807; CHEM 2400

2440 Organic Chemistry for Biologists is an introduction to the principles of organic chemistry with an emphasis on material relevant to biological molecules. The laboratory will introduce techniques and illustrate concepts covered in the course. This course is designed primarily for Biology Majors.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 2400, the former 2420, the former 240A/B
LH: 3
PR: Science 1807; a minimum 60% in CHEM 1011 (or 1001 or 1051)
UL: may not be used for credit by Chemistry or Biochemistry Majors and is will not serve as a prerequisite for any other Chemistry course.
2400 Introductory Organic Chemistry I is a course on bonding involving carbon; conformations and stereochemistry; introduction to functional groups and nomenclature; properties, syntheses and reactions of hydrocarbons, alkyl halides, and alcohols, and ethers.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: the former CHEM 2420, CHEM 2440, the former CHEM 240A/B
LH: 3
PR: A minimum 60% in CHEM 1051 or the former 1031; or CHEM 1010 and CHEM 1011 with a grade of at least 80% in each; or CHEM 1011 with a grade of at least 85%; or CHEM 1001 (or the former 1031) with a grade of at least 65%

2401 Introductory Organic Chemistry II is an introduction to the interpretation of mass, infrared, $^1$H and $^{13}$C-13 NMR spectroscopy; properties, syntheses and reactions of ethers, simple aromatic and heteroaromatic compounds, ketones, aldehydes, amines, carboxylic acids and their derivatives; aldol and related reactions.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: the former CHEM 2420, CHEM 2440, the former CHEM 240A/B
LH: 3
PR: CHEM 2400

2440 Organic Chemistry for Biologists is an introduction to the principles of organic chemistry with an emphasis on material relevant to biological molecules. The laboratory will introduce techniques and illustrate concepts covered in the course. This course is designed primarily for Biology Majors.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 2400, the former CHEM 2420, the former CHEM 240A/B
LH: 3
PR: A minimum 60% in CHEM 1011 (or CHEM 1001 or CHEM 1051)
UL: is designed primarily for Biology Majors and may not be used for credit by Chemistry or Biochemistry Majors and may will not serve as a prerequisite for any other Chemistry course.
Clean Version

Under **10.3 Chemistry (St. John's)**

**2400 Introductory Organic Chemistry I** is a course on bonding involving carbon; conformation and stereochemistry; introduction to functional groups and nomenclature; properties, syntheses and reactions of hydrocarbons, alkyl halides, alcohols, and ethers.

**AR:** attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

**CR:** CHEM 2440

**LH:** 3

**PR:** Science 1807; a minimum 60% in CHEM 1051; or CHEM 1010 and 1011 with a grade of at least 80% in each; or CHEM 1011 with a grade of at least 85%; or CHEM 1001 (or the former 1031) with a grade of at least 65%

**2401 Introductory Organic Chemistry II** is an introduction to the interpretation of mass, infrared, \(^1\text{H}\) and \(^{13}\text{C}\) NMR spectra; properties, syntheses and reactions of simple aromatic and heteroaromatic compounds, ketones, aldehydes, amines, carboxylic acids and their derivatives; aldol and related reactions.

**AR:** attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

**CR:** CHEM 2440

**LH:** 3

**PR:** CHEM 2400

**2440 Organic Chemistry for Biologists** is an introduction to the principles of organic chemistry with an emphasis on material relevant to biological molecules. The laboratory will introduce techniques and illustrate concepts covered in the course. This course is designed primarily for Biology Majors.

**AR:** attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

**CR:** CHEM 2400

**LH:** 3

**PR:** Science 1807; a minimum 60% in CHEM 1011 (or 1001 or 1051)

**UL:** may not be used for credit by Chemistry or Biochemistry Majors and will not serve as a prerequisite for any other Chemistry course.
2400 Introductory Organic Chemistry I is a course on bonding involving carbon; conformations and stereochemistry; introduction to functional groups and nomenclature; properties, syntheses and reactions of hydrocarbons, alkyl halides, alcohols, and ethers.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 2440
LH: 3
PR: A minimum 60% in CHEM 1051; or CHEM 1010 and CHEM 1011 with a grade of at least 80% in each; or CHEM 1011 with a grade of at least 85%; or CHEM 1001 (or the former 1031) with a grade of at least 65%

2401 Introductory Organic Chemistry II is an introduction to the interpretation of mass, infrared, \(^1\)H and \(^{13}\)C NMR spectra; properties, syntheses and reactions of simple aromatic and heteroaromatic compounds, ketones, aldehydes, amines, carboxylic acids and their derivatives; aldol and related reactions.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 2440
LH: 3
PR: CHEM 2400

2440 Organic Chemistry for Biologists is an introduction to the principles of organic chemistry with an emphasis on material relevant to biological molecules. The laboratory will introduce techniques and illustrate concepts covered in the course. This course is designed primarily for Biology Majors.
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
CR: CHEM 2400
LH: 3
PR: A minimum 60% in CHEM 1011 (or CHEM 1001 or CHEM 1051)
UL: may not be used for credit by Chemistry or Biochemistry Majors and will not serve as a prerequisite for any other Chemistry course.
Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The different requirements for entrance into CHEM 2400, CHEM 1051 (St. John’s campus) and CHEM 1001 (Grenfell) reflect the difference in the content of the two first year programs. Students who wish to take CHEM 2400 on either campus will be required to have a minimum 60% in CHEM 1051 or 65% in CHEM 1001. The other modifications to 2400, 2401, and 2440 are housekeeping measures and/or to ensure consistency between the two calendar entries.
Consultations Sought From

Grenfell
Marine Institute
Mathematics and Statistics
Computer Science
Physics
Biochemistry
Biology
Psychology
Ocean Sciences
Earth Sciences
Pharmacy
Engineering
Faculty of Education

Library Report Received

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

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

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:

Consultation letter

Original Message-----
From: Chris Flinn [mailto:cqflinn@mun.ca]
Sent: Monday, April 25, 2016 4:41 PM
To: associatevpoffice@mun.ca; MIUG Consultations
   mihugconsultations@mun.ca; Mellor, Judith smellor@mun.ca;
   mathconsult@mun.ca; co-chair@mun.ca; Biochemistry Head
   biochemistry@mun.ca; Karen
   Morris kmorris@mun.ca; Annie Mercier amercier@mun.ca; psychology.head@mun.ca;
   Engineering Consultations engconsult@mun.ca; pharminfo@mun.ca; Alison Leitch
   alitch@mun.ca; 'Lagowski, Jolanta' jolanta@mun.ca; Alcock, Erin
   erin@mun.ca;
Cc: Head of Chemistry schevemy@mun.ca
Subject: chemistry proposals for consultation, library review

Hello everyone,
We have six chemistry proposals for review mostly involving changes to course prerequisites which are more appropriate to the courses in question and course descriptions which should better reflect course content as they are being in recent years. A number of course prerequisite changes involve Grenfell campus courses which have resulted from direct discussions.

cheers,

Chris Flinn
Deputy Head, Undergraduate Studies
Chemistry Department
MUN St.John's campus
This email is governed by the Terms and Conditions found in our Disclaimer<http://www.mun.ca/ict/disclaimer>.

Replies received

Library report

15 August 2016

To: Chris Flinn, Department of Chemistry
From: Erin Alcock, Science Research Liaison Librarian
Subject: Change to prerequisite for Chemistry 2400 and house-keeping in 2400, 2401, and 2440

I have reviewed the proposal to change the prerequisites and minimum grade requirement for Chemistry 2400 and the corresponding house-keeping changes for Chemistry 2401 and 2440. This change will have no impact on the Library system.

Biology

Hi Chris,

The Biology Undergraduate Studies Committee reviewed the proposed calendar changes for Chemistry 2100,2210,2301, 2302,2400,2401,2440, 3410 and 3411.

Biology supports the proposed minimum grade requirement that is required prior to admittance into the second year Chemistry courses but we would ask that students taking the course(s) be reminded of this minimum grade requirement as it could affect their timely progress through a science degree program.

We have no issues or concerns with the other minor wording changes.

Thanks

Karen

Marine Institute:

Chris.
Thank you for the opportunity to review and comment on the changes to Chemistry 2400, 2401 and 2440.

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

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

Physics

Hello Chris,

Physics and Physical Oceanography Department looked over these chemistry proposals and, since they primarily deal with prerequisites for chemistry courses offered at Grenfell and St John's campus, this does not affect our course offerings. We are fine with the proposals.

Jolanta

Jolanta B. Lagowski, Professor and Head
Physics and Physical Oceanography
Memorial University
St. John's, NL, Canada A1B 3X7
Email: jolantal@mun.ca
Phone: (709) 864-8738

Education

Hello Chris:

We are pleased to support your calendar changes as outlined.

Judith
Judith Mellor
Co-ordinator, Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
T: 709.864.7554
F: 709.864.2623

Engineering

Dear Dr. Flinn,

Thank you for the opportunity to comment on the proposed set of minor Calendar changes to nine Chemistry courses.

At this afternoon's meeting, the Committee on Undergraduate
Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs. The suggested changes are consistent with the new minors in Chemistry for Process Engineering Majors and in Applied Science-Process Engineering for Chemistry Majors and Honours.

However I note a recurring minor typographical error: "minimum" should be "minimum" in the prerequisite lists for CHEM 2301 and CHEM 2302 (both St. John's and Grenfell versions and both markup and clean versions, eight instances in all).

Yours sincerely,

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

Ocean Sciences

Dear Chris:

The proposed calendar changes were considered by our undergrad studies committee. While changes to these Chemistry courses, in particular Chemistry 2400, 2401 and 2440 (minimum grades), have implications for the programs we are currently developing, there were no major concerns expressed.

All the best,

Annie

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

Grenfell

Subject: changes to chem courses.
From: "Parkinson, Don-Roger" <dparkins@grenfell.mun.ca> Date:
29/04/2016 2:02 PM
To: Travis Fridgen <chemhead@mun.ca>
CC: "Gallant, Robert" <rpgallant@grenfell.mun.ca>

Dear Travis,

I was looking through the package with changes to the chemistry courses sent around by Dr. C. Flinn.
We, Environmental Science Chemistry (ENVC), are willing to support those changes agreed upon in the January 2016 meeting at Grenfell regarding the courses: Chern 2301, Chern 2302, Chern 2210, Chern 2400 and Chern 2401. Further, we are willing to support the changes to Chern 2100 which we did not talk about.

The changes to Chern 2440 were not discussed at the January meeting. The view at Grenfell is that Chern 2440 by its very name, "Organic Chemistry for Biologists," is not a Chemistry course in a true sense as it is offered to the Biology/Biologists to conform to their program. Further, the course is credit restricted and usage limited; it cannot be used as a chemistry credit for a Chemistry or a Biochemistry program of study. The current MUN Calendar prerequisite requires Chern 1911, or Chern 1959 (or Chern 1001 at Grenfell) all with a pass. These are the only Chemistry courses needed to enter into Chern 2440. If changes in prerequisites are to be made then there needs to be a wider discussion involving the Biology Dept. in St. John's and the Environmental Biologists at Grenfell. Changes to the Chern 2440 entry requirements have the most direct ramifications to their programs. As of yet, I have seen no discussion or email trail with those faculty involved.

After preliminary discussion with some ENVB colleagues, we suggest that you pull the course (Chern 2440) from the list of changes until Biology (St. John's), Environmental Biology (ENVB) Grenfell, Chemistry (St. John's), and Environmental Chemistry Grenfell (ENVC) can all agree; so that we can move ahead with the other changes to the chemistry courses.

Regards, D-

R.P.

Or: Don-Roger Parkinson,
Associate Professor in Analytical Chemistry,
Environmental Chemistry and Chemistry, AS237
Chair of Environmental Science,
Grenfell Campus,
Memorial University of Newfoundland,
P.O. Box 2900
Corner Brook, NL A2H 6P9

Subject: RE: changes to chem courses
From: Parkinson, Don-Roger <dparkins@grenfell.mun.ca>
Date: 05/05/2016 1054 AM
To: Travis Fridgen <chemhead@mun.ca>
CC: Gallant, Robert <rpgallant@grenfell.mun.ca>

Dear Travis,

I have circulated the change you have suggested to the ENVS faculty (chemistry and Biology) and it seems that we would be agreeable to your change for Chern 2440 as indicated in the email below. Could also write the PR as: Science 1807; Chern 1051 or Chern 1001 or Chern 1011 with a 60%.

Also for the Grenfell section for all chem courses: Science 1807 should be added to all courses as a PR, as now all of MUN must have this Safety course completed for all students who enter a course with a lab.

Regards, D-

R.P.

---- Original Message ----
From: Travis Fridgen [mailto:chemhead@mun.ca]
Sent: Friday, April 29, 2016 3:25 PM
To: Parkinson, Don-Roger
Cc: Gallant, Robert; Chris Flinn; Karen Hattenhauer; Marino, Paul; Karen Morris
Subject: Re: changes to chem courses
courses.

Dear Don-Roger,

Thank you for your e-mail.

With respect to not talking about CHEM 2100 I have to disagree, we certainly did. It was one of the courses that was listed in the table (along with 2210 and 2301) as having differential marks for students coming from 1051 or 1001. We had agreed that all 2nd year courses would have the change to the prerequisites.

As for 2440, you are absolutely correct that this should have first been discussed with Chemistry at Grenfell before we made this proposal since you also teach the course. The current calendar requires CHEM 1011 or CHEM 1051 (not ase as you stated in your e-mail) or 1aa1. All we are proposing is that if students come from the 1911 route, which is not taught at Grenfell, then they must have a 60% average. I think the problem you are having with it is that the way it is worded, it looks like they have to have 60% in 1051 and 1aa1 also, but that is not the intention, the 60% minimum is only for CHEM 1911.

So, I suggest that you change the wording to state for St. John's:

PR: Science 1807; a minimum 60% in CHEM 1011 or a passing grade in either CHEM 1001 or 1051.

and for the Grenfell Calendar:

PR: a minimum 60% in CHEM 1011 or a passing grade in either CHEM 1001 or 1051.

I hope this clarifies things and that this is acceptable.

Our desire for the 60% in CHEM 1011 is because we teach almost 300 (for example last year 278) students per year and the instructor (and I) have looked at the grades and people coming from 1011 who have less than 60% are very unlikely to pass. Teaching this many students and having a group of students who are unlikely to pass the course is a drain on the instructor and doesn't do the students any good.

I would like to have these changes go through at the same time as the 2400 and 2401 changes. This consultation process is the perfect avenue for Biology (who am I cc'ing) as well as ENVB and ENVC to comment on the changes.

Take care, Travis
November 7, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes, New programs and New Course Proposals

At a meeting held on October 25, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Changes to course descriptions, including some prerequisite changes, for seven Chemistry courses
   (ii) Proposal for new major program in Chemistry (Biological)
   (iii) Calendar change to amend biochemistry requirement in majors programs

2. Department of Ocean Sciences
   (i) Proposals for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems)
   (ii) Proposal for new course Ocean Sciences 2500: Practical Introduction to Ocean Sciences

Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
General and Honours BSc’s in Chemistry (Biological)

Proposal for new chemistry program:
General and Honours BSc in Chemistry (Biological)

Executive Summary

The proposed programs are an Honours or General Bachelor of Science in Chemistry (Biological). Students will graduate with a strong background in chemistry, but through carefully chosen biology and biochemistry courses will specialize on the chemistry of biological systems at the molecular level. This is a challenging option in an ever increasingly important interdisciplinary area of chemistry.

Resource Implications: Instructional Costs

The programs are a novel packaging of existing courses. There are currently no new courses proposed for this and no new resources are anticipated.

Library Holdings and/or Other Resources Required

With no new courses proposed, no other resources are required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
General and Honours BSc's in Chemistry (Biological)

**General and Honours BSc in Chemistry (Biological)**
In the general and honours programs in Chemistry (Biological) students will graduate with a strong background in chemistry as well as a solid base in biology preparing students for further specialization in the chemistry of biological systems at the molecular level. Chemists who focus on biological systems focus on chemical reactions and interactions between biological molecules, use the specialized tools of the chemist to understand small molecules involved in biology and disease—they manipulate these systems and design new biological systems to cure disease and use biological systems to perform chemical processes (environmental remediation by enzymes or whole bacteria/fungi). Honours students will be prepared for graduate research in chemistry, biochemistry, molecular biology, biological chemistry, environmental chemistry, pharmaceutical chemistry, food chemistry, biotechnology, medicinal chemistry, as well as careers in any of these fields.

These are programs that are desirable for students who may have medical school ambitions and for students who would like to teach both chemistry and biology in high school. Currently, students who wish to teach both chemistry and biology cannot do an honours degree due to the intensive laboratory nature of both chemistry and biology. A chemistry honours with a biology minor is still far too onerous to complete in four years. We have been told this by students on numerous occasions. The combination of chemistry and biology as teachable subjects, however, is typical. Over the last 5 years there were 101 students who entered the Faculty of Education at Queen's University in the intermediate/senior division who had chemistry and biology as their two teachable subjects. At Memorial there have been no (0, zero) students in the faculty of education in the last 5 years who chose chemistry and biology as their two teachable subjects. We know, anecdotally, from speaking with students that this is because it is too difficult to complete a chemistry major and biology minor (or vice versa) due to labs, not for lack of interest in the combined subjects.

The proposed programs offer students with interests in biology, biochemistry, medicine, pharmaceutical sciences, and chemistry, a different route to many careers requiring these expertise. The program is significantly different from the biochemistry and joint biochemistry/chemistry degrees. The Honours Chemistry (Biological) program meets and exceeds all requirements for accreditation by the Chemical Institute of Canada (CIC).

Chemistry 4410 (Bio-Organic) and CHEM 490 A/B are both required courses for the Honours program (4410 is required for the General program) and will be capstone courses. CHEM 4410 is a course that deals primarily with the biosynthesis of lipids, terpenes, polyketides, shikimic acids (and their metabolism) etc. In 490 A/B students will be expected to use the integrative experience of their chemistry, biology, and biochemistry courses. Furthermore, on a rotating basis, students will be offered CHEM 4151 (Mass Spec), 4201 (Coord. Chem. in Bio Molecules), CHEM 4305 (Green Chem), CHEM 4305 (Stat Thermo) and CHEM 4701 (Pharmaceutical); Students will be required to complete at least one of these courses.

**Honours Degree in Chemistry (Biological) Timetable**

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<th>Winter</th>
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<tr>
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<td>PHYS1051 or 1021</td>
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<tr>
<td></td>
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<tr>
<td></td>
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<td>CHEM2100 (Analytical I)</td>
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<td>CHEM2302 (Quantum and Spectroscopy)</td>
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<td>CHEM2400 (Organic I)</td>
<td>CHEM2401 (Organic II)</td>
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<td>BIOL2250 (Principles of Genetics)</td>
<td>BIOC2101 (Intro to Biochemistry)</td>
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<tr>
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<td>Elective(1)</td>
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General and Honours BSc's in Chemistry (Biological)

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<th>BIOL3050 (Intro to Microbiology)</th>
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<th>CHEM3211</th>
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<td>CHEM490A</td>
<td>CHEM4410 (Bio-organic)</td>
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At least 6 of the 14 electives must be chosen from:

a) At least three credit hours from chemistry (3210, 3303, 3411 or other 4XXX not previously taken from b).

b) At least three credit hours from: Chemistry 4151*(Mass Spec), 4201(Coord. Chem. in Bio. Molecules), 4206 (Green), 4305 (Adv. Statistical Thermodynamics), 4701 (Pharmaceutical).

c) At least six credit hours from: Biology 3530 (Mol. and Developmental Bio.), 3950(Res. Meth. Genetic. Biotech), 3951(Bioinformatics), 4245(Biophysics), 4050(Adv. Top. Microbio.), 4010(Virology), 4404(Microbial Physiology), and Ocean Sciences 3002 (Aquaculture and Fisheries Biotechnology).

d) At least six credit hours from Biochemistry 3105 (Physical), 3106 (Metabolism), 3107 (Nucleic Acids) 4101(Proteins), or 4201(Membranes).

*4151, students in the chemistry (biological) program would be required to do a seminar in biological mass spectrometry.

Students wishing to pursue medicine have ample elective room to take courses such as physiology, psychology, and sociology to give them a better background for that profession and for the MCAT.

Students wishing to enter a BEd program in the Intermediate and Senior division at MUN have a first and second teachable in chemistry and biology, respectively.

Required Courses and comparisons with other BSc programs (Honours):

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<td>31</td>
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<tr>
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<td>25</td>
<td>24</td>
<td>23</td>
<td>26</td>
</tr>
</tbody>
</table>

*note all degrees are 40 courses. The difference between the required and prescribed are that prescribed courses must be taken in a discipline, but there are choices that students can make.

Graduates will have a very strong chemistry background but will also obtain a good understanding of biological systems at the molecular level. While not required to do so, a list of potential supervisors for projects is below:

While any project involving chemistry (biological) research will suffice for a 490 A/B Honours project, the following are identified as having significant research in biological chemistry (this list is not necessarily comprehensive).

Dr. Laleh Alisaraie (Pharmacy)  Dr. Andrew Lang (Biology)
General and Honours BSc's in Chemistry (Biological)
Dr. Mark Berry (Biochemistry)
Dr. Robert Bertolo (Biochemistry)
Dr. Dawn Bignell (Biology)
Dr. Valerie Booth (Biochemistry)
Dr. Chris Flinn (Chemistry)
Dr. Travis Fridgen (Chemistry)
Dr. Andrei Igamberdiev (Biology)
Dr. Francesca Kerton (Chemistry)
Dr. Robert Helleur (Chemistry)

Dr. Erika Merschrod (Chemistry)
Dr. Sunil Pansare (Chemistry)
Dr. Chris Parrish (Ocean Sciences)
Dr. Ray Poirier (Chemistry)
Dr. Matthew Rise (Ocean Sciences)
Dr. Chris Rowley (Chemistry)
Dr. Brian Staveley (Biology)
Dr. Kapil Tahlan (Biology)
Dr. Peter Warburton (Chemistry)
General and Honours BSc's in Chemistry (Biological)

SUMMARY PAGE FOR SENATE

Approval Form

Program Title

General and Honours Bachelors of Science in Chemistry (Biological)

Course Additions

There are no new courses proposed.

Calendar Entries

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

9.3.8.1 Required Courses
1. a. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, and 4410.
   b. At least 6 credit hours from Chemistry 3210, 3303, 3411 or any 4000-level Chemistry course.
2. Biology 1001, 1002, 2250, 2060, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4245, 4251, 4010, 4050, 4404.
3. Biochemistry 2101 and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
5. Physics 1050 (or 1020) and Physics 1051 (or 1021).
6. Six credit hours in English.

9.3.8.2 Other Information
1. In their first year, prospective students for the General Degree in Chemistry (Biological) should take
   a. Six credit hours in English
   b. Chemistry 1050 and 1051
   c. Biology 1001 and 1002
   d. Physics 1050 (or 1020) and 1051 (or 1021)
   e. Mathematics 1000 and 1001
2. This program fulfills the first and second teachable requirements for admission into the Bachelor of Education (Intermediate/Secondary) at Memorial University with Chemistry and Biology as the first and second teachable subjects, respectively.
3. Students wishing to pursue admission to the Doctor of Medicine program have ample elective room to take physiology, psychology, and sociology courses to better prepare them for the MCAT.
4. Students in the Chemistry (Biological) program are not able to also qualify for a minor in Biology.
5. Some courses in 9.3.8.1 require one or more prerequisites that are not defined as part of the program.
General and Honours BSc's in Chemistry (Biological)

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

9.3.9.1 Required Courses
1. a. Chemistry 1050 and 1051, 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410 and 490A/B.
   b. At least 3 credit hours from Chemistry 3210, 3303, 3411 or any 4000-level Chemistry course not used to fulfill 1.c.
   c. At least 3 credit hours from Chemistry 4151, 4201, 4206, 4305, or 4701.
2. Biology 1001, 1002, 2250, 2060, and 3050 and at least 6 credit hours chosen from Biology 3530, 3950, 3951, 4245, 4251, 4050, 4010, 4404.
3. Biochemistry 2101, and at least 6 credit hours from Biochemistry 3105, 3106, 3107, 4101, and 4201.
5. Physics 1050 (or 1020) and Physics 1051 (or 1021).
6. Six credit hours in English.

9.3.9.2 Other Information
1. In their first year, prospective Honours students in Chemistry (Biological) should take
   a. Six credit hours in English
   b. Chemistry 1050 and 1051
   c. Biology 1000 and 1001
   d. Physics 1050 (or 1020) and 1051 (or 1021)
   e. Mathematics 1000 and 1001
2. Those courses in which a grade of B or an average of 75% or higher are required as specified in the Regulations for the Honours Degree of Bachelor of Science, Academic Standing, clause a., are the courses beyond first year used to satisfy clauses 1, 2, and 3 under Required Courses above.
3. Chemistry 490A/B will normally require the equivalent of nine hours per week for two semesters. Registration in Chemistry 490A/B is restricted to those students who have honours standing. The Honours dissertation will be assessed by a committee comprising the supervisor and one other faculty member. 490 A/B Projects are to be approved by the Head of the department or delegate.
4. The Honours in Chemistry (Biological) program can be completed in four years. Students should consult the Undergraduate Student Handbook for timetabling details.
5. Students completing first year requirements for any of Chemistry, Mathematics, or Physics via the three course options (i.e. Chemistry 1010, 1050, 1051 (or 1010, 1011, and the former 1031), Mathematics 1090, 1000, 1001, Physics 1020, 1021, 1051) instead of the two course options (Chemistry 1050, 1051, Mathematics 1000, 1001, Physics 1050, 1051) will require the corresponding number of extra credits to obtain an Honours degree.
6. With the permission of the head of the department, 6000-level courses may be taken in the final year of the Honours Program.
7. This program fulfills the first and second teachable requirements for admission into the Bachelor of Education (Intermediate/Secondary) at Memorial University with Chemistry and Biology as the first and second teachables, respectively.
8. Students wishing to pursue admission to the Doctor of Medicine program have ample elective room to take physiology, psychology, and sociology courses to better prepare them for the MCAT.
9. Students in the Chemistry (Biological) program are not able to also qualify for a minor in Biology.
10. Some courses in 9.3.9.1 require one or more prerequisites that are not defined as part of the program.
General and Honours BSc's in Chemistry (Biological)

Secondary Calendar Changes

9.3 Chemistry
www.chem.mun.ca
The following undergraduate programs are available in the Department:
1. Applied Mathematics and Chemistry Joint Honours
2. Biochemistry and Chemistry Joint Honours
3. Chemistry and Earth Sciences Joint Honours
4. Chemistry and Physics Joint Honours
5. Major or Honours in Chemistry (Option for Minor in Applied Science-Process Engineering)
6. Minor in Chemistry
7. Major or Honours in Computational Chemistry
8. Major or Honours in Chemistry (Biological)

The Majors and Honours in Chemistry and Chemistry (Biological), and the Joint Honours with Applied Mathematics, Biochemistry, and Physics are accredited by the Canadian Society for Chemistry.

9.3.810 Course Restrictions
Students should be aware of a number of credit restrictions. For further information see the Chemistry course descriptions section found at the end of the Faculty of Science section under Course Descriptions, Chemistry.

Rationale

In the general and honours programs in Chemistry (Biological), students will graduate with a very strong background in chemistry but will also have a real strength in biology and will obtain specialized knowledge in the chemistry of biological systems at the molecular level. Chemists who focus on biological systems focus on chemical reactions and interactions between biological molecules, use the specialized tools of the chemist to understand small molecules involved in biology and disease—they manipulate these systems and design new biological systems to cure disease and use biological systems to perform chemical processes (for example environmental remediation by enzymes or whole bacteria/fungi). These students will be prepared for graduate research in chemistry, biochemistry, molecular biology, biological chemistry, environmental chemistry, pharmaceutical chemistry, food chemistry, biotechnology, medicinal chemistry, as well as careers in these fields. It is a program that will also be desirable for students who may have medical school intentions. The degrees will also allow students admission into the Faculty of Education with Chemistry and Biology as their first and second teachable subjects, respectively. It is beneficial to the Province and to Canada that we produce teachers with some research experience. Currently it is impossible to complete an honours in chemistry with biology as a second teachable in a four year span.

The proposed program offers students with interests in biology, biochemistry, medicine, pharmaceutical sciences, and chemistry, an alternate route to many careers requiring the expertise in these areas. The program is significantly different from the biochemistry and joint biochemistry/chemistry degrees. The Honours Chemistry (Biological) and General Chemistry (Biological) degrees meet all requirements for accreditation by the Chemical Institute of Canada (CIC).
General and Honours BSc's in Chemistry (Biological)

Clean Version of Secondary Calendar Changes

9.3 Chemistry
www.chem.mun.ca

The following undergraduate programs are available in the Department:
1. Applied Mathematics and Chemistry Joint Honours
2. Biochemistry and Chemistry Joint Honours
3. Chemistry and Earth Sciences Joint Honours
4. Chemistry and Physics Joint Honours
5. Major or Honours in Chemistry (Option for Minor in Applied Science-Process Engineering)
6. Minor in Chemistry
7. Major or Honours in Computational Chemistry
8. Major or Honours in Chemistry (Biological)

The Majors and Honours degrees in Chemistry and Chemistry(Biological), and the JointHonours with Applied Mathematics, Biochemistry, and Physics are accredited by the Canadian Society for Chemistry.

9.3.10 Course Restrictions
Students should be aware of a number of credit restrictions. For further information see the Chemistry course descriptions section found at the end of the Faculty of Science section under Course Descriptions, Chemistry.
General and Honours BSc's in Chemistry (Biological)

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Library Report Received          yes

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

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

Name

FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:
General and Honours BSc's in Chemistry (Biological)

Consultation email:

----- Original Message -----  
From: Chris Flinn [mailto:cgflinn@mun.ca]  
Sent: March-07-16 10:40 AM  
To: associatevpoffice@grenfell.mun.ca; miugconsultations@ml.mun.ca; Mellor, Judith; McLeod, Heather; 
mathconsult@mun.ca; cs-chair@mun.ca; Biochemistry Head; Karen Morris; psychology.head@mun.ca; 
amercier@mun.ca; Alison Leitch; Engineering Consultations; pharminfo@mun.ca; Lagowski, Jolanta; Head of 
Chemistry  
Subject: consultation request biological chemistry corrected  

Hello Everyone,

Please find as an attachment, a new proposal for a major and an honours degree in biological chemistry. I would appreciate your feedback at your earliest convenience. Please note that I sent the wrong attachment previously!

thanks,

Chris Flinn  
Deputy Head, Undergraduate Studies  
Chemistry Department

Library response:

Collection Development Division  
Queen Elizabeth II Library

4 April 2016

To: Chris Flinn, Department of Chemistry  
From: Erin Alcock, Science Research Liaison Librarian  
Subject: General and Honours BSC degrees in Biological Chemistry Proposal

I have reviewed the proposal for a new degree; that of General and Honours BSc in Biological Chemistry. As there are no new courses proposed at this time, but rather a redistribution of required, existing, courses, the Memorial University of Newfoundland Library system has more than sufficient resources to support this degree program as it already supports these courses under existing budget allocations.

Responses from consulted faculties, science departments etc:

Biochemistry
General and Honours BSc’s in Chemistry (Biological)

Consultation summary:

Biochemistry raised a number of concerns with the proposal resulting in extensive email correspondence between the two departments. A face to face meeting between Martin Mulligan and Mark Berry from Biochemistry and the Chemistry Head and Deputy Head, Undergraduate Studies, on April 4 ended with agreement on the resolution of all of Biochemistry’s concerns about the program. Chemistry agreed to change the name of the proposal from biological chemistry to chemistry (biological). We also added BIOC 3106 as a potential course and moved BIOC 3105 from a required course to the list of potential courses.

Hi Travis,

Rather than wait for Mark to make the department’s official response, I thought I’d point out a few small errors and typos that really don’t need to be part of that response:

In the Executive Summary (p1), it still says “The proposed degree is an Honours Bachelor of Science in Chemistry (Biological)” - no mention of General there.

on p3, below the table: degrees are 40 course degrees (not 40 credit). Also, it should read “discipline” not “disciple”

on the following line, it should be “obtain” not “abtain”

On p4, Other information should be numbered 9.3.8.2
On p5, Other information should likewise be numbered 9.3.9.2

Martin

Biology:

Hi Chris,
The Biology Undergraduate Studies Committee reviewed the proposal for a major and an honours in Biological Chemistry and we are in support of the proposal.

Thanks
Karen

Karen Morris
Undergraduate Officer
Department of Biology
Memorial University of Newfoundland
St. John’s, NL A1B 3X9
709-864-3021

Engineering

Dear Dr. Flinn,

Thank you for the opportunity to comment on the proposed new major and honours degree in biological chemistry, the change in
General and Honours BSc's in Chemistry (Biological)

prerequisites for CHEM 1051 and the new course CHEM 4620 "environmental chemistry".

At its meeting of March 16, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science determined that these proposals should have no impact on our programs.

Yours sincerely,

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

Physics: from Martin Plummer

Hi Chris,

Physics has no issues with the proposed new major and honours degrees in biological chemistry.

Cheers,

Martin

Mathematics and Statistics

Hi Chris,

The Department of Mathematics and Statistics would like to make the following comments regarding the proposed new Major in Biological Chemistry:

* Given the content of the proposed program, was the inclusion of a Statistics course considered in the requirements (at least for the honours degree if not for the general degree)? It would seem to be a natural fit, and would be consistent with the requirements for the Major and Honours in Biology, as well as the Honours in Biochemistry.

* The proposal asserts that the Major in Biological Chemistry is "significantly different from the biochemistry and joint biochemistry/chemistry degrees" and supports this statement with a breakdown of the respective course requirements. However, it would be informative if the proposal also elaborated on the practical (rather than regulatory) distinction between the programs.

* Is there a concern regarding "brand confusion" amongst the student body? That is, will students understand that the Major in Biochemistry and the Major in Biological Chemistry are two distinct programs?

Regards,

Shannon
General and Honours BSc's in Chemistry (Biological)

Dr. Shannon Patrick Sullivan
Dept. of Mathematics & Statistics
Senior Faculty Advisor, Faculty of Science
Memorial University of Newfoundland
St. John's · NL · Canada
shannon@mun.ca · www.ucs.mun.ca/~shannon

****

In response to the first concern, chemistry has added Statistics 2550 as a "strongly recommended" course, but we do not that none of the courses in the program require STAT 2550, but we do feel it should be recommended.

The second concern is addressed in the preamble. This is another, very different option of program for students and none of the other programs, for example, will allow for teachable subjects in both chemistry and biology.

To address the third concern, we have changed the name of the programs to Chemistry (Biological). It is a mouthful, but it works.

Marine Institute:

Chris,

Thank you for the opportunity to review and comment on the proposed new Honours program in Biological Chemistry.

This program will have no impact on the programs at the Marine Institute and we are happy to support this proposal.

A couple of minor typos regarding the numbering of the sections will need to be addressed (9.3.8.1 and 9.3.9.1 are both listed twice.)

Best of luck 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

Ocean Sciences:

Hi Chris:
General and Honours BSc's in Chemistry (Biological)
I have consulted with our undergraduate studies committee, and we all agree that the proposed program is valuable and interesting. We also came up with unanimous suggestions:

(1) BIOL 4251 Genomics should appear in the electives for this program, as its contents are very relevant. OCSC 3002 Aquaculture and Fisheries Biotechnology may also be of interest to students in this program.

(2) The list of supervisors might include two faculty members from the Department of Ocean Sciences with relevant expertise: Drs. Matthew Rise and Christopher Parrish.

I also attach the annotated document.

All the best,
Annie

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

Faculty of Education:

Hello Chris:

Thank you for the opportunity to respond.

I am confirming that both the general and honours degree proposed will meet the credit hour requirements for first teachable area (Chemistry) and second teachable area (Biology) when students apply to the Bachelor of Education (Intermediate/Secondary) program. (As discussed, we will consider one biochemistry course towards the requirement for the (second) biology teachable area.

We recommend, if possible, for a mathematics course (beyond first year) be included in the requirements for the honours degree, preferably in the area of statistics, calculus or linear algebra. This will keep it more in line with other honours degrees and would be beneficial to those who may be involved more intensively in research. (If this is addressed within any individual courses; please disregard.)

Best regards,
Judith

Judith Mellor
Co-ordinator, Undergraduate Programs
Faculty of Education
Memorial University of Newfoundland
T: 709.864.7554
F: 709.864.2623
November 7, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes, New programs and New Course Proposals

At a meeting held on October 25, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Changes to course descriptions, including some prerequisite changes, for seven Chemistry courses
   (ii) Proposal for new major program in Chemistry (Biological)
   (iii) Calendar change to amend biochemistry requirement in majors programs

2. Department of Ocean Sciences
   (i) Proposals for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems)
   (ii) Proposal for new course Ocean Sciences 2500: Practical Introduction to Ocean Sciences

Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

Proposal:
Change requirement in Chemistry/Joint Chemistry BSc/HBSc programs from CHEM 3410 to BIOC 2101,
Change CHEM 3410 to 4410,
and Some Housekeeping Changes

Executive Summary
This proposal is to change the biochemistry requirement in the chemistry programs from CHEM 3410 to BIOC 2101 to meet accreditation requirements from the Chemical Society of Canada. Concurrently, we propose to change the numbering of CHEM 3410 to CHEM 4410 and drop the lab requirements from the course; the course descriptions for (the new) CHEM 4410 and CHEM 3411 are also updated. Some housekeeping changes are also being proposed to tidy the calendar.

Resource Implications: Instructional Costs
There are no costs associated with this calendar change.

Library Holdings and/or Other Resources Required
There are no new library or other resources required.

Signature of Unit Head (if appropriate):

Date:

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

Date:
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

SUMMARY PAGE FOR SENATE
Approval Form

Calendar Changes

9.3 Chemistry

The Major, Honours, and Joint Honours with Applied Mathematics, Biochemistry, Earth Sciences, and Physics are accredited by the Canadian Society for Chemistry.

9.3.4 General Degree - Major in Chemistry

The courses required for a Major in Chemistry are:

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, 3410, and 3411.
2. Physics 1050 (or 1020) and 1051 (or 1021).
4. Biochemistry 2101

Recommended courses: Biochemistry 2101, Mathematics 2051, Physics 2820 and/or 2750.

Students considering declaring Chemistry as their Major are encouraged to contact either the Head of the Department or the Deputy Head (Undergraduate Studies).

Chemistry Majors may complete a minor in Applied Science - Process Engineering. The requirements for this minor are detailed under Faculty of Engineering and Applied Science, Minor in Applied Science - Process Engineering.

9.3.5.1 Required Courses

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, 3410, 3411, and 490A/B and 12 credit hours selected from the remaining 4000 level Chemistry courses.
2. 12 credit hours selected from the 4000 level Chemistry courses chosen in consultation with the 490A/B supervisor for chemistry.
3. Physics 1050 (or 1020) and 1051 (or 1021).
5. Biochemistry 2101.

9.3.5.2 Other Information

2. Recommended courses: Biochemistry 2100, Biochemistry 2101, Mathematics 2051, Physics 2820 and/or 2750.

7. Given appropriate circumstances, the Honours Chemistry program may be completed in four years. Students should consult the Undergraduate Student Handbook for timetabling details.

8. Students completing first year requirements for either Chemistry or Mathematics via the three course options (i.e. Chemistry 1010, 1050, 1051 (or 1010, 1011, and the former 1031), Mathematics 1090, 1000, 1001) instead of the two course options (Chemistry 1050, 1051,
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

Mathematics 1000, 1001) will require the corresponding number of extra credits to obtain an Honours degree.

9.3.6.1 Required Courses

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, 4304, 4305.

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 39 credit hours in Chemistry, a minimum of 21 credit hours in Mathematics, a minimum of 15 credit hours in Physics, and a minimum of 15 credit hours in Computer Science. An additional 3 credit hours in recommended Biochemistry, Chemistry, Computer Science, Mathematics or Physics 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 the former 1031) (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, 4304, and 4305.

9.3.7.3 Other Information

4. Students completing first year requirements for any of Chemistry, Mathematics or Physics via the three course options (i.e. Chemistry 1010, 1050, and 1051, or 1010, 1011, the former 1031, Mathematics 1090, 1000, 1001, Physics 1020, 1021, 1051) instead of the two course options (Chemistry 1050, 1051, Chemistry 1200, 1001, Mathematics 1000, 1001, Physics 1050, 1051) will require the corresponding number of extra credits to obtain an Honours degree.
5.1.1 Applied Mathematics and Chemistry Joint Honours (B.Sc. Only)

The following courses are required:

3. Biochemistry 2101 or Chemistry 3410.

6. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.

8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.

5.1.3 Biochemistry and Cell Biology Joint Honours

4. Chemistry 2100, 2301, 2400, 2401; either 3410 or 3411 or 4410.

5.1.4 Biochemistry and Chemistry Joint Honours

The following courses are required:

3. Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 3410, 4410.

5.1.12 Chemistry and Earth Sciences Joint Honours

3. Chemistry 2100, 2210, 2301, 2302, 2400, 2401 and 3110; plus 3211, 3303, 3410, and 3411 with the option of substituting up to 6 credit hours of these 3000-level courses with 4000-level Chemistry courses; and at least 3-6 additional credit hours in the remaining 3000-level and 6 credit hours in 4000-level Chemistry courses.

5. Biology 2120 (or Biology 1001 and 1002) or and Biochemistry 2101.

5.1.13 Chemistry and Physics Joint Honours

The following courses are prescribed:

3. Chemistry 1050 and 1051 (or Chemistry 1010, 1011 and the former 1031; or Chemistry 1200 and 1001), 2100, 2210, 2301 (or the former Chemistry 2300), 2302, 2400, 2401, 3210 or 3211, 3303, 3410, and 6 additional credit hours in Chemistry courses numbered 3000 or higher.


45. Either An Honours Dissertation (Chemistry 490A/B or Physics 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.
9.1.2.1 Honours Degree in Biochemistry

3. Required courses:
   g. Chemistry 2301 or Physics 2053, Chemistry 2400, 2401, one of Chemistry 3410 or 3411 or 4410.

10.3 Chemistry


AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

CR: the former CHEM 3404 3410
LH: 3
PR: Science 1807; CHEM 2401.

**3411 Synthetic Organic Chemistry I** is a survey of some important reactions used in organic synthesis, including pericyclic reactions and those based on carbocation, carbone, nitrene and carbanion intermediates. Emphasis is placed on multifunctional compounds. It is an introduction to organic synthesis. It covers the principles of organic synthesis and a range of reactions that are used in its pursuit. These reactions fall under the general headings of functional group interconversion (oxidation, reduction, protection, deprotection, substitution, elimination) and skeleton-building (reactions of carbon nucleophiles with electrophiles, transition metal-catalyzed reactions, pericyclic reactions and reactions involving reactive intermediates).

AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.

CR: the former CHEM 3460
LH: 3
PR: Science 1807; CHEM 3410, or all of CHEM 2401, Biochemistry 2100 and Biochemistry 2101.
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

Clean Version for Calendar

9.3 Chemistry

The Major, Honours, and Joint Honours with Applied Mathematics, Biochemistry, Earth Sciences, and Physics are accredited by the Canadian Society for Chemistry.

9.3.4 General Degree - Major in Chemistry

The courses required for a Major in Chemistry are:
1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, and 3411.
2. Physics 1050 (or 1020) and 1051 (or 1021).
4. Biochemistry 2101

Recommended courses: Mathematics 2051, Physics 2820 and/or 2750.

Students considering declaring Chemistry as their Major are encouraged to contact either the Head of the Department or the Deputy Head (Undergraduate Studies).

Chemistry Majors may complete a minor in Applied Science - Process Engineering. The requirements for this minor are detailed under Faculty of Engineering and Applied Science, Minor in Applied Science - Process Engineering.

9.3.5.1 Required Courses

1. Chemistry 1050 and 1051 (or 1010, 1011 and the former 1031) (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210, 3211, 3303, 3411, and 490A/B.
2. 12 credit hours selected from the 4000 level Chemistry courses chosen in consultation with the 490A/B supervisor.
3. Physics 1050 (or 1020) and 1051 (or 1021).
5. Biochemistry 2101.

9.3.5.2 Other Information

2. Recommended courses: Biochemistry 2100, Mathematics 2051, Physics 2820 and/or 2750.

7. Students should consult the Undergraduate Student Handbook for timetabling details.
8. Students completing first year requirements for either Chemistry or Mathematics via the three course options (i.e. Chemistry 1010, 1050, Mathematics 1090, 1000, 1001) instead of the two course options (Chemistry 1050, 1051, Mathematics 1000, 1001) will require the corresponding number of extra credits to obtain an Honours degree.
9.3.6.1 Required Courses

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, 4304, 4305.

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.

9.3.7.1 Required Courses

1. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, 4304, and 4305.

9.3.7.3 Other Information

4. Students completing first year requirements for any of Chemistry, Mathematics or Physics via the three course options (i.e. Chemistry 1010, 1050, 1051, Mathematics 1090, 1000, 1001, Physics 1020, 1021, 1051) instead of the two course options (Chemistry 1050, 1051, Chemistry 1200, 1001, Mathematics 1000, 1001, Physics 1050, 1051) will require the corresponding number of extra credits to obtain an Honours degree.
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

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

6. Chemistry 1050 and 1051 (or 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3210 or 3211, 3303.

8. An Honours Dissertation (Mathematics 419A/B or Chemistry 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.

5.1.3 Biochemistry and Cell Biology Joint Honours
4. Chemistry 2100, 2301, 2400, 2401; either 3411 or 4410.

5.1.4 Biochemistry and Chemistry Joint Honours
The following courses are required:
3. Chemistry 2100, 2210, 2301, 2302, 2400, 2401, 3110, 3211, 4410.

5.1.12 Chemistry and Earth Sciences Joint Honours
3. Chemistry 2100, 2210, 2301, 2302, 2400, 2401 and 3110; and at least 6 additional credit hours in the remaining 3000-level and 6 credit hours in 4000-level Chemistry courses.

5.  Biology 2120 and Biochemistry 2101.

5.1.13 Chemistry and Physics Joint Honours
The following courses are prescribed:
3. Chemistry 1050 and 1051 (or Chemistry 1200 and 1001), 2100, 2210, 2301, 2302, 2400, 2401, 3210 or 3211, 3303, and 6 additional credit hours in Chemistry courses numbered 3000 or higher.
5. An Honours Dissertation (Chemistry 490A/B or Physics 490A/B). The topic of the Honours Dissertation must have the prior approval of the Heads of the two Departments. A faculty member of either Department may act as supervisor.

5.1.13.1 Honours Degree in Biochemistry
3. Required courses:
h. Chemistry 2301 or Physics 2053, Chemistry 2400, 2401, one of Chemistry 3411 or 4410.

10.3 Chemistry

CR: the former CHEM 3410
PR: CHEM 2401.

3411 Synthetic Organic Chemistry I is an introduction to organic synthesis. It covers the principles of organic synthesis and a range of reactions that are used in its pursuit. These reactions fall under the general headings of functional group interconversion (oxidation, reduction, protection, deprotection, substitution, elimination) and skeleton-building (reactions of carbon nucleophiles with electrophiles, transition metal-catalyzed reactions, pericyclic reactions and reactions involving reactive intermediates).
AR: attendance is required in the laboratory component of this course. Failure to attend may result in a failing grade or deregistration from the course.
LH: 3
PR: Science 1807; CHEM 2401
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

Rationale

In order to maintain CSC (Chemical Society of Canada) accreditation, the CHEM 3410 requirement in all chemistry degrees is proposed to change to BIOC 2101 which satisfies accreditation. In essence, this is a reversion to the way it was 6 years ago. CHEM 3410 is currently an optional course for some biochemistry programs and about 20 or so biochemists take it every year. We also expect that many chemistry majors or honours students will still want this as an optional course to satisfy their degree requirements. Since the course is not going to be “core” material, we propose to change the numbering from CHEM 3410 to CHEM 4410 and remove the lab component as is the norm for more specialized courses in Chemistry. As a result there are a number of changes throughout the calendar associated with the numbering of the course.

We have also taken the opportunity to update some other calendar language such as:

- The course descriptions for CHEM 3411 and the newly numbered 4410 (formerly 3410)
- Updating the wording for the honours thesis requirements for the Joint Chemistry/Physics and Chemistry/Applied Math—the same language as in the Chemistry/Earth Sciences major—stating that the heads of both departments should have approval of both heads. This is important for chemistry accreditation as we use the lab hours in the dissertation to meet requirements.
- Removal of the CHEM 1010/1011/1031 three-course first year option as 1031 does not exist anymore.
- Some minor changes to the chemistry/earth sciences program to require instrumental analysis (CHEM 3110) and BIOC 2101 (for accreditation) and making the language a bit easier to understand.
- Removal of the summary of credit hours at the beginning of the Honours degree in computational chemistry.
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

<table>
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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:
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping
Library Report:

Dr. Flinn,

I have reviewed the proposal to change the biochemistry course requirement for chemistry majors and the housekeeping that follows. I see this as having minimal impact on the library.

Any further information required, please let me know.

Erin Alcock

Erin Alcock
Science Research Liaison Librarian
QE2 Library
Memorial University of Newfoundland
ekalcock@mun.ca
709-864-8316

Consultations:
Consultation email from chemistry:

-----Original Message-----
From: Chris Flinn [mailto:chflinn@mun.ca]
Sent: Thursday, September 29, 2016 4:24 PM
To: LibraryConsultations@mun.ca; MIUG Consultations
   chflinn@mun.ca; Mallor, Judith chmallor@mun.ca;
   mallorconsult@mun.ca; ns-chair@mun.ca; Biochemistry Head alcohead@mun.ca; Annie
   Mercier emercier@mun.ca; psychology.head@mun.ca; Engineering Consultations
   econsult@mun.ca; phlumm@mun.ca; prattm@mun.ca; Alison Leitch
   alleitch@mun.ca; 'Lagowski, Jolanta' jolanal@mun.ca; Alcock, Erin
   ekalcock@mun.ca.
Subject: Consultations on a new chemistry proposal and Library report

Hello everyone,

Please review the attached proposal from chemistry which involves chemistry organic courses, biochemistry 2101 and a number of minor calendar changes and send your comments to me at your earliest convenience.

thanks,

Chris Flinn
Deputy Head, Undergraduate Studies
MUN Chemistry Department

Responses to consultation email:

Marine Institute:

Chris,
Changes to CHEM 3410, Chemistry/Joint Chemistry BSc/HBSc Programs, and Housekeeping

Thank you for the opportunity to review and comment on the changes to the Biochemistry requirements and the Calendar changes.

These changes will have no impact on the programs at the Marine Institute. We are happy to support this proposal.

One extremely minor detail: "Earth Sciences" is underlined in the clean version (p.6 of the document).

All the best,

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

Physics:

Hi Chris,

Physics is okay with this proposal.

Martin Plumer

-----Original Message-----
From: Lagowski, Jolanta [mailto:jolanta@mun.ca]
Sent: September-29-16 4:48 PM
To: Martin Plumer
Subject: FW: Consultations on a new chemistry proposal and Library report

Please have a look. I should point out the the honcur thesis topic will required to be approved by the heads (or their delegates) of both departments.

Jolanta

Pharmacy:

Hi Dr. Flinn
Dr. Dillon, Associate Dean has reviewed the proposed calendar changes and has no comments other than she supports the changes.

Csop Glew

CSOP GLEW, Hon. B.A., M.U.P. I MANAGER OF ACADEMIC PROGRAMS
School of Pharmacy
Memorial University of Newfoundland
St. John's, NL I A1B 3V6
Health Sciences Centre I Room H3435
T 709 777 6963 I F 709 777 7044
www.mun.ca/pharmacy
November 7, 2016

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

At a meeting held on October 25, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Changes to course descriptions, including some prerequisite changes, for seven Chemistry courses
   (ii) Proposal for new major program in Chemistry (Biological)
   (iii) Calendar change to amend biochemistry requirement in majors programs

2. Department of Ocean Sciences
   (i) Proposals for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems)
   (ii) Proposal for new course Ocean Sciences 2500: Practical Introduction to Ocean Sciences

Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal for a New Program
Major in Ocean Sciences

Executive Summary

The proposed degree is a Bachelor of Science with a Major in Ocean Sciences. It is an interdisciplinary program, providing a solid foundation in ocean studies, including the basic principles of its main sub-disciplines (physical, chemical, geological, and biological oceanography). The unique requirements for a broader than usual introductory coursework (to adequately prepare students for higher-level courses in a diversity of disciplines) is balanced by a slightly lower number of mandatory courses from the subject of the Major. The need for the proposed program and the anticipated benefits to students both lie in the crucial role that oceans play in the sustainability of the planet and in the livelihood of its inhabitants.

Resource Implications: Instructional Costs

New resources are not required beyond the instructional costs associated with a new field course (OCSC 2500), outlined in a separate new course proposal.

Library Holdings and/or Other Resources Required

The library can support this program with existing resources.

Signature of Unit Head (if appropriate): ________________________________

Date: ________________________________

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

Date: ________________________________
Rationale for a Degree in Ocean Sciences

The Department of Ocean Sciences has the appropriate expertise and is ideally positioned for continued leadership in student training in marine fields. The proposed Major in Ocean Sciences would complement the Department’s newly approved Minors in Oceanography and in Sustainable Aquaculture and Fisheries Ecology, and its well subscribed graduate programs in Marine Biology. Several indicators support the need for an undergraduate program dedicated to ocean sciences, which would be among the very few of its kind in Atlantic Canada, and thus, have the potential to attract new students. Even without an existing program, we have received nearly 50 e-mails inquiring about our undergraduate programs since January 2013, and more than 10 inquiries via Facebook. On average, we also get 4 phone calls per month regarding existing and prospective programs. Enrollment in the Department’s introductory course (OCSC 1000 – Exploration of the World Ocean) is consistently high (~60), demonstrating sustained interest on the part of the student community. Several students have already registered in the Minors, despite their recent implementation and the absence of a Major. Finally, the marine Public Education Program (PEP) continues to be very successful, and the Department’s engagement with high school students is ever growing.

Canada’s ocean environment is among the most dynamic in the world, and its capacity to support productive fisheries hinges upon complex interactions between a wide range of species and the physical, chemical, geological, and biological environments. In light of accelerated climate change and increased pressure on marine resources (from fisheries, the petroleum industry, coastal development and aquaculture), work related to ocean sciences is flourishing. Memorial University has the potential to emerge as a world leader in the training of marine scientists, in line with its goal of becoming ‘Canada’s oceans university’. Graduates with a Major in Ocean Sciences would be expected to find positions in the field of ocean technology (e.g. alternative energies, offshore exploration, fishing, aquaculture, meteorology) as well as with agencies or organizations involved in ocean management and stewardship (e.g. Environment Canada, Fisheries and Oceans Canada, public aquariums). Alternatively, the proposed program will prepare students for graduate school and future careers in marine research, where their contribution to the exploration, preservation and sustainable use of our oceans would become a collective wealth.

The proposed program is interdisciplinary and, as such, has no current equivalent among undergraduate offerings in the Faculty of Science or at Memorial, except through joint degrees. The unique requirement of a broader than usual introductory coursework (to adequately prepare students for higher-level courses in a diversity of disciplines) is balanced by a slightly lower number of mandatory courses in the subject of the Major. Students can choose between a general degree in Ocean Sciences or a concentration in Environmental Systems, which provides a geological/geographical context to biological and chemical phenomena; it also covers such key ocean-related topics as climate change and natural hazards. Additional Majors soon to be offered by our Department are currently being developed in collaboration with the Department of Biology and the Marine Institute, to cover the fields of Marine Biology and Fisheries/Aquaculture (or Marine Biotechnology).
## Potential Time Tables for Bachelor of Science in Ocean Sciences

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FALL SEMESTER</th>
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<td>OCSC 4122*</td>
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*Note that some courses are offered outside the normal semester schedules, including OCSC 2500 (May), OCSC 4000 (August) and OCSC 4122 (April-May). Such timing is illustrated as an inter-semester space inserted after the winter semester.*
Major in Ocean Sciences (31 October 2016)

SUMMARY PAGE FOR SENATE

Approval Form

Program Title

Bachelor degree with Major in Ocean Sciences
B.Sc. (Ocean Sciences)

Course Additions

Only one new course is being developed:
OCSC 2500 Practical Introduction to Ocean Sciences

Calendar Entry

9.9.3 Major in Ocean Sciences

Students wishing to take this program are encouraged to carefully consult Section 6.4 of the Calendar dealing with Regulations for the Degree of Bachelor of Science.

The Major in Ocean Sciences consists of core courses that provide a broad appreciation of the multidisciplinary nature of ocean study, and additional courses in various Science subjects. Students can pursue the general Major in Ocean Sciences, or a disciplinary stream that provides focus for the degree program. More information on specialization, including recommended courses and time tables, can be found in the Handbook of Undergraduate Studies in Ocean Sciences on the Department website.

9.9.3.1 Entrance Requirements

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

1. English 1080 and 1110 (or equivalent);
2. Mathematics 1000 (or equivalent);
3. Physics 1020 (or Physics 1050);
4. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001);
5. Biology 1001 and 1002;
6. Earth Sciences 1000;
7. Ocean Sciences 1000 with a minimum grade of 65%

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

1. English 1080 and 1110 (or equivalent);
2. Mathematics 1000 (or equivalent);
3. Statistics 2550 (or equivalent);
4. Physics 1020 and 1021 (or Physics 1050 and 1051);
5. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001);
6. Biology 1001 and 1002;
7. Earth Sciences 1000;
8. A minimum of 30 credit hours in Ocean Sciences, including:
   a. Ocean Sciences 1000, 2000 (or Biology 3710), 2001, 2100 and 2500;
   b. At least one of Ocean Sciences 2200 or 2300;
   c. At least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3620, 3640, 4000, 4100, 4122, 4601;
9. Extra Science courses as necessary to fulfill the minimum requirement for 78 credit hours in Science as stipulated in Clause 3.a. of the Regulations for the General Degree of Bachelor of Science. The program should include a minimum of 15 credit hours in Science courses at the 3000 and/or 4000 level.
10. Elective courses as necessary to make up the total of 120 credit hours.

9.9.3.3 Bachelor of Science with Major in Ocean Sciences (Environmental Systems)

1. English 1080 and 1110 (or equivalent);
2. Mathematics 1000 (or equivalent);
3. Statistics 2550 (or equivalent)
4. Physics 1020 and 1021 (or Physics 1050 and 1051);
5. Chemistry 1050 and 1051 (or Chemistry 1010 and 1011) (or 1200 and 1001);
6. Biology 1001 and 1002;
7. Geography 1050, and at least two of Geography 2102, 2195, or 2425;
8. Earth Sciences 1000, 1002, 2502;
9. At least 9 credit hours at the 3000 and/or 4000 level among:
   a. Geography 3120, 3140, 3250, 3425, 3510, 3905, 3907, 4250, 4908, 4917;
   b. Earth Sciences 3600, 4605, 4903;
10. A minimum of 30 credit hours in Ocean Sciences, including:
   a. Ocean Sciences 1000, 2000 (or Biology 3710), 2001, 2100, 2200, 2300 and 2500;
   b. At least 9 credit hours at the 3000 and/or 4000 level. Choices include but are not limited to Ocean Sciences 3000, 3002, 3620, 3640, 4000, 4100, 4122, 4601;
11. Elective courses as necessary to make up the total of 120 credit hours.

Secondary Calendar Changes

No secondary change required.
**Consultations Sought From**

<table>
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<tr>
<th>Department</th>
<th>Comments Received</th>
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<td>Marine Institute</td>
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<tr>
<td>Grenfell campus</td>
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<td>Department of Biochemistry</td>
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<td>Department of Economics</td>
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<td>Department of Geography</td>
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<tr>
<td>Department of Mathematics and Statistics</td>
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<td>Department of Physics and Physical Oceanography</td>
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<td>Department of Psychology</td>
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<td>Faculty of Education</td>
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<tr>
<td>Faculty of Engineering and Applied Science</td>
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</tbody>
</table>

**Library Report Received**

Yes

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

Name

---

**FOR OFFICE USE ONLY**

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:
APPENDIX 1: CONSULTATIONS

REQUEST FOR FEEDBACK

From: Fletcher, Garth
Sent: May-13-16 1:03 PM
To: Mercer, Stacey; Biochemistry Head; Business; 'cs-chair@mun.ca'; Locke, Wade; education; Hicks, Sue; Engineering; Alcock, Erin; Gerard Martin; 'John Hanchar, Earth Sciences'; Jolanta Lagowski; Lagowski, Jolanta; Moore, Karen; Marino, Paul; 'mathconsult@mun.ca'; 'miugconsultations@mi.mun.ca'; Catto, Norm; 'Peter Pickup, Chemistry'; 'vpoffice@grenfell.mun.ca'
Cc: Fletcher, Garth; Annie Mercier; Foster, Andy

Subject: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500

Colleagues, please find attached our proposal for a new undergraduate program of study, and proposal for a new course OCSC 2500.

Could you review and forward your comments to me (cc to Annie Mercier) at your earliest convenience please.

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

FEEDBACK RECEIVED

From: Geography, Engineering, Arts, Marine Institute, Earth Sciences, Physics & Physical
Oceanography, Biology, Chemistry

GEOGRAPHY

From: Catto, Norm
Sent: May-13-16 1:46 PM
To: Fletcher, Garth
Subject: RE: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Dear Garth:

Geog 3905, 3907, and 4908 are in the process of being regularized. Geog 4917 (Corals and Coral Reefs) and 4190 (Coastal Geomorphology) could also be added.

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

ENGINEERING & APPLIED SCIENCES

Subject: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Wed, 18 May 2016 16:38:24 -0230
From: Engineering Consultations <engrconsult@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Barrington, Kaela <kbarrington@mun.ca>, Andrew Fisher <adfisher@mun.ca>, Annie Mercier <amercier@mun.ca>

Dear Dr. Fletcher,

Thank you for the opportunity to comment on the proposed new major in Ocean Sciences and the new course OCSC 2500.

At this afternoon’s meeting, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs.

I wish you well in the development of this new major.

Yours sincerely,

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

HUMANITIES & SOCIAL SCIENCES (ARTS)
Subject: Feedback in responses to consultation request (re: New Ocean Sciences undergraduate program proposal and new course OCSC 2500)

Date: Thu, 19 May 2016 14:33:39 +0000
From: Marland, Alex <amarland@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Loshaj, Jennifer <loshaj@mun.ca>, Walsh, Donna <donnaw@mun.ca>, amercier@mun.ca <amercier@mun.ca>, Catto, Norm <ncatto@mun.ca>, Locke, Wade <wlocke@mun.ca>, Mercer, Stacey <staceym@mun.ca>

Hello Dr. Fletcher,

Thank you for consulting the Faculty of Humanities and Social Sciences about the proposed Ocean Sciences program and course. It is possible that you may receive some feedback from some other members of the Faculty who share some expertise in the area of Ocean Sciences. I am writing about the inclusion of English in the proposed program, following a brief conversation with the Head of that department.

It might be appropriate to encourage a conversation about the phrasing “English 1080 and 1110 (or equivalent)”. This is because the Faculty of HSS now has a series of Critical Reading and Writing (CRW) courses offered by a variety of participating departments, including English. Our Bachelor of Arts regulations no longer require two English courses; instead, we require two CRW courses, at least one of which must be delivered by English. A list of CRW courses appears below, and the guidelines that every CRW course must follow can be found at http://www.mun.ca/hss/programs/undergraduate/critical_reading_writing.php

APPROVED BY SENATE
Archaeology 1001 Critical Reading and Writing about the Archaeological Past
Archaeology 1005 Critical Reading and Writing in Aboriginal and Indigenous Studies
English 1080 Critical Reading and Writing I
English 1101 Critical Reading and Writing II (Fiction)
English 1102 Critical Reading and Writing II (Drama)
English 1103 Critical Reading and Writing II (Poetry)
English 1110 Critical Reading and Writing II (Context, Substance, Style)
Gender Studies 2005 Critical Reading and Writing: Identities and Difference
German 1010 Critical Reading and Writing: Hansel, Gretel, and the Big Bad Wolf
History 1300 Critical Reading and Writing about Borders and Peripheries
History 1301 Critical Reading and Writing about Historical Encounters
Philosophy 1001 Critical Reading and Writing in Human Nature
Philosophy 1230 Critical Reading and Writing in Ethics
Political Science 1001 Critical Reading and Writing: Politics and Governance
Religious Studies 1001 Critical Reading and Writing: Religion and Violence
University 1020 Critical Reading and Writing: A Path to Future Studies
University 1500: Introduction to Critical Reading and Writing in University

NEW COURSE PROPOSAL THAT IS OUT FOR CONSULTATION
Folklore 1001: Critical Reading and Writing in Newfoundland and Labrador Studies

OTHER CRW COURSES IN DEVELOPMENT
All 1000-level History courses

I appreciate that this may extend into matters involving the BSc requirements overall – for instance the requirement for 6 credit hours in English as a basis of admission to the Major. In my opinion this increases the importance of a conversation, because academic advisors and some students are potentially following the 1 English CRW + 1 other CRW model. At a minimum this raises questions about whether a non-English CRW might be deemed appropriate to meet the “or equivalent” language in the proposed “English 1080 and 1110 (or equivalent)” passage. As well, requiring a student who has completed two CRWs to double-back and complete another 1000-level English course might be questioned in circumstances where that occurs.

In my opinion this is an area that might benefit from some tightening. For instance, perhaps the wording is intended as “6 credit hours in English, normally English 1080 and 1110” or perhaps, given the new CRW model in use that will continue for years to come, the existence of CRW courses as an adequate alternative ought to be mentioned in the calendar. A further possibility is that Ocean Sciences might specify particular CRWs that are relevant to its program as alternatives.

All of the above is meant to be helpful. I’d be happy to chat about this and can be reached at 864-8254.

Have a great day!

Alex

Alex Marland
Associate Professor, Political Science
Associate Dean, Undergraduate, Faculty of Humanities & Social Sciences
Arts & Administration Building, A-5015
Memorial University, St. John’s, NL, Canada A1B 3X9
T (709) 864-8254 F (709) 864-2135
www.mun.ca/post/people/Marland.php

MARINE INSTITUTE

Subject: RE: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Tue, 14 Jun 2016 11:11:28 +0000
From: MIUG Consultations <MIUGconsultations@mi.mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: amercier@mun.ca <amercier@mun.ca>

Garth,

Thank you for the opportunity to review and comment on the new program: Major in Ocean Sciences as well as the new course: OCSC 2500 Practical Introduction to Ocean Sciences.

It is our understanding that there has already been significant consultation and collaboration (e.g. co-delivery of OCSC 3000) with the Marine Institute’s School of Fisheries around the development of this new program and course. We would merely reiterate that Ocean Sciences continue to investigate the
Marine Institute facilities available at our Holyrood Marine Base (e.g. the Marine Institute’s M/V The Inquisitor). There may be opportunity to make use of these should scheduling allow.

In addition, the practical component of the OCSC 2500 course is very similar to our MENV 2102 (Sampling) course found in our Marine Environmental diploma program. There may be an opportunity for credit transfer for students wishing to move between these two programs.

We are happy to support this proposal as presented and wish the Ocean Sciences Department success in this new program and new course.

Derek

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

Response to MI
On 14/06/2016 9:39 AM, Fletcher, Garth wrote:
Thank you very much Derek. We do indeed look forward to developing a cooperative program between MI and Ocean Sciences.
Best regards
Garth

EARTH SCIENCES

Subject:Fwd: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Fri, 24 Jun 2016 11:27:40 -0230
From: Dr Alison Leitch <aleitch@mun.ca>
To: Annie Mercier <amercier@mun.ca>

Hi Annie,
Here is Ali’s response. His (minor) concern seems to be that OCSC sticks to its in-house expertise at this point. I would like to see the development of a joint program EASC-OCSC, but that is clearly for the future and should not slow the development of OCSC’s program.
Cheers,
Alison

----- Forwarded message from "Ali E. Aksu" <aaksu@mun.ca> -----  
Date: Fri, 24 Jun 2016 10:32:21 -0230  
From: "Ali E. Aksu" <aaksu@mun.ca>  
Reply-To: "Ali E. Aksu" <aaksu@mun.ca>
Subject: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
    To: Dr Alison Leitch <aleitch@mun.ca>

Hi Alison,
I read the documents. I have no major concerns with the suggestion. There are some very minor issues, which are not critical. For example, why are they requiring EASC1002? They might think that this is another 1st year Earth Sciences course without realising that it does nothing to their program.

It would have been good to have brief descriptions of the Ocean Sciences courses, so that I could understand the general aim, however, this is largely curiosity. Let us make sure that one (or more) of these 3rd and/or 4th yearcourses is(are) not a geological in content.
Thank you for the opportunity to review this.

Best wishes,
Ali

Sent from my iPhone

Dr. Ali E. Aksu, Professor and University Research Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL
Canada, A1B 3X5

Tel: 709 864 8385
Fax: 709 864 2589
e-mail: aaksu@mun.ca

Subject:RE: Fwd: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Tue, 12 Jul 2016 23:12:09 -0230
From: Dr Alison Leitch <aleitch@mun.ca>
To: John Jamieson <jjamieson@mun.ca>
CC: Annie Mercier <amerzier@mun.ca>

Hi John,

Thanks for the feedback.

It was decided to hold back on the different streams since OCSC doesn't have the required in-house specialization at present. The thought is to develop a joint program with Earth Sciences for 'geological oceanography' in the future.

If the joint program goes forward, you and Ali would ideally have significant influence in its shape!
Cheers,
Alison

Quoting John Jamieson <jjamieson@mun.ca>:

Hi Alison,

What happened to the idea of the different degree streams (chemical/physical/geological oceanography)? Has that been abandoned in favour of simply Oceanography and Environmental Oceanography? If so, that was probably a good idea, in my opinion, especially for the "geological oceanography".

The only downside I see to the Ocean Sciences program is that the broader introductory course work, and associated reduction in more specialized courses might hurt students down the road that want to specialize in grad school but don't have an adequate background. But that's probably a moot point now. In terms of the curriculum, it looks fine to me.

The OCSC 2500 course description looks good to me.

John

Response to Earth Sciences

On 24/06/2016 12:05 PM, Annie Mercier wrote:

Dear Alison:

We thank you and Ali for reviewing our proposal and expressing your support.

Regarding the requirement for EASC 1002 in the Environmental Systems stream, it results from it being a prerequisite for EASC 2502 (Introduction to Geochemistry), which is required in the proposed program. Furthermore, either EASC 1002 and/or EASC 2502 are prerequisite for all the other EASC courses listed as choices.

Like you, we look forward to the development of a joint program between OCSC and EASC. I'd be happy for us to meet again and discuss it at your earliest convenience.

Cheers,
Annie

PHYSICS AND PHYSICAL OCEANOGRAPHY

Subject: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Thu, 9 Jun 2016 13:26:17 -0230
From: Martin Plumer <plumer@mun.ca>
To: 'Fletcher, Garth' <fletcher@mun.ca>, 'Dr. Annie Mercier' <amercier@mun.ca>
CC: 'Physics Head' <physicshead@mun.ca>
Hi Garth and Annie,
Here are comments from Physics and Physical Oceanography on the proposed major and new course in OCSC.
Regards,
Martin

The proposed Ocean Science program appears intended to be an Multidisciplinary introduction to oceanography. We support the Memorial University’s offering of a general, major science degree in this area that prepares students for a future in ocean technology, management, and/or research. In general, we believe that the program in its current form is sufficient as a Bachelor of Science major degree program, however we have some comments.

While the General Regulations for Science Degree (Section 6.4 of the calendar) will ensure student have a sufficient number of upper year courses, it seems a bit odd that a student could graduate with a Major with only three upper course in their major discipline.

Of the eight course listed as recommended OCSC courses at the 3000/4000 level, four of them are actually taught in Biology (cross-listed). The number of real OCSC courses is fairly small. Since the program only requires at least three of this list, it is possible to graduate with this major with no upper year courses taught by OCSC.

The introduction of OCSC 2500 is an encouraging step. Could this be followed by a third year lecture course that is focused on the data analysis and interpretation of the field work done in 2500? Alternatively, could OCSC 2500 be offered at the third year level? We hope that new additional courses taught within the Department of Ocean Sciences at the third or fourth year level to support this program will be developed in the near future. Given the focus of the course lists on the fisheries and aquaculture, maybe there is an opportunity to develop an upper year course dealing with the policy and economic aspects.

Finally, we note that the related Minor in Oceanography requires both OCSC 2200 and 2300; neither of which are definitely required in the Major program. Also, the Minor in Oceanography makes specific references to course to take in other science departments:

Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810,
Chemistry 2100, 3110, 4151, 4156,
Earth Sciences 4302,
Geography 3120, 3510, 4190, 4300,
Environmental Science 3072, 3210, 3211, 4230, Ocean Sciences 2001, 3000, 3002, 3620, 4000, 4122, 4601,
Physics and Physical Oceanography 3300, 3340, 4300, 4340.

Perhaps these course (or some subset of them) should be listed as being recommended for this major program. We realize the difficulty in ensuring students have the required prerequisites for some of this courses. Our point is that the Major does not at least encompass all of the requirements of the corresponding Minor. However, this may be intentional.
Response to Physics and Physical Oceanography

On 21/07/2016 1:43 PM, Annie Mercier wrote:

Dear Martin:

Many thanks for your supportive comments and advice. Here are our answers to your concerns:

1- Regarding the number of required courses in OCSC at the 3000/4000 level. We have determined that three higher-level OCSC courses would be suitable given that this is a multidisciplinary degree (differing from the usual "major discipline"). Here, students also have to take higher-level courses in other relevant Science subject(s), to get a well-rounded degree. It would be different if we offered higher OCSC courses in all sub-disciplines of ocean sciences inside our department, which as you know is not the case. We are hoping to guide each student towards the best possible coursework through our handbook and the assignment of a faculty advisor.

2- Regarding the fact that four of the OCSC courses at the 3000/4000 level are cross-listed with Biology, we need to emphasize that these courses are not taught by Biology faculty (as inferred in your comment) but by OCSC faculty. Therefore it will not be possible for students to graduate with no upper year courses taught by OCSC. Quite the contrary. The cross listings are an outcome of our unit's history, whereby our faculty members had developed and taught most of their courses for Biology before we became a department in 2012.

3- Regarding your suggestion of developing additional higher-level courses, which might include a third year lecture course focused on the data analysis and interpretation of the field work done in 2500, we will take this under consideration as we develop our curriculum. We are in the process of developing further third and fourth year level courses, especially with the arrival of at least two new faculty members in the coming months, and searches currently underway for two further appointments.

4- Regarding the fact that both OCSC 2200 and 2300 are required in the Oceanography Minor; neither of which are definitely required in the Major program. First of all, please note that one of the proposed Majors (the Environmental Systems stream) does require these two courses; whereas the general Major originally listed them among choices (1 of 3). We have now adjusted the general Major, so that one of them is required, as follows:

8. A minimum of 30 credit hours in Ocean Sciences, including:
   a. OCSC 1000, 2000, 2001, 2100 and 2500;
   b. At least one of OCSC 2200 or 2300;
   c. At least three courses at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3520, 3540, 4000, 4100, 4122, 4601

Therefore, there is now only a slight difference (both required vs at least one required). We have given this issue some serious consideration and discussed it at curriculum development meetings. Essentially, we see a difference between the Minor and the Major (hence the different names we gave to each). Specifically, the Minor in Oceanography requires students to have a basic foundation in all sub-disciplines of oceanography, whereas the general Major in Ocean Sciences embodies a more flexible multidisciplinary approach that might or might not include all the sub-disciplines of oceanography. It is designed to allow students to deepen their knowledge in a preferred field of ocean sciences, should they so wish, which would demand that they take more required first and second year courses in a subject (in
order to access higher-level courses in that subject). However, we would strongly recommend that students in the Major in Ocean Sciences take all of our introductory oceanography courses. This is illustrated in the time table templates provided in the proposal, and as mentioned above, the proposed stream in Environmental Systems already requires them all.

5- Regarding specific reference to courses to take in other science departments. After much discussion, we have opted to do this in a departmental handbook rather than in the calendar, in order to have easier control over addition of new relevant courses, removal of inactive courses, etc. A list in the calendar means that we have to propose formal amendments every time changes made to any of these courses by other departments affect our program, making this very laborious.

Best regards,
Annie

BIOLOGY

Subject: Re: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Thu, 30 Jun 2016 16:15:36 -0230
From: Karen Morris <morrisk@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Annie Mercier <amercier@mun.ca>, deansci@mun.ca

Hi Garth,

The Biology Undergraduate Studies Committee reviewed the new course proposal for OCSC 2500 Practical Introduction to Ocean Science.

While reviewing the proposal we noted on page 2 it states that “OCSC 2500 is meant to satisfy the laboratory requirements for Ocean Science majors” yet on page 1 of the proposal it states that it is not a mandatory course and in the proposal for the new Program major in Ocean Science it is not required but is one from a choice of 3 and the student must complete one of the three. We are wondering if the intent is to make this a required course for all the new majors; if so, this should be specified.

The committee felt that the course as proposed would provide some practical experience but would not equate to a 3 credit field course based on content described in the proposal. The course could be extended so that it is two weeks of field and lab work, with the inclusion of a shore/intertidal component, which at present is mentioned as a possible component to be done only if more than 12 students are enrolled. Additional activities could be included, such as a module on navigation, bathymetry, coastal geomorphology and geology to satisfy the interdisciplinary requirement of this course (since this is a course that is being used as the lab experience for an Ocean Science major). Modules could be done as preparatory to these two weeks in the field/lab in order to maximize hands-on experiences and training during the two weeks of the course.

In reviewing the proposal for a new Program major in Ocean Science we noted under the Calendar Entry description on the summary page for Senate it states “to be considered for admission to the
program students must normally have completed 30 credit hours with an overall average of at least 65% ...” but it does not list any specific courses. We would suggest that you list the courses such as Math 1000, English 1080 and 1110, Chemistry 1050 & 1050 (or...), Physics 1020 & 1021 (or...) or Biology 1001 & 1002 and Earth Science 1000 and a 65% on Ocean Sciences 1000.

Reiterating the point mentioned earlier it is not clear whether the Laboratory course (field course) 2500 is mandatory yet the comment that “OCSC 2500 is meant to satisfy the laboratory requirements for Ocean Science majors” would indicate that it is.

Many thanks
Karen

**Response to Biology**

On 28/07/2016 10:06 AM, Annie Mercier wrote:

Dear Karen:

Many thanks for reviewing our proposal and offering some thoughtful input, which we have now largely incorporated in the proposal. Here are our detailed answers to your concerns and suggestions:

1- You are right about OCSC 2500; our aim is to make it a requirement of the OCSC Majors. Point 8 of the Major in Ocean Sciences has been revised accordingly to state:
   8. A minimum of 30 credit hours in Ocean Sciences, including:
      a. OCSC 1000, 2000, 2001, 2100 and 2500;
      b. At least one of OCSC 2200 or 2300;
      c. At least three courses at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3620, 3640, 4000, 4100, 4122, 4601;

2- Regarding your feeling that the proposed OCSC 2500 “would not equate to a 3 credit field course based on content described in the proposal.” This comment highlights two separate issues: (i) what can be considered suitable content to fulfill 3 credit hours; (ii) whether the current proposal offers a satisfactory description of said content. We have considered point (i) carefully in developing the proposal. There does not seem to be any consensus across Science departments (there are numerous formats/lengths of field courses offered). Not to mention that students can earn 3 credits for completing a course with 3 lecture hours (3LH) or a combination 3-h lecture + 3-h lab component (3LH+3LC; nearly double the content). One important note is the rarity of field courses at the 2000 level, such as the one we propose. We felt we needed to consider the introductory nature of this hands-on course as we developed our proposal, which is why we settled on a 7-day (+ 2-day prep) rather than 10-day (2-week) format. The slightly shorter duration essentially strove to parallel the 3LH format, whereas the 10-day format typically corresponds to the 3LH+3LC format of higher-level courses. This said, we have discussed your suggestion of a 2-week duration with added components/modules, and the instructors are not against it. As you know, they have extensive experience leading similar field courses in Biology (at 3000 level). So you can be assured that they we will develop a well-rounded and attractive field course that is both adapted to second-year students and adequately fulfills the learning objectives. However, we have to be careful with adding field trips (which can be costly and logistically complex). Our proposal has now
been clarified; we adjusted the duration (to 2-week), gave a more accurate idea of the course, and specified that shore-based components will not be restricted to groups of >12 students.

3- Regarding the suggestion to clarify the entrance requirements (i.e. explicitly list the courses that must have been completed before being admitted into the Major). We thank you and we have now made this clear in the revised proposal. While we cannot require completion of all the courses you suggested (given the broader foundation of our multidisciplinary program), the revised proposal now states:

To be considered for admission to the program students must normally have completed 30 credit hours with an overall average of at least 65%. The following courses must normally have been completed:
1. English 1080 and 1110 (or equivalent);
2. Mathematics 1000 (or equivalent);
3. Physics 1020 (or Physics 1050);
4. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001);
5. Biology 1001 and 1002;
6. Earth Sciences 1000;
7. Ocean Sciences 1000 with a minimum grade of 65%

All the best,
Annie

**CHEMISTRY**

**Subject:** Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500

**Date:** Thu, 8 Sep 2016 15:25:12 -0230

**From:** Travis Fridgen <chemhead@mun.ca>

**To:** Fletcher, Garth <fletcher@mun.ca>, amercler@mun.ca

Hi Garth and Annie,

I applaud this degree program and I think that it will provide a worthwhile degree for students.

I have a couple of comments. First, you are requiring CHEM 1050 and 1051 (or 1010 and 1011 or 1200 and 1001). Chem 1010 is actually a course that is preparatory for CHEM 1050. It covers high school material. CHEM 1011 is a course that covers some other topics in chemistry but is taught at little more than a high school level. CHEM 1050 and 1051 (and 1200 and 1001 at Grefell) are typical university level courses. For a university degree I think it is probably better to require university level chemistry.

My second comment is that you consider including CHEM 2100 (Analytical Chemistry). I think that any Ocean Sciences graduate would definitely benefit from a course in analytical chemistry. Even if they do not perform an analysis themselves, they would read literature and have to assess work that relies on chemical analysis.

Sincerely,
Travis Fridgen

Response to Chemistry

On 16/09/2016 8:53 AM, Annie Mercier wrote:

Dear Travis:

Many thanks for your strong support and valuable suggestions. Our undergraduate studies committee has discussed these suggestions and here is our reply:

Our first reflex was to agree with your suggestion of requiring the university level Chemistry courses. However, looking at similar BSc Majors (e.g. Biology, Earth Sciences) we noticed that they accept CHEM 1010/1011 as alternatives. We wish our program to remain consistent with them, but we certainly plan to strongly recommend CHEM 1050/1051 in our handbook. In our proposal, we list CHEM 1050/1051 first to emphasize our preference/recommendation.

We agree that CHEM 2100 would be beneficial to Ocean Sciences graduates, but it would also make our program heavier in the Chemistry sub-discipline. Other units might argue that correspondingly advanced 2000-level courses in Physics or Earth Sciences would also be beneficial. This being a multidisciplinary degree, we have to draw the line somewhere to make the Major accessible to students with a diversity of backgrounds and interests. Our foundation courses are already quite numerous. But we do plan to make appropriate recommendations based on the students’ interests in our departmental handbook, including CHEM 2100.

All the best,

Annie

On 16/09/2016 9:33 AM, Travis Fridgen wrote:

Hi Annie,

Thank you for the consideration of our comments. I did notice that 1050/1051 were listed first which is good. I will note that Earth Sciences is looking at changing their requirements to 1050/1051, and I hope that this will take place soon. The other main difference between 1010/1011 and 1050/1051 is that in the latter there are a full slate of 10 labs in each course (much more lab experience) rather than only 5 in each of 1010/1011.

It might be worth considering, in your handbook, to inform student that 1011 is a terminal course. That means if they do 1010 and 1011 and decide they need university level chemistry or any second year chemistry course, then they will require both 1050 and 1051.

Take care,

Travis
On 16/09/2016 9:46 AM, Annie Mercier wrote:

Dear Travis:

Many thanks for this further input. We will keep it on our radar, and also make sure to inform students about CHEM 1011.

All the best,

Annie
29 July 2016

To: Garth Fletcher, Department of Ocean Sciences

From: Erin Alcock, Science Research Liaison Librarian

Subject: Proposal for a New Program Major in Ocean Sciences

I have reviewed the proposal for the Bachelor of Science with a Major in Ocean Sciences. As the Memorial University Libraries system has supported graduate level research in all of the sub-disciplines of oceanography for quite some time, there should be more than adequate resources available for this undergraduate program. Monograph material will continue to be collected from relevant subject funds including Biology, Earth Sciences and Physics and Physical Oceanography. Journal collections, while reduced due to recent and continued budgetary constraints, will be more than acceptable for study at this level.
November 7, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes, New programs and New Course Proposals

At a meeting held on October 25, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

1. Department of Chemistry
   (i) Changes to course descriptions, including some prerequisite changes, for seven Chemistry courses
   (ii) Proposal for new major program in Chemistry (Biological)
   (iii) Calendar change to amend biochemistry requirement in majors programs

2. Department of Ocean Sciences
   (i) Proposals for new majors in Ocean Sciences and Ocean Sciences (Environmental Systems)
   (ii) Proposal for new course Ocean Sciences 2500: Practical Introduction to Ocean Sciences

Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal
New Course
OCSC 2500 Practical Introduction to Ocean Sciences

Executive Summary

This is a proposal for a new course in Ocean Sciences that will be taught at the 2000-level.

Resource Implications: Instructional Costs

This course will be taught by current faculty members in the Department of Ocean Sciences using existing facilities and infrastructure. It will be an integral part of the proposed Major in Ocean Sciences. It may be taught annually or every second year, depending on subscription in the Major. Projected costs include:

- Transport (return trip to Holyrood): $300 x 2 days = $600
- Transport (local field trips): $200
- Rental of M/V Coastal Explorer (fully equipped): $1200/d x 2 days = $2400
- Laboratory supplies and incidentals: $500

TOTAL: $3700

Library Holdings and/or Other Resources Required

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

Signature of Unit Head (if appropriate): ________________________________

Date: ________________________________

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

______________________________

Date: ________________________________
Sample Course Outline and Method of Evaluation

General Concept

OCSC 2500 is meant to satisfy the laboratory course requirement for Ocean Sciences majors. The course will consist of a preparatory module (offered either online or face-to-face during the winter semester) followed by a 2-week intensive module offered in May or June.

During the intensive segment, two full days will be dedicated to sampling at sea on the MV Coastal Explorer. Either a single group of students (max. 12) will take part in the two expeditions or (for larger groups to a max. of 24 students) two teams will take turns: while one team will be on the boat, the other will participate via remote access or engage in shore-based work. The MV Coastal Explorer is a fully outfitted vessel based in Holyrood and operated by Captain Jan Negrijn of Coastal Connections Ltd. Ship-based activities will be coordinated through the Ocean Learning Partnership (OLP), ensuring that all safety measures and on-board equipment are in place (see Appendix for details). There will also be two days of dedicated shore-based sampling, and six land-based full-day classes that will take place at the Ocean Sciences Centre (Logy Bay). Each class will generally be separated into a morning and an afternoon module of three to four hours each. This time will be devoted to short lectures, workshops and discussions, complementary laboratory investigations, and analysis and presentation of the data gathered at sea and on the shore.

It is anticipated that students will learn about hypothesis-driven oceanographic approaches, current issues facing oceanographers, and common methodologies used to address them. Students will also develop a hands-on understanding of the local marine environment. While the proposed framework includes ship-based sampling and shore-based (intertidal) sampling, it could easily be adapted to focus entirely on shore-based activities if necessary.

Prospective Schedule of Activities

Preparatory module (equivalent to ~ 2 days of work): All students will need to complete this module (likely offered on the D2L shell) before the onset of the field segment. The module will consist of assigned readings and activities designed to test and standardize the students’ level of knowledge in the course topic. It will also ensure that participants are fully aware of the requirements and expectations of the field course.

The first week will normally be dedicated to sampling (field module), and the second week will essentially focus on sample analysis and laboratory work (lab module). Flexibility will likely be required to address issues with weather and logistics.

Day 1. In class (Logy Bay)
  Morning:
  • Welcome and review of syllabus and course requirements
  • Lecture 1 on hypothesis-driven ocean-related research
  • Lecture 2 on commonly used methodologies and sampling techniques to address current questions in oceanography
  Afternoon:
  • Safety orientation and introduction to tools and equipment
  • Preparation of field work (lab books and spreadsheet)
OCSC 2500 – Practical Introduction to Ocean Sciences (3 Nov 2016)

- Review of protocols and background research (provided in advance)

Day 2. At sea (Holyrood)
Data collection focused on water sampling and analysis: this might include deployment and retrieval of conductivity/temperature/density (CTD) meter and water sampling bottles, using various tools to measure oxygen, pH and chlorophyll a in seawater, use of current meters, discussions on measuring and reporting salinity, etc. Measurements will be made in different locations for comparison and hypothesis testing (e.g. near/away from shore; near/away from freshwater input).

Day 3. On shore (location TBD):
Shore-based activities will include exploration of near-shore processes and coastal geomorphology, and practical introduction to field sampling techniques.

Day 4. At sea (Holyrood)
Field work dedicated to pelagic and benthic sample collection: this might include use of plankton/fish nets, cores/grabs to collect epifaunal and infaunal organisms, and use of a small remotely operated vehicle (ROV) to survey the seafloor in real time. Samplings and surveys will be made in different locations for comparison and hypothesis testing (e.g. along bathymetric gradients and/or at various distances from the shore; over/on different substrata). Students will learn how to separate, grade, and store samples. Some organisms will be kept alive and brought back to the lab for further study.

Day 5. On shore (location TBD)
Shore-based activities will include a survey of coastal/intertidal communities, and additional field sampling.

Day 6. In class (Logy Bay)
Morning: Data analysis. Students will compile and analyze the data gathered during the previous week at the different sites.
Afternoon: Workshop and discussions related to findings. This may be team-based or general, depending on the number of students.

Day 7. In class (Logy Bay)
Morning: Data analysis. Students will continue to compile and analyze the samples gathered previously. Brief experiments or observational studies using live animals might be undertaken.
Afternoon: Workshop and discussions related to findings. This may be team-based or general, depending on the number of students.

Day 8. In class (Logy Bay)
Morning: Prepare and finalize Report 1. Students (alone or in teams) will use ship-based findings to prepare a written report based on the provided template.
Afternoon: Prepare and finalize Report 2. Students (alone or in teams) will use shore-based findings to prepare a written report based on the provided template.
Day 9. In class (Logy Bay)
Morning and afternoon: Dedicated to presentation of results by students and discussions of findings. Emphasis will be on comparing hypotheses and results, and highlighting key aspects of field work (advantages vs limitations, importance of thorough research and preparation, dealing with unpredictable conditions, etc.).

Day 10. In class (Logy Bay)
This day might be needed to complete the analysis/presentations (depending on size of class). Time permitting, it might include a guest lecture by someone in the field (in person or remotely from the field), or a day trip (e.g. museum, mini aquarium). It might also include discussions of a current topic (e.g. recent discovery or case study).

Evaluation

Participation/preparation = 20%
- Students will be expected to complete preparatory assignments before the course, and to participate actively in workshops and in the field and laboratory activities. The participation mark will be based on several criteria, such as the student's performance in the preparatory module, the student's demonstrated ability with the gear/tools under study, the student's degree of involvement during the group discussions, "summary of the day" assessments where students are asked to write a half page summary of the day's activities, and the student's general attitude and level of preparation before and during the activities (e.g. active participation, organization, timely submission of log book and reports).

Lab books (4 x 10%) = 40%
- A laboratory notebook will be provided to each student. Its purpose is for students to keep a permanent record of their work, which should be detailed, accurate and clear enough to be understood. It will also be instrumental in the preparation of the project reports. At the end of Days 2, 3, 4 and 5, lab books will be collected and marked.

Lab reports (2 x 20%) = 40%
- For each of the two thematic hands-on segments, students will have to prepare a report outlining the main results of data analysis and the key interpretations, following a template that will be provided.

Learning Outcomes

At the end of the course, students should have learned to:
- Safely operate modern field and laboratory instruments commonly used in ocean studies
- Collect laboratory data and various types of marine samples
- Conduct basic data analysis including graphical and statistical exploration
- Extract, synthesize, compare and interpret trends in the data
- Present the results of data analyses and interpretations in writing and orally
- Assess the usefulness and limitations of field and laboratory studies in ocean sciences
Special Requirements

- Students should be comfortable undertaking shore-based and/or ship-based activities
- Students are required to dress appropriately for field and laboratory work
- Students must know how to operate and have access to a personal computer

Texts

None

Instructor(s)

Potential instructors include: Patrick Gagnon, Paul Snelgrove, Ian Fleming, Annie Mercer
SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title: OCSC 2500 – Practical Introduction to Ocean Sciences

Abbreviated Course Title: Practical Ocean Sciences

Calendar Description

Under 10.9 Ocean Sciences

Ocean Sciences 2500 Practical Introduction to Ocean Sciences explores the instruments, techniques and analytical methods commonly used to study marine life and processes, chiefly focusing on the interaction between living organisms and their chemical, physical and geological environment. The course combines ship-based or shore-based sampling and data collection with laboratory investigation in an intensive 2-week long format. It is primarily intended for mid-level undergraduate students majoring in Ocean Sciences. This course will either be offered during a special session following the winter semester, or in the spring semester.

PR: Science 1807, OCSC 1000, at least three of OCSC 2000 (or BIOL 3710), 2100, 2200, 2300

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The proposed course is considered instrumental to the Ocean Sciences programs, as it provides a hands-on (laboratory) experience to complement the 2000-level introductory courses (OCSC 2000 Introductory Biological Oceanography, OCSC 2100 Introductory Chemical Oceanography, OCSC 2200 Introductory Geological Oceanography and OCSC 2300 Introductory Physical Oceanography). As a prerequisite, students must have completed at least three of these four courses before registering for OCSC 2500, normally at the end of their fourth semester. By incorporating field sampling methods, laboratory work and data analysis, the course provides a solid introduction to many practical aspects of ocean studies. It will be a unique undergraduate course, which we expect will attract students to our programs.
Consultations Sought From | Comments Received
---|---
Marine Institute | Yes
Grenfell campus | No
Department of Biochemistry | No
Department of Biology | Yes
Department of Chemistry | Yes
Department of Computer Sciences | No
Department of Earth Sciences | Yes
Department of Economics | No
Department of Geography | Yes
Department of Mathematics and Statistics | No
Department of Physics and Physical Oceanography | Yes
Department of Psychology | No
Faculty of Arts | Yes
Faculty of Education | No
Faculty of Engineering and Applied Science | Yes

Library Report Received | Yes

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

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FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:
Secretary:
Date:
APPENDIX 1: CONSULTATIONS

REQUEST FOR FEEDBACK

From: Fletcher, Garth
Sent: May-13-16 1:03 PM
To: Mercer, Stacey; Biochemistry Head; Business; 'cs-chair@mun.ca'; Locke, Wade; education; Hicks, Sue; Engineering; Alcock, Erin; Gerard Martin; 'John Hanchar, Earth Sciences'; Jolanta Lagowski; Lagowski, Jolanta; Moore, Karen; Marino, Paul; 'mathconsult@mun.ca'; 'miugconsultations@mi.mun.ca'; Catto, Norm; 'Peter Pickup, Chemistry'; 'vpoffice@grenfell.mun.ca'
Cc: Fletcher, Garth; Annie Mercier; Foster, Andy
Subject: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500

Colleagues, please find attached our proposal for a new undergraduate program of study, and proposal for a new course OCSC 2500.

Could you review and forward your comments to me (cc to Annie Mercier) at your earliest convenience please.

Best Regards

Garth

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

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

FEEDBACK RECEIVED

From: Geography, Engineering, Arts, Marine Institute, Earth Sciences, Physics & Physical Oceanography, Biology, Chemistry

GEOGRAPHY

From: Catto, Norm
Sent: May-13-16 1:46 PM
To: Fletcher, Garth
Subject: RE: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Dear Garth:

Geog 3905, 3907, and 4908 are in the process of being regularized. Geog 4917 (Corals and Coral Reefs) and 4190 (Coastal Geomorphology) could also be added.

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

ENGINEERING & APPLIED SCIENCES

Subject: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Wed, 18 May 2016 16:38:24 -0230
From: Engineering Consultations <engrconsult@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Barrington, Kaela <kbarrington@mun.ca>, Andrew Fisher <adfisher@mun.ca>, Annie Mercier <amercier@mun.ca>

Dear Dr. Fletcher,

Thank you for the opportunity to comment on the proposed new major in Ocean Sciences and the new course OCSC 2500.

At this afternoon's meeting, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science found these changes will have no impact on our programs.

I wish you well in the development of this new major.

Yours sincerely,

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

HUMANITIES & SOCIAL SCIENCES (ARTS)
Subject: Feedback in responses to consultation request (re: New Ocean Sciences undergraduate program proposal and new course OCSC 2500)

Date: Thu, 19 May 2016 14:33:39 +0000
From: Marland, Alex <amarland@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Lokashi, Jennifer <jlokash@mun.ca>, Walsh, Donna <donnaw@mun.ca>, amerier@mun.ca <amerier@mun.ca>, Catto, Norm <ncatto@mun.ca>, Locke, Wade <wlocke@mun.ca>, Mercer, Stacey <staceym@mun.ca>

Hello Dr. Fletcher,

Thank you for consulting the Faculty of Humanities and Social Sciences about the proposed Ocean Sciences program and course. It is possible that you may receive some feedback from some other members of the Faculty who share some expertise in the area of Ocean Sciences. I am writing about the inclusion of English in the proposed program, following a brief conversation with the Head of that department.

It might be appropriate to encourage a conversation about the phrasing "English 1080 and 1110 (or equivalent)". This is because the Faculty of HSS now has a series of Critical Reading and Writing (CRW) courses offered by a variety of participating departments, including English. Our Bachelor of Arts regulations no longer require two English courses; instead, we require two CRW courses, at least one of which must be delivered by English. A list of CRW courses appears below, and the guidelines that every CRW course must follow can be found at http://www.mun.ca/hss/programs/undergraduate/critical_reading_writing.php.

APPROVED BY SENATE
Archaeology 1001 Critical Reading and Writing about the Archaeological Past
Archaeology 1005 Critical Reading and Writing in Aboriginal and Indigenous Studies
English 1080 Critical Reading and Writing I
English 1101 Critical Reading and Writing II (Fiction)
English 1102 Critical Reading and Writing II (Drama)
English 1103 Critical Reading and Writing II (Poetry)
English 1110 Critical Reading and Writing II (Context, Substance, Style)
Gender Studies 2005 Critical Reading and Writing: Identities and Difference
German 1010 Critical Reading and Writing: Hansel, Gretel, and the Big Bad Wolf
History 1300 Critical Reading and Writing about Borders and Peripheries
History 1301 Critical Reading and Writing about Historical Encounters
Philosophy 1001 Critical Reading and Writing in Human Nature
Philosophy 1230 Critical Reading and Writing in Ethics
Political Science 1001 Critical Reading and Writing: Politics and Governance
Religious Studies 1001 Critical Reading and Writing: Religion and Violence
University 1020 Critical Reading and Writing: A Path to Future Studies
University 1500: Introduction to Critical Reading and Writing in University

NEW COURSE PROPOSAL THAT IS OUT FOR CONSULTATION
Folklore 1001: Critical Reading and Writing in Newfoundland and Labrador Studies

OTHER CRW COURSES IN DEVELOPMENT
All 1000-level History courses

I appreciate that this may extend into matters involving the BSc requirements overall – for instance the requirement for 6 credit hours in English as a basis of admission to the Major. In my opinion this increases the importance of a conversation, because academic advisors and some students are potentially following the 1 English CRW + 1 other CRW model. At a minimum this raises questions about whether a non-English CRW might be deemed appropriate to meet the “or equivalent” language in the proposed “English 1080 and 1110 (or equivalent)” passage. As well, requiring a student who has completed two CRWs to double-back and complete another 1000-level English course might be questioned in circumstances where that occurs.

In my opinion this is an area that might benefit from some tightening. For instance, perhaps the wording is intended as “6 credit hours in English, normally English 1080 and 1110” or perhaps, given the new CRW model in use that will continue for years to come, the existence of CRW courses as an adequate alternative ought to be mentioned in the calendar. A further possibility is that Ocean Sciences might specify particular CRWs that are relevant to its program as alternatives.

All of the above is meant to be helpful. I’d be happy to chat about this and can be reached at 864-8254.

Have a great day!

Alex

Alex Marland
Associate Professor, Political Science
Associate Dean, Undergraduate, Faculty of Humanities & Social Sciences
Arts & Administration Building, A-5015
Memorial University, St. John’s, NL, Canada A1B 3X9
T (709) 864-8254 F (709) 864-2135
www.mun.ca/posc/people/Marland.php

MARINE INSTITUTE

Subject: RE: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Tue, 14 Jun 2016 11:11:28 +0000
From: MIUG Consultations <MIUGconsultations@mi.mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: amerclier@mun.ca <amerclier@mun.ca>

Garth,

Thank you for the opportunity to review and comment on the new program: Major in Ocean Sciences as well as the new course: OCSC 2500 Practical Introduction to Ocean Sciences.

It is our understanding that there has already been significant consultation and collaboration (e.g. co-delivery of OCSC 3000) with the Marine Institute’s School of Fisheries around the development of this new program and course. We would merely reiterate that Ocean Sciences continue to investigate the
Marine Institute facilities available at our Holyrood Marine Base (e.g. the Marine Institute’s M/V The Inquisitor). There may be opportunity to make use of these should scheduling allow.

In addition, the practical component of the OCSC 2500 course is very similar to our MENV 2102 (Sampling) course found in our Marine Environmental diploma program. There may be an opportunity for credit transfer for students wishing to move between these two programs.

We are happy to support this proposal as presented and wish the Ocean Sciences Department success in this new program and new course.

Derek

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

Response to MI
On 14/06/2016 9:39 AM, Fletcher, Garth wrote:
Thank you very much Derek. We do indeed look forward to developing a cooperative program between MI and Ocean Sciences.
Best regards
Garth

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EARTH SCIENCES

Subject:Fwd: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Fri, 24 Jun 2016 11:27:40 -0230
From: Dr Alison Leitch <aleitch@mun.ca>
To: Annie Mercier <amerrier@mun.ca>

Hi Annie,
Here is Ali’s response. His (minor) concern seems to be that OCSC sticks to its in-house expertise at this point. I would like to see the development of a joint program EASC-OCSC, but that is clearly for the future and should not slow the development of OCSC’s program.
Cheers,
Alison

----- Forwarded message from "Ali E. Aksu" <aaksu@mun.ca> -----
Subject: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
To: Dr Alison Leitch <aleitch@mun.ca>

Hi Alison,
I read the documents. I have no major concerns with the suggestion. There are some very minor issues, which are not critical. For example, why are they requiring EASC1002? They might think that this is another 1st year Earth Sciences course without realising that it does nothing to their program.

It would have been good to have brief descriptions of the Ocean Sciences courses, so that I could understand the general aim, however, this is largely curiosity. Let us make sure that one (or more) of these 3rd and/or 4th year courses is(are) not a geological in content.
Thank you for the opportunity to review this.

Best wishes,
Ali

Sent from my iPhone

Dr. Ali E. Aksu, Professor and University Research Professor
Department of Earth Sciences
Memorial University of Newfoundland
St. John's, NL
Canada, A1B 3X5

Tel: 709 864 8385
Fax: 709 864 2589
e-mail: aksu@mun.ca

Subject: RE: Fwd: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Tue, 12 Jul 2016 23:12:09 -0230
From: Dr Alison Leitch <aleitch@mun.ca>
To: John Jamieson <jjamieson@mun.ca>
CC: Annie Mercier <amercier@mun.ca>

Hi John,

Thanks for the feedback.

It was decided to hold back on the different streams since OCSC doesn't have the required in-house specialization at present. The thought is to develop a joint program with Earth Sciences for 'geological oceanography' in the future.

If the joint program goes forward, you and Ali would ideally have significant influence in its shape!
Cheers,
Alison

Quoting John Jamieson <ijamieson@mun.ca>:

Hi Alison,

What happened to the idea of the different degree streams (chemical/physical/geological oceanography)? Has that been abandoned in favour of simply Oceanography and Environmental Oceanography? If so, that was probably a good idea, in my opinion, especially for the "geological oceanography".

The only downside I see to the Ocean Sciences program is that the broader introductory course work, and associated reduction in more specialized courses might hurt students down the road that want to specialize in grad school but don't have an adequate background. But that's probably a moot point now. In terms of the curriculum, it looks fine to me.

The OCSC 2500 course description looks good to me.

John

Response to Earth Sciences

On 24/06/2016 12:05 PM, Annie Mercier wrote:

Dear Alison:

We thank you and Ali for reviewing our proposal and expressing your support.

Regarding the requirement for EASC 1002 in the Environmental Systems stream, it results from it being a prerequisite for EASC 2502 (Introduction to Geochemistry), which is required in the proposed program. Furthermore, either EASC 1002 and/or EASC 2502 are prerequisite for all the other EASC courses listed as choices.

Like you, we look forward to the development of a joint program between OCSC and EASC. I'd be happy for us to meet again and discuss it at your earliest convenience.

Cheers,
Annie

PHYSICS AND PHYSICAL OCEANOGRAPHY

Subject: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Thu, 9 Jun 2016 13:26:17 -0230
From: Martin Plumer <plumer@mun.ca>
To: 'Fletcher, Garth' <fletcher@mun.ca>, 'Dr. Annie Mercier' <amercier@mun.ca>
CC: 'Physics Head' <physicshead@mun.ca>
Hi Garth and Annie,

Here are comments from Physics and Physical Oceanography on the proposed major and new course in OCSC.

Regards,

Martin

The proposed Ocean Science program appears intended to be an Multidisciplinary introduction to oceanography. We support the Memorial University’s offering of a general, major science degree in this area that prepares students for a future in ocean technology, management, and/or research. In general, we believe that the program in its current form is sufficient as a Bachelor of Science major degree program, however we have some comments.

While the General Regulations for Science Degree (Section 6.4 of the calendar) will ensure student have a sufficient number of upper year courses, it seems a bit odd that a student could graduate with a Major with only three upper course in their major discipline.

Of the eight course listed as recommended OCSC courses at the 3000/4000 level, four of them are actually taught in Biology (cross-listed). The number of real OCSC courses is fairly small. Since the program only requires at least three of this list, it is possible to graduate with this major with no upper year courses taught by OCSC.

The introduction of OCSC 2500 is an encouraging step. Could this be followed by a third year lecture course that is focused on the data analysis and interpretation of the field work done in 2500? Alternatively, could OCSC 2500 be offered at the third year level? We hope that new additional courses taught within the Department of Ocean Sciences at the third or fourth year level to support this program will be developed in the near future. Given the focus of the course lists on the fisheries and aquaculture, maybe there is an opportunity to develop an upper year course dealing with the policy and economic aspects.

Finally, we note that the related Minor in Oceanography requires both OCSC 2200 and 2300; neither of which are definitely required in the Major program. Also, the Minor in Oceanography makes specific references to course to take in other science departments:

- Biology 3014, 3709, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4810,
- Chemistry 2100, 3110, 4151, 4156,
- Earth Sciences 4302,
- Geography 3120, 3510, 4190, 4300,
- Environmental Science 3072, 3210, 3211, 4230, Ocean Sciences 2001, 3000, 3002, 3620, 4000, 4122, 4601,
- Physics and Physical Oceanography 3300, 3340, 4300, 4340.

Perhaps these course (or some subset of them) should be listed as being recommended for this major program. We realize the difficulty in ensuring students have the required prerequisites for some of this courses. Our point is that the Major does not at least encompass all of the requirements of the corresponding Minor. However, this may be intentional.
Response to Physics and Physical Oceanography

On 21/07/2016 1:43 PM, Annie Mercier wrote:

Dear Martin:

Many thanks for your supportive comments and advice. Here are our answers to your concerns:

1. Regarding the number of required courses in OCSC at the 3000/4000 level. We have determined that three higher-level OCSC courses would be suitable given that this is a multidisciplinary degree (differing from the usual "major discipline"). Here, students also have to take higher-level courses in other relevant Science subject(s), to get a well-rounded degree. It would be different if we offered higher OCSC courses in all sub-disciplines of ocean sciences inside our department, which as you know is not the case. We are hoping to guide each student towards the best possible coursework through our handbook and the assignment of a faculty advisor.

2. Regarding the fact that four of the OCSC courses at the 3000/4000 level are cross-listed with Biology, we need to emphasize that these courses are not taught by Biology faculty (as inferred in your comment) but by OCSC faculty. Therefore it will not be possible for students to graduate with no upper year courses taught by OCSC. Quite the contrary. The cross listings are an outcome of our unit’s history, whereby our faculty members had developed and taught most of their courses for Biology before we became a department in 2012.

3. Regarding your suggestion of developing additional higher-level courses, which might include a third year lecture course focused on the data analysis and interpretation of the field work done in 2500, we will take this under consideration as we develop our curriculum. We are in the process of developing further third and fourth year level courses, especially with the arrival of at least two new faculty members in the coming months, and searches currently underway for two further appointments.

4. Regarding the fact that both OCSC 2200 and 2300 are required in the Oceanography Minor; neither of which are definitely required in the Major program. First of all, please note that one of the proposed Majors (the Environmental Systems stream) does require these two courses; whereas the general Major originally listed them among choices (1 of 3). We have now adjusted the general Major, so that one of them is required, as follows:

   8. A minimum of 30 credit hours in Ocean Sciences, including:
      a. OCSC 1000, 2000, 2001, 2100 and 2500;
      b. At least one of OCSC 2200 or 2300;
      c. At least three courses at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3520, 3640, 4000, 4100, 4122, 4601

Therefore, there is now only a slight difference (both required vs at least one required). We have given this issue some serious consideration and discussed it at curriculum development meetings. Essentially, we see a difference between the Minor and the Major (hence the different names we gave to each). Specifically, the Minor in Oceanography requires students to have a basic foundation in all sub-disciplines of oceanography, whereas the general Major in Ocean Sciences embodies a more flexible multidisciplinary approach that might or might not include all the sub-disciplines of oceanography. It is designed to allow students to deepen their knowledge in a preferred field of ocean sciences, should they so wish, which would demand that they take more required first and second year courses in a subject (in...
order to access higher-level courses in that subject). However, we would strongly recommend that students in the Major in Ocean Sciences take all of our introductory oceanography courses. This is illustrated in the time table templates provided in the proposal, and as mentioned above, the proposed stream in Environmental Systems already requires them all.

5- Regarding specific reference to courses to take in other science departments. After much discussion, we have opted to do this in a departmental handbook rather than in the calendar, in order to have easier control over addition of new relevant courses, removal of inactive courses, etc. A list in the calendar means that we have to propose formal amendments every time changes made to any of these courses by other departments affect our program, making this very laborious.

Best regards,
Annie

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BIOLOGY

Subject: Re: FW: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Thu, 30 Jun 2016 16:15:36 -0230
From: Karen Morris <morrisk@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>
CC: Annie Mercier <amercier@mun.ca>, deansci@mun.ca

Hi Garth,

The Biology Undergraduate Studies Committee reviewed the new course proposal for OCSC 2500 Practical Introduction to Ocean Science.

While reviewing the proposal we noted on page 2 it states that “OCSC 2500 is meant to satisfy the laboratory requirements for Ocean Science majors” yet on page 1 of the proposal it states that it is not a mandatory course and in the proposal for the new Program major in Ocean Science it is not required but is one from a choice of 3 and the student must complete one of the three. We are wondering if the intent is to make this a required course for all the new majors; if so, this should be specified.

The committee felt that the course as proposed would provide some practical experience but would not equate to a 3 credit field course based on content described in the proposal. The course could be extended so that it is two weeks of field and lab work, with the inclusion of a shore/intertidal component, which at present is mentioned as a possible component to be done only if more than 12 students are enrolled. Additional activities could be included, such as a module on navigation, bathymetry, coastal geomorphology and geology to satisfy the interdisciplinary requirement of this course (since this is a course that is being used as the lab experience for an Ocean Science major). Modules could be done as preparatory to these two weeks in the field/lab in order to maximize hands-on experiences and training during the two weeks of the course.

In reviewing the proposal for a new Program major in Ocean Science we noted under the Calendar Entry description on the summary page for Senate it states “to be considered for admission to the
program students must normally have completed 30 credit hours with an overall average of at least 65% ...." but it does not list any specific courses. We would suggest that you list the courses such as Math 1000, English 1080 and 1110, Chemistry 1050 & 1050 (or...) , Physics 1020 &1021 (or...) or Biology 1001& 1002 and Earth Science 1000 and a 65% on Ocean Sciences 1000.

Reiterating the point mention earlier it is not clear whether the Laboratory course (field course) 2500 is mandatory yet the comment that “OCSC 2500 is meant to satisfy the laboratory requirements for Ocean Science majors” would indicate that it is.

Many thanks
Karen

Response to Biology

On 28/07/2016 10:06 AM, Annie Mercier wrote:

Dear Karen:

Many thanks for reviewing our proposal and offering some thoughtful input, which we have now largely incorporated in the proposal. Here are our detailed answers to your concerns and suggestions:

1- You are right about OCSC 2500; our aim is to make it a requirement of the OCSC Majors. Point 8 of the Major in Ocean Sciences has been revised accordingly to state:
   8. A minimum of 30 credit hours in Ocean Sciences, including:
   a. OCSC 1000, 2000, 2001, 2100 and 2500;
   b. At least one of OCSC 2200 or 2300;
   c. At least three courses at the 3000 and/or 4000 level. Choices include but are not limited to OCSC 3000, 3002, 3620, 3640, 4000, 4100, 4122, 4601;

2- Regarding your feeling that the proposed OCSC 2500 “would not equate to a 3 credit field course based on content described in the proposal.” This comment highlights two separate issues: (i) what can be considered suitable content to fulfill 3 credit hours; (ii) whether the current proposal offers a satisfactory description of said content. We have considered point (i) carefully in developing the proposal. There does not seem to be any consensus across Science departments (there are numerous formats/lengths of field courses offered). Not to mention that students can earn 3 credits for completing a course with 3 lecture hours (3LH) or a combination 3-h lecture + 3-h lab component (3LH+3LC; nearly double the content). One important note is the rarity of field courses at the 2000 level, such as the one we propose. We felt we needed to consider the introductory nature of this hands-on course as we developed our proposal, which is why we settled on a 7-day (+ 2-day prep) rather than 10-day (2-week) format. The slightly shorter duration essentially strove to parallel the 3LH format, whereas the 10-day format typically corresponds to the 3LH+3LC format of higher-level courses. This said, we have discussed your suggestion of a 2-week duration with added components/modules, and the instructors are not against it. As you know, they have extensive experience leading similar field courses in Biology (at 3000 level). So you can be assured that they will develop a well-rounded and attractive field course that is both adapted to second-year students and adequately fulfills the learning objectives. However, we have to be careful with adding field trips (which can be costly and logistically complex). Our proposal has now
been clarified; we adjusted the duration (to 2-week), gave a more accurate idea of the course, and specified that shore-based components will not be restricted to groups of >12 students.

3- Regarding the suggestion to clarify the entrance requirements (i.e. explicitly list the courses that must have been completed before being admitted into the Major). We thank you and we have now made this clear in the revised proposal. While we cannot require completion of all the courses you suggested (given the broader foundation of our multidisciplinary program), the revised proposal now states:

To be considered for admission to the program students must normally have completed 30 credit hours with an overall average of at least 65%. The following courses must normally have been completed:

1. English 1080 and 1110 (or equivalent);
2. Mathematics 1000 (or equivalent);
3. Physics 1020 (or Physics 1050);
4. Chemistry 1050 and 1051 (or 1010 and 1011) (or 1200 and 1001);
5. Biology 1001 and 1002;
6. Earth Sciences 1000;
7. Ocean Sciences 1000 with a minimum grade of 65%

All the best,
Annie

CHEMISTRY

Subject: Re: Consultation request: New Ocean Sciences undergraduate program proposal and new course OCSC 2500
Date: Thu, 8 Sep 2016 15:25:12 -0230
From: Travis Fridgen <chemhead@mun.ca>
To: Fletcher, Garth <fletcher@mun.ca>, amercler@mun.ca

Hi Garth and Annie,

I applaud this degree program and I think that it will provide a worthwhile degree for students.

I have a couple of comments. First, you are requiring CHEM 1050 and 1051 (or 1010 and 1011 or 1200 and 1001). Chem 1010 is actually a course that is preparatory for CHEM 1050. It covers high school material. CHEM 1011 is a course that covers some other topics in chemistry but is taught at little more than a high school level. CHEM 1050 and 1051 (and 1200 and 1001 at Grefell) are typical university level courses. For a university degree I think it is probably better to require university level chemistry.

My second comment is that you consider including CHEM 2100 (Analytical Chemistry). I think that any Ocean Sciences graduate would definitely benefit from a course in analytical chemistry. Even if they do not perform an analysis themselves, they would read literature and have to assess work that relies on chemical analysis.

Sincerely,
Travis Fridgen

Response to Chemistry

On 16/09/2016 8:53 AM, Annie Mercier wrote:

Dear Travis:

Many thanks for your strong support and valuable suggestions. Our undergraduate studies committee has discussed these suggestions and here is our reply:

Our first reflex was to agree with your suggestion of requiring the university level Chemistry courses. However, looking at similar BSc Majors (e.g. Biology, Earth Sciences) we noticed that they accept CHEM 1010/1011 as alternatives. We wish our program to remain consistent with them, but we certainly plan to strongly recommend CHEM 1050/1051 in our handbook. In our proposal, we list CHEM 1050/1051 first to emphasize our preference/recommendation.

We agree that CHEM 2100 would be beneficial to Ocean Sciences graduates, but it would also make our program heavier in the Chemistry sub-discipline. Other units might argue that correspondingly advanced 2000-level courses in Physics or Earth Sciences would also be beneficial. This being a multidisciplinary degree, we have to draw the line somewhere to make the Major accessible to students with a diversity of backgrounds and interests. Our foundation courses are already quite numerous. But we do plan to make appropriate recommendations based on the students' interests in our departmental handbook, including CHEM 2100.

All the best,

Annie

On 16/09/2016 9:33 AM, Travis Fridgen wrote:

Hi Annie,

Thank you for the consideration of our comments. I did notice that 1050/1051 were listed first which is good. I will note that Earth Sciences is looking at changing their requirements to 1050/1051, and I hope that this will take place soon. The other main difference between 1010/1011 and 1050/1051 is that in the latter there are a full slate of 10 labs in each course (much more lab experience) rather than only 5 in each of 1010/1011.

It might be worth considering, in your handbook, to inform student that 1011 is a terminal course. That means if they do 1010 and 1011 and decide they need university level chemistry or any second year chemistry course, then they will require both 1050 and 1051.

Take care,

Travis
On 16/09/2016 9:46 AM, Annie Mercier wrote:

Dear Travis:

Many thanks for this further input. We will keep it on our radar, and also make sure to inform students about CHEM 1011.

All the best,

Annie
29 July 2016

To: Garth Fletcher, Department of Ocean Sciences
From: Erin Alcock, Science Research Liaison Librarian
Subject: Proposal for a New Course, OCSC 2500: Practical Introduction to Ocean Sciences

I have reviewed the proposal for the new course OCSC 2500: Practical Introduction to Ocean Sciences. As the course will mainly take place either at sea or at the Ocean Sciences Centre, the physical collections of the Queen Elizabeth II and C.R. Barrett Libraries will probably be of limited use to these students, however the MUN Library system has more than 500 electronic books on the topic of ocean and marine sampling that may be of use during the preparatory assignments, etc. in addition to the periodical literature. Web based guides pointing students to these types of library resources could be prepared for the benefit of the students taking these courses, librarians should be contacted if a solution like this is desired.
The Coastal Explorers Field School
Overview of Floating Classroom

The 'floating classroom' is a tour and research vessel that has been outfitted and equipped to bring students into the field for an introduction to ocean sciences and ocean research. The vessel (M/V Coastal Explorer) is a comfortable, stable and vessel based in North Arm, Holyrood, approximately 35 minutes from St. John’s, NL.

The vessel meets all criteria as a passenger vessel, is certified under Transport Canada’s Blue Decal program, and is fully insured. Captain Jan Negrijn of Coastal Connections Ltd., operates the vessel and brings over thirty years of experience as an educator and vessel operator. Trained marine educators and deck hands guide participants during activities and help to ensure guest safety at all times.

The vessel is designed for hands-on marine studies and exploration by students and can accommodate 12 passengers at one time. Amenities onboard include a toilet, kitchenette with running water, microwave, fridge, kettle, and sink, as well as propane stove for heat. Life vests are provided to all participants prior to leaving shoreline, and boarding takes place safely and easily via a gangway and floating wharf.
Students deploy plankton tow as part of a plankton survey (above), and retrieve an ROV from the water, with guidance from OSC graduate students. Images by David Howells.
Vessel Specifications

- **MV Coastal Explorer** is a 42ft Northumberland Strait design vessel that meets all criteria as a passenger vessel for Transport Canada (Blue Decal Program) and is fully insured.
- Design allows easy deployment and retrieval of oceanographic equipment, including a small winch for deep water sampling.
- Provision of 120v power for computers and other oceanographic instrumentation (Onan 5Kw diesel generator).
- Electric hydrographic winch with 400meters of cable and meter block. Meter block with calibration to 1,000 meters.
- Navigation equipment including Nobletec electronic charting system, JLP - 21 GPS compass, Furuno GP30 - GPS, Furuno 1621-Mark 2 16 mile radar, Robertson AP100 Automatic Pilot system, Olex electronic charting system.
- Furuno DSC equipped radio telephone.
- Also have 20ft Fibreglass speedboat with 2013 model 25HP and 50HP Yamaha 4 stroke outboard motors.

Onboard Technology + Equipment

**Advanced Ocean Technology**

- Seabotix Remotely Operated Vehicle - LBV200 (with 150 m umbilical)
- Wassp-Olex Seabed Mapping System
- RBR Concerto CTD data logger (can be used to 200 m)

**Other Oceanographic + Scientific Equipment**

- Niskin water sampling bottle, Van-Dorn water sampling bottle
- PONAR bottom grab
- Two plankton ring nets (333 microns and 1,000 microns)
- Dissecting microscope with Motix eyepiece mounted camera
- 12 hand-held discovery scopes
- Thermometer, refractometer, barometer, anemometer, bearing compass
- Marine life field guides and other reference books plus preserved specimens of larval cod and lobster
- Dissection kits and trays
- 40ft Beach Seine and hauling rope
- 12 pairs chest waders, hand nets, underwater spy-glasses

**Onboard Fishing Equipment**

- 5 shark rod/reel combinations; Rods: Penn Senator, Reels: Penn Senator
- Tags and tagging equipment
- 4 deep water snow crab pots with small mesh; 4 whelk pots
- 4 Lobster pots: two are traditional wooden construction, two are PVC covered wire.
- 10 saltwater fishing rods and reels with associated tackle
- DFO Experimental License to sample for educational purposes.

Note: The ROV, Deep water camera, seabed mapping system, electronic charting systems and dissecting microscope are all interfaced with a 37" HD monitor for ease of viewing by students. Onboard laptop computer allows for display on the monitor (i.e. Powerpoint presentations, images). There is wireless capability in North Arm for connectivity via Skype, etc.
A student learns to pilot the ROV console which is set up on the table inside the cabin (above). Below: the interior monitor is used to show what the ROV is seeing on the seafloor.
Hi Gail,

the three items have received six votes in favour (Ron, Yuanzhu, Alison, Stephanie, Ivan and myself), none against. These proposals can be submitted for the approval of the Faculty Council.

Regards,
-j

On 11/07/2016 02:06 PM, Kenny, Gail wrote:
> Thanks JC. Any news on this request? The agenda for Faculty Council will be put together on Wednesday and we should get these items on that agenda so that we meet the deadlines in other offices for these items. Thank you.
> Gail
> -----Original Message-----
> From: JC Loredo-Osti [mailto:jclredoosti@mun.ca]
> Sent: November-04-16 9:14 AM
> To: Brian E. Staveley <bestave@mun.ca>; Christina Bottaro
> <cbottaro@mun.ca>; JC Loredo-Osti <jclredoosti@mun.ca>; Kenny, Gail
> <gkenny@mun.ca>; Len Zedel <zedel@mun.ca>; Ron Haynes
> <rhaynes@mun.ca>; Rob Berolo <rbertolo@mun.ca>; Ivan Booth
> <ibooth@mun.ca>; Stephanie H. Curnoe <curnoe@mun.ca>; Cyr Couturier
> <Cyr.Couturier@mi.mun.ca>; Carolyn Walsh <cwalsh@play.psych.mun.ca>;
> Tom Chapman <tomc@mun.ca>; Courage, Mary <mcourage@mun.ca>; Yuanzhu
> Chen <yzchen@mun.ca>; Alison Malcolm <amalcolm@mun.ca>; Matthew Rise
> <mrise@mun.ca>
> Subject: Fwd: GS Committee business
> Dear committee members,
> we have three proposals whose decision is yet to be made. If you have not answered my email related to these proposal, please, do so at your earliest convenience.
> -j
>
To: Faculty of Science Faculty Council  
From: Dr. Chris Radford, Head, Department of Mathematics and Statistics  
Subject: Approval of Request - Regulations of M.Sc. Programmes  
Date: October 13, 2016

At the departmental meeting held on October 12, 2016, the Faculty approved the request for the following changes to the regulations of M.Sc. programmes:

1. The first of these changes extends the number of core courses for the Masters in Mathematics in order to offer more options to the M.Sc. students. Under the current regulation thesis based M.Sc. students of mathematics have to take two courses, Math-6351 (Advanced Linear Algebra) and Math-6310 (Functional Analysis) and course based M.Sc. students have to take these two courses plus Math-6332.

   The request is to have four core courses, Math-6351, Mat-6310, Math-6332 and Math-6160 (Partial Differential Equations). Thesis based M.Sc students shall complete at least two of these courses while course based M.Sc. students in mathematics shall complete at least three of these courses.

   This change will offer more flexibility in the selection of student programmes.

2. The second change will harmonize the departmental regulation regarding Comprehensive Exams with the School of Graduate Studies current regulation.
Changes to the University Calendar regarding the degree of Master of Science (Mathematics)

24.18.1 Specific Requirements for the M.Sc. in Mathematics

Every candidate for the M.Sc. in Mathematics is required to complete one of two options:

1. **Option 1** MAT11 6340, 6351 and 696A/B, two courses from MAT11 6160, 6310, 6332, 6351, and a minimum of 9 further credit hours in courses chosen from the departmental course offerings, excluding MAT11 6299, and a thesis as per General Regulations, Theses and Reports.

2. **Option 2** MAT11 6299, 6340, 6332, 6351, 696A/B, three courses from MAT11 6160, 6310, 6332, 6351, and a minimum of 42 9 further credit hours in courses chosen from the departmental course offerings.

- Algebra: 6320, 6324
- Analysis: 6340, 6341, 6342
- Applied Mathematics: 6160, 6201 or 6212, 6420
- Combinatorics: 6340, 6341, 6342
- Topology: 6300 or 6301, 6332

...
Changes to the University Calendar regarding the degree of Doctor of Philosophy

32.25.1 Program of study
The following regulations should be read in conjunction with the General Regulations of the School of Graduate Studies.

1. Candidates shall be assigned a supervisory committee consisting of the Supervisor (or Co-Supervisors) and at least two other members of faculty appointed by the Dean on the recommendation of the Head.

2. A candidate shall complete at least 6 credit hours in graduate courses in the area of specialization. Candidates not holding a Masters Degree shall, in addition, complete or have already completed successfully, the course requirements for a Memorial University of Newfoundland Master's Degree in mathematics or in statistics, as appropriate. Any candidate may be required to take additional courses at any time during his/her program.

3. The Comprehensive Examination consists of two parts, called the "qualifying review" and the "intermediate review". Successful completion of both the qualifying and intermediate reviews constitutes successful completion of the Comprehensive Examination in the sense of General Regulation Comprehensive Examinations.

a. The qualifying review consists of written examinations and takes place as soon as once the student has successfully completed the courses specified in his/her program of study at the time of this review and the Supervisory Committee deems it appropriate; but not later than the end of the candidate's third semester in the doctoral program. Its main purpose is to ensure that the candidate has a reasonably broad general knowledge of mathematics or of statistics, as appropriate.

b. The intermediate review consists of an oral presentation on the candidate's thesis topic followed by an oral examination based on the presentation although questions of a general nature relating to the field of specialization are also permitted. It must take place no later than the end of the candidate's seventh semester in the doctoral program and at least three months after the qualifying review. Its purpose is to ensure that the candidate has specialized knowledge in his/her chosen area sufficient to do original research of a high level.

More details concerning the Department's comprehensive examinations can be obtained from the Department.

32.25.2 Specific Regulations for the Ph.D. in Mathematics
A Masters Degree in mathematics or related area from a recognized university is required for entry into the Ph.D. program. Students currently registered in their first year at Memorial University of Newfoundland's M.Sc. Program in mathematics who have obtained A in at least four program courses are eligible to be transferred into a Ph.D. program. Such transfer must be supported by a prospective Ph.D. supervisory committee as well as the Graduate Studies Committee and approved by the Dean of Graduate Studies. Transferred students shall finish their Masters program courses plus the minimum Ph.D. requirements.

32.25.3 Specific Regulations for the Ph.D. in Statistics
A Masters Degree in statistics from a recognized university is normally required for entry into the Ph.D. program. Students currently registered in their first year at Memorial University of Newfoundland's M.A.S. or M.Sc. Program in statistics who have obtained A in at least four program courses are eligible to be transferred into a Ph.D. program. Such transfer must be supported by a prospective Ph.D. supervisory committee as well as the Graduate Studies Committee and approved by the Dean of Graduate Studies. Transferred students shall finish their Masters program plus the minimum Ph.D. requirements.

In addition to general Departmental requirements, each candidate for the Ph.D. in mathematics or statistics will be required to present at least one paper at a graduate seminar on a topic to be approved by his or her Supervisor.

32.25.4 Courses
A selection of the following graduate courses will be offered to meet the requirements of candidates, as far as the resources of the Department will allow:
Mathematics
6100 Dynamical Systems
6101 Modern Perturbation Theory
6102 Mathematical Biology
6104 Infinite Dimensional Dynamical Systems
6110 Advanced General Relativity
6111 Calculus in Manifolds
6112-6119 Special Topics in Applied Mathematics
6120 Theoretical Fluid Dynamics
6121 Functional Differential Equations
6130 Introduction to General Relativity
6140 Partial Differential Equations
6201 Numerical Methods for Partial Differential Equations
6204 Iterative Methods in Numerical Linear Algebra

6573 Statistical Genetics
6570-6589 Selected Topics in Statistics and Probability (excluding 6571, 6573, 6586)

Notice that, although the courses 6160, 6310, 6332, 6351, 6510 and 6560 cannot be used to fulfill the 6 credit hours graduate courses requirement, any of them can be listed as part of the program of study as additional course work, whenever the supervisory committee deems it appropriate.
Math-6160 - Partial differential equations

1 Description

This course is an introduction to the theory of partial differential equations (PDE). It should be of interest to students working on applied mathematics, differential geometry, mathematical physics, fluid mechanics, mathematical biology, probability, harmonic analysis, dynamical systems, and other areas, as well as to PDE/Analysis-focused students.

2 Course overview

This course aims to teach the basics of Partial differential equations, a subject that touches on many branches of pure mathematics, applied mathematics, as well as physics and applied science. Partial differential equations are a very rich subject; so much so that at a research level most workers in the field specialize in one of the many sub-fields. The aim of this one-semester course is both to give an overview of the subject as much as possible, and introduce some tools that are used throughout.

3 Pre-requisites

Although there are not formal pre-requisites, it is expected that students are familiar with basic real analysis, primarily Lebesgue measure and $L_p$ spaces, the basics of the Fourier transform on $\mathbb{R}^n$ and some functional analysis, along with multivariable calculus (Stokes' theorem). Familiarity with the general theory of ordinary differential equations is desirable; also an undergraduate-level PDE course will be an asset.

4 Textbook

The main textbook will be Partial Differential Equations by L. C. Evans, (American Math Society, 2010). This will be complemented by further materials, either notes from the instructor, or referrals to other textbooks.

5 Tentative course outline

1. Quick overview of basic facts on the local existence theory for systems of ordinary differential equations: existence, uniqueness, continuous dependence on initial data. Gronwall’s inequality.

2. Classical linear equations
   - Laplace equation I: mean value properties and maximum principles, applications to uniqueness and regularity
   - Laplace equation II: regularity of weak harmonic functions, analyticity, Harnack inequality, etc
   - Laplace equation III: existence: Perron’s sub-solution method and Dirichlet principle
   - Heat equations; their solution formulas and Maximum Principles
3. Sobolev spaces
   - weak derivatives and Sobolev spaces
   - inequalities of Sobolev, Morrey, Poincare, and Gagliardo Nirenberg; compactness and embeddings
   - approximations, extensions, trace, compactness, and dual spaces

4. Weak solutions of elliptic equations
   - weak solutions and maximal principle
   - existence and eigenvalues by Lax Milgram theorem and Fredholm alternative
   - regularity
   - application to semilinear elliptic problems
   - analogous results for 2nd order parabolic equations

5. Classical solutions of second order elliptic equations
   - weak and strong maximal principles
   - Holder spaces and Schauders a priori estimates
   - existence by the method of continuity

6. Quick review of variational and non-variational techniques for nonlinear PDE
   - Direct method of calculus of variations
   - Constraint methods
   - Mountain-pass theorem
   - Fixed point methods
   - Method of sub-super solutions
   - Monotonicity formula (Ahurgen, Alt-Caffarelli-Friedman) and Pohozaev identities

6 References


Hi Gail,

the three items have received six votes in favour (Ron, Yuanzhu, Alison, Stephanie, Ivan and myself), none against. These proposals can be submitted for the approval of the Faculty Council.

Regards,
- j

On 11/07/2016 02:06 PM, Kenny, Gail wrote:
> Thanks JC. Any news on this request? The agenda for Faculty Council will be put together on Wednesday and we should get these items on that agenda so that we meet the deadlines in other offices for these items. Thank you.
> Gail
> 
> -----Original Message-----
> From: JC Loredo-Osti [mailto:jlloredoosti@mun.ca]
> Sent: November-04-16 9:14 AM
> To: Brian E. Staveley <bestave@mun.ca>; Christina Bottaro
>     <cbottaro@mun.ca>; JC Loredo-Osti <jlloredoosti@mun.ca>; Kenny, Gail
>     <kgenny@mun.ca>; Len Zedel <zedel@mun.ca>; Ron Haynes
>     <rhaynes@mun.ca>; Rob Bertolo <rbertolo@mun.ca>; Ivan Booth
>     <ibooth@mun.ca>; Stephanie H. Curnoe <curnoe@mun.ca>; Cyr Couturier
>     <Cyr.Couturier@mi.mun.ca>; Carolyn Walsh <cwalsh@play.psych.mun.ca>
>     <Tom Chapman <tomp@mun.ca>; Courage, Mary <mcourage@mun.ca>; Yuanzhu
>     <Chen <yzchen@mun.ca>; Alison Malcolm <amalcolm@mun.ca>; Matthew Rise
>     <mrise@mun.ca>
> Subject: Fwd: GS Committee business
> 
> Dear committee members,
> 
> we have three proposals whose decision is yet to be made. If you have not answered my email related to these proposal, please, do so at your earliest convenience.
> 
> - j
> 
> 
> -------- Forwarded Message --------
> Subject: GS Committee business
> Date: Wed, 2 Nov 2016 17:32:40 +0000
> From: Kenny, Gail <kgenny@mun.ca>
> To: JC Loredo-Osti <jlloredoosti@mun.ca>, MathStat Graduate Officer
October 17, 2016

TO: M. Abrahams, Dean, Faculty of Science
FROM: R. Haynes, Chair, Scientific Computing Program
SUBJECT: Calendar Changes and updates

I am requesting, with the support of the Department of Computer Science, that COMP 6931 and CMSC 6910 be cross-listed. These courses have been co-taught over the last number of years, as noted in the attached email from Dr. George Miminis, the course instructor.

As well, while going through the exercise of preparing the calendar entry as it should look if these courses are cross-listed, I noticed that a number of the Computer Science courses listed as part of our calendar entry had not been updated when that department made changes in the previous year. I am requesting these updates be approved as well so that Scientific Computing’s entry matches that of Computer Science.

Ron Haynes
Kenny, Gail

From: R. Edwards <redwards@mun.ca>
Sent: October-13-16 9:40 AM
To: Kenny, Gail
Cc: gong@mun.ca
Subject: Re: FW: cross listing COMP 6931 with CMSC 6910

Gail,

The Department of Computer Science consulted with members via email on the cross-listing of COMP-6931 and CMSC-6910 and no objections were raised.
The Department is in agreement with this proposal.

Regards,
Regina Edwards
for
Minglun Gong, Department Head

-----
Contact Person: Regina Edwards  |  Secretary to Department Head
Email: redwards@mun.ca  |  Department of Computer Science
Phone: (709) 864-8652  |  Memorial University of Newfoundland
Fax: (709) 864-2009  |  St. John's, NL Canada A1B 3X5

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Confidentiality Notice: This communication is intended for the use of the recipient to whom it is addressed, and may contain confidential, personal, and/or privileged information. Please contact us immediately if you are not the intended recipient of this communication, and do not copy, distribute, or take action relying on it. Any communication received in error should be deleted or destroyed.

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On Mon, 26 Sep 2016, Kenny, Gail wrote:

> Date: Mon, 26 Sep 2016 13:08:32 +0000
> From: "Kenny, Gail" <gkenny@mun.ca>
> To: "redwards@mun.ca" <redwards@cs.mun.ca>
> Subject: FW: cross listing COMP 6931 with CMSC 6910
>
> Hi Regina,
>
> Scientific Computing has proposed that COMP 6931 and CMSC 6910 be cross-listed in the calendar. I need confirmation from the Department of Computer Science that the department agrees with this proposal. Thanks much.
>
> Gail
> From: George Miminis [mailto:george@mun.ca]
> Sent: May-04-16 1:32 PM
> To: Kenny, Gail <gkenny@mun.ca>; Ronald Haynes <rhaynes74@gmail.com>
> Subject: Re: cross listing COMP 6931 with CMSC 6910
Hi folks,

I am attaching the latest course outline, as I handed it on to students that took CMSC6910 or COMP6931 last semester (Winter 2016). Also, I am attaching the course report as I submitted it a few days ago to the CS department. Gail please let me know if you need anything else.

For the history, COMP6931 changed number this year, it was COMP6732. COMP6732 was first given in 1994. My e-records don't go any further back and that's what I have here with me. After 1994, COMP6732 was given yearly staring on 2011 until 2016 along with CMSC6910. The latter had started on 2004, given on its own and then it was given linked with COMP6732.

Cheers

George

George Miminis, Ph.D.

Professor, Dept. of Computer Science

Memorial University of Newfoundland

St. John's, NL, Canada, A1B 3X5

Tel. (709) 864-8655

Fax. (709) 864-2009

If you decide to print this...

then you'll need to find a place to file it...

From: Gail Kenny <gkenny@mun.ca>
Date: Wednesday, May 4, 2016 at 4:32 PM
To: Ronald Haynes <rhaynes74@gmail.com>
Cc: Memorial University of Newfoundland
Subject: RE: cross listing COMP 6931 with CMSC 6910

Hi Ron,

I don't have an up-to-date course outline for CMSC 6910 and I'll need that as part of the paperwork as we move this forward. George is copied on this email, so hopefully he can provide that paperwork. As well, I'll need a course outline of COMP 6931. Is George teaching both courses?

Gail

From: Ronald Haynes
Sent: April-26-16 11:25 AM
Hi folks,

I am attaching the latest course outline, as I handed it on to students that took CMSC6910 or COMP6931 last semester (Winter 2016). Also, I am attaching the course report as I submitted it a few days ago to the CS department. Gail please let me know if you need anything else.

For the history, COMP6931 changed number this year, it was COMP6732. COMP6732 was first given in 1994. My e-records don’t go any further back and that’s what I have here with me. After 1994, COMP6732 was given yearly staring on 2011 until 2016 along with CMSC6910. The latter had started on 2004, given on its own and then it was given linked with COMP6732.

Cheers

George

George Miminis, Ph.D.
Professor, Dept. of Computer Science
Memorial University of Newfoundland
St. John’s, NL. Canada, A1B 3X5
Tel. (709) 864-8635
Fax. (709) 864-2009

If you decide to print this...

then you’ll need to find a place to file it...!

Hi Ron,

I don’t have an up-to-date course outline for CMSC 6910 and I’ll need that as part of the paperwork as we move this forward. George is copied on this email, so hopefully he can provide that paperwork. As well, I’ll need a course outline of COMP 6931. Is George teaching both courses?

Gail

From: Gail Kenny <gkenny@mun.ca>
Date: Wednesday, May4,2016 at 4:32 PM
To: Ronald Haynes <rhaynes74@gmail.com>
Cc: Memorial University of Newfoundland <george@mun.ca>
Subject: RE: cross listing COMP 6931 with CMSC 6910

Hi Ron,

I don’t have an up-to-date course outline for CMSC 6910 and I’ll need that as part of the paperwork as we move this forward. George is copied on this email, so hopefully he can provide that paperwork. As well, I’ll need a course outline of COMP 6931. Is George teaching both courses?

Gail

From: Ronald Haynes [mailto:rhaynes74@gmail.com]
Sent: April-26-16 11:25 AM
Matrix Computations and Applications
COMP 6931 and CMSC 6910

1. GENERAL INFORMATION
   INSTRUCTOR: George Klimis
   E-MAIL: george@umn.ca
   OFFICE: EN 2030

2. STUDENTS INTERESTED
   Students who are doing research that includes developing efficient numerical solutions of problems that originate in Linear Algebra and are applicable in areas such as Control Engineering, Signal Processing, Statistics, Linear and nonlinear Optimization, as well as in most of the areas of Computational Sciences and Engineering, should find this course interesting as well as enabling.

3. OBJECTIVES OF THE COURSE
   An introduction to the techniques of Numerical Linear Algebra. Emphasis is placed upon developing the most recent and reliable numerical algorithms. The Numerical Stability of selected algorithms as well as the Sensitivity (Conditioning) of selected problems will be studied.

4. IMMEDIATE PREREQUISITE(S)
   Students that have taken COMP 3731 or equivalent are well prepared for this course. Although an Introduction to some essential topics of Linear Algebra may be given here, good knowledge of the subject will be very helpful.

5. IMMEDIATE SUCCESSOR(S)
   Special Topics in Numerical Computations

6. WORK LOAD
   - Assignments: 40%
   - Project proposal: 10%
   - Project write-up: 20%
   - Project presentation and "mini" test: 10% +15%
   - In-class participation: 5%

   *Students are encouraged, but not limited, to present part of their thesis topic if there is some relation to the course material.

   There will be about 7 assignments given throughout the semester. Programming assignments will be chosen to illustrate the effects of finite precision arithmetic as well as develop expertise for efficient algorithmic design. Programming assignments will be written mainly in MATLAB. Non-programming problems may also be assigned.
7. REPRESENTATIVE COURSE OUTLINE

- An introduction to essential topics of Linear Algebra and to Floating Point Arithmetic (If necessary).
- Systems of Linear Equations
- The QR Decomposition and the Linear Least Squares Problem
- The Eigenvalue Problem
- The Singular Value Decomposition
- Applications of Matrix Computations in Control Theory (If time permits)
- Introduction to Parallel Matrix Computations (If time permits)

8. TEXT(S)

- Class Notes
- MATLAB primer (will be provided).

9. REFERENCES

- Lloyd N. Trefethen, David Bau III, "Numerical Linear Algebra", SIAM
- Demmel James, “Applied Numerical Linear Algebra”, SIAM.
Assignment on Complete Pivoting

You are asked to solve the system of equations

\[ Ax = b, \ A \in \mathbb{R}^{n \times n}, \ \text{rank} (A) = n, \ b \in \mathbb{R}^n \]

using complete pivoting. Give a brief, maximum a page, but rigorous enough mathematical explanation of your algorithm. Write two \texttt{matlab} functions that will implement your algorithm.

1. The function \texttt{x=VirtUTC(U,d,r,c)} computes the solution \( x \) of a system \( Ux = d \), where \( U \) is virtually upper triangular. For this it uses two permutations \( r \) and \( c \), where \((r(i),c(i))\), with \( i = 1 : n \) are the indices of the \( i \)th diagonal element of \( U \), therefore \( U(r,c) \) is upper triangular.

2. The function \( x=Gauss\_Complete\_Piv(A,b) \) transforms \((A,b)\), using complete pivoting and elementary matrices, into an equivalent system \((U,d)\) where \( U \) is virtually upper triangular. The function also computes permutations \( r \) and \( c \) such that \( U(r,c) \) is upper triangular. Finally the function calls \texttt{VirtUTC(U,d,r,c)} for the computation of \( x \).

Guidelines: Your program should \textbf{not} swap rows or columns and should use \textit{vectorization} when possible. Function \texttt{VirtUTC} can access \( U \) by row or column, the choice is yours. You are welcome to use recursion if you find it useful. Apply your code to a couple of random instances \((7 \leq n \leq 10)\) and present the numerical results.
Assignment on Profile Storage

You are given a large and sparse symmetric positive definite matrix $A \in \mathbb{R}^{n \times n}$ in profile storage scheme, e.g.

$$
A = \begin{pmatrix}
25 & 3 \\
3 & 21 & 2 & 4 \\
2 & 23 & 0 \\
4 & 0 & 22 & 1 \\
1 & 20
\end{pmatrix}
$$

stored row by row, in terms of two one-dimensional arrays. A one-dimensional array $s$ in which the nontrivial elements of $A$ are stored; along with another one-dimensional array $m$ of indices pointing to the diagonal elements of $A$ in $s$ ($s(m(i)) = A(i,i)$) as described in the class. For example the above matrix would be stored as

$$
s = (25, 3, 21, 2, 23, 4, 0, 22, 1, 20)
$$

$$
m = (1, 3, 5, 8, 10)
$$

Using MATLAB do the following:

1. Write a function `chol_profile.m` that computes the Cholesky Factor $L$ of $A$ and stores it using the same profile storage scheme as with $A$, that is, overwriting $s$.

2. Given the above $A$ as well as $b^T = (1, 1, 1, 1)$ solve the system $Ax = b$, in an efficient way using the profile storage scheme of $A$. In doing so you should take into consideration the zeros at the beginning of each row. Also your algorithm should be in harmony with your data structure, for example, if you matrix is stored by row, your algorithm should use it by row.

**Remark 1** Do **NOT** store $A$ and then compute $s$ and $m$, store directly $s$ and $m$. 

Assignment on the Computation of the QR Decomposition and Solution of the LLS

Write two efficient MATLAB functions, qrhouse.m and qrgivens.m, that compute the QR decomposition of a matrix using Householder transformations and Givens rotations respectively. Your code is expected to be efficient, that is, it should use vectorization, manage memory wisely and not waste time. Your functions should produce only the upper triangular matrices of the corresponding QR decompositions and not the orthogonal matrices. You may consider creating two functions house.m and givens.m such that when given an $n$-dimensional vector or a 2-dimensional vector $x$, respectively, these functions compute the corresponding Householder transformation or Givens rotation, respectively, for the reduction of the given vector. These functions may now be used by your qrhouse.m and qrgivens.m accordingly.

Use your qrhouse.m and/or qrgivens.m to do the following:

1. Compute the QR decomposition of a random $7 \times 4$ matrix and give a trace of your computation. Your trace should display the reduction column by column when Householder transformations are used, and element by element when Givens rotations are used. Compare your results with MATLAB’s build in function qr.m

2. Write a MATLAB function lls_rd.m (rd stands for rank deficient) to solve the LLS problem

$$\min_{x \in \mathbb{R}^n} \| b - Ax \|_2$$

were $A \in \mathbb{R}^{m \times n}$, with rank $(A) = r$, where $r < n < m$. Use lls_rd.m on a random problem with $m = 7$, $n = 4$, $r = 2$. Note that here you will need to keep track of the orthogonal matrix of one of the QR decompositions.
Assignment on The Power Algorithm

Consider the following $n \times n$ matrix

$$A_n = \begin{pmatrix} n & \alpha & n - 1 \\ \alpha & 2 & \alpha \\ \alpha & \alpha & 1 \end{pmatrix}$$

Obviously $\lambda(A_n) = \{1, 2, \ldots, n\}$, for any $\alpha$.

1. Generate the single precision matrices $A_1$ and $A_{10}$ for $n = 10$, insert the machine epsilon $\varepsilon = 10^{-7}$ at position $(1, n)$ of both matrices and compute the eigenvalues of the perturbed matrices $\tilde{A}_1$ and $\tilde{A}_{10}$ using matlab's eig built-in function. Explain why the eigenvalues of $\tilde{A}_{10}$ have been perturbed so much, whereas the eigenvalues of $\tilde{A}_1$ have not. Your explanation should have two phases, a theoretical phase where the justification is based on the characteristic equation of the perturbed matrices, and a numerical phase where the justification is based on the overall condition number of the eigenvalue problem of a matrix.

2. Using MATLAB, write a function Power_Algorithm that implements the Power Algorithm for the computation of the maximum eigenvalue of a matrix $A$. Your function should take as input $A$, $q$ (the initial approximation of the eigenvector) and a scale (it was given as $\sigma$ in the lectures). Your function should stop when the relative difference between two consecutive approximations of the eigenvector is less than $10^{-5}$ or if the iterations exceed 100. [Hint: Take $q = c_1$ and $\sigma = 1$]. Run in single precision Power_Algorithm on $\tilde{A}_1$ and $\tilde{A}_{40}$ and present the results.
Question 1 (2+5 = 7): Linear Equations

1. Consider the linear system $Ax = b$, where

$$A = \begin{pmatrix} 2 & 2 \\ 2 & 4 \end{pmatrix}, \quad b = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$$

Make two Gauss-Seidel iterations on this system with a zero initial guess. That is starting with $x_0 = 0$ compute $x_2$. Recall that the Gauss-Seidel method is defined by the iteration

$$x_{k+1} = (L + D)^{-1} (-Ux_k + b)$$

where $D$ is the diagonal of $A$ and $L$, $U$ the strictly lower and upper triangles of $A$, respectively.

2. Show how to compute a nonzero solution $x$ to the upper triangular system $Ux = 0$ when $u_n = 0$.

Question 2 (10+3 = 13): Linear Least Squares, QR

1. Show how you would use the QR decomposition to solve, as efficiently as possible, the LLSP $\min_x \|b - Ax\|_2$ when $A \in \mathbb{R}^{m \times n}$ has full column rank.

2. How would you store a Householder transformation $H = I - \pi^{-1}uu^T \in \mathbb{R}^{n \times n}$ efficiently on a computer and using your method of storing $H$ how would you compute $HA$ in $O(n^2)$ flops, with $A \in \mathbb{R}^{n \times n}$. 

1
Question 1 (30 minutes): You are given matrix $A \in \mathbb{R}^{n \times n}$, vectors $b \in \mathbb{R}^n$, $c \in \mathbb{R}^n$, $d \in \mathbb{R}^n$ and scalars $\alpha \in \mathbb{R}$, $\beta \in \mathbb{R}$. You are also given the LU decomposition of $A = LU$. Show how you would compute effectively the solution of

$$\begin{pmatrix} A & d \\ c^T & \alpha \end{pmatrix} \begin{pmatrix} x \\ \xi \end{pmatrix} = \begin{pmatrix} b \\ \beta \end{pmatrix}$$

You should justify your answer mathematically and when needed you may use a $4 \times 4$ system for illustration as

$$\begin{pmatrix} \times & \times & \times & \times \\ \times & \times & \times & \times \\ \times & \times & \times & \times \\ \times & \times & \times & \times \end{pmatrix} \begin{pmatrix} \times \\ \times \\ \times \\ \times \end{pmatrix} = \begin{pmatrix} \times \\ \times \\ \times \\ \times \end{pmatrix}$$

Question 2 (30 minutes): Compute the solution $x \in \mathbb{R}^n$ to the Constraint Linear Least Squares Problem

$$\min_{x \in \mathbb{R}^n} \|Ax - b\|_2$$

where $A \in \mathbb{R}^{m \times n}$, $C \in \mathbb{R}^{\ell \times n}$, $b \in \mathbb{R}^m$, $d \in \mathbb{R}^\ell$, with $m \geq n \geq \ell$, and $n = \text{rank}(A)$, $\ell = \text{rank}(C)$. Hint: Use either the QR or the SVD decomposition of $A$.

Question 3 (10 minutes): Assume $A \in \mathbb{R}^{n \times n}$ and that $x$ is an approximate eigenvector of $A$. Find the "best" approximate eigenvalue $\lambda$ of $A$ corresponding to $x$. Justify your answer and explain your choice of "best".

Question 4 (10 minutes): Solve the eigenproblem of Jordan block $J_{\lambda}^{(k)}$ and justify your answer.

Question 5 (15 minutes): If $J_{\lambda}^{(k)}$ is a Jordan block of $A$, find full column rank $X_k$ such that

$$AX_k = X_k J_{\lambda}^{(k)}$$

Question 6 (25 minutes): Given a full column rank matrix $Z \in \mathbb{R}^{n \times (n-1)}$, a symmetric positive definite matrix $A \in \mathbb{R}^{n \times n}$, and positive scalar $\alpha \in \mathbb{R}^+$, show how to compute $x \in \mathbb{R}^n$ such that

$$x^TAx = \alpha \wedge x^T Z = 0$$
Course Project Guidelines, Winter 2016

• **Proposal:**
  Your proposal should be no more than two pages long plus references and graphs (if any) and should address the following points (template):
  1. **Problem Statement:** State the problem clearly.
  2. **Introduction:** General information about the background theory of the problem as well as the motivation that prompted you to solve it.
  3. **Previous work:** What have others done on this problem?
  4. **Your contribution:** What aspect of the problem you will be working on?
  5. **References**
A word of caution: The above template could be applied even to a Ph.D. thesis. Therefore, you should use good judgment as to what you should include in your course project and how much of it.
Your proposal will be judged on:
- How relevant the proposed problem is to **Computational Linear Algebra**.
- How interesting, from a scientific point of view, the proposed problem is.
- How well it has been presented.

• **Project:**
Your project should be of the same format as your proposal but clearly more detailed. It should not exceed 10 pages, plus references and graphs if necessary.

• **Presentation:**
Your presentation should be in **pdf** form (strictly), should not exceed 15 minutes (strictly) and should follow the above template (at least). A question period of about 5 minutes will follow your presentation. Therefore, each one of you will have a total of 20 minutes to present their project and answer possible questions on their project.

• **Proposal submission and Deadlines:**
Your proposal should be submitted as a **pdf** file by midnight **Wednesday, March 9th**.
Please keep in mind that your proposal needs to be approved by me. It may take a few days, between me suggesting changes and you responding to my suggestions, until you get an acceptable proposal. Then you will need enough time to work on it and meet the project submission deadline. Therefore, a suggested date for an initial submission is a week earlier on **Wednesday, March 2nd**.

• **Other Submissions and Deadlines:**
Your project must be submitted as a **pdf** file by midnight, **Wednesday, April 6th**. Your presentation should be sent to me, in **pdf** form, by email no later than midnight **Friday, April the 8th**. Your presentations will take place next day on **Saturday, April the 9th**, starting at 10:00 am until 12:00 pm, lunch break 12:00 pm - 1:00 pm; the 30-minute test will start at 1:00 pm.

• **Place and Participation:**
The presentations will take place at the Computer Science seminar room (EN-2022). Everybody is expected to be present throughout the entire session and participate actively in the discussions. This will actually count towards your 5% for the "in class participation" portion of your grade.
Computer Science:
24.10.4 Courses
A selection of the following graduate courses will be offered to meet the requirements of candidates, as far as the resources of the Department will allow. Normally, students will be expected to complete their course work during the fall and winter semesters. Courses might not be offered in the spring semester.

601W Work Term
6758-6769 Special Topics in Computer Applications
6770-6790 Special Topics in Computer Science
690A/B Research Methods in Computer Science
6901 Applied Algorithms (credit may be obtained for only one of 6901 and 6783)
6902 Computational Complexity (credit may be obtained for only one of 6902 and 6743)
6903 Concurrent Computing
6904 Advanced Computer Architecture (credit may be obtained for only one of 6904 and 6722)
6905 Software Engineering (credit may only be obtained for one of 6905 or 6713)
6906 Numerical Methods (credit may only be obtained for one of 6906 or 6731)
6907 Introduction to Data Mining (credit may be obtained for only one of 6907 and 6762)
6908 Database Technology and Applications (credit may be obtained for only one of 6908 and 6751)
6909 Fundamentals of Computer Graphics (credit may be obtained for only one of 6909 or 6752)
6910 Services Computing, Semantic Web and Cloud Computing
6911 Bio-inspired Computing
6912 Autonomous Robotics (credit may be obtained for only one of 6912 and 6778)
6913 Bioinformatics
6914 3D Modelling and Rendering
6915 Machine Learning
6916 Security and Privacy
6918 Digital Image Processing (credit may be obtained for only one of 6918 or 6756)
6921 Syntax and Semantics of Programming Languages (credit may be obtained for only one of 6921 or 6711)
6922 Compiling Methods (credit may be obtained for only one of 6922 and 6712)
6924 Formal Grammars, Automata and Languages
6925 Advanced Operating Systems
6926 Performance Evaluation of Computer Systems
6928 Knowledge-Based Systems (credit may be obtained for only one of 6928 or 6755)
6929 Advanced Computational Geometry (credit may be obtained for only one of 6929 or 6745)
6930 Theory of Databases (credit may be obtained for only one of 6930 or 6742)
6931 Matrix Computations and Applications (credit may only be obtained for one of 6931 or CMSC 6910) (cross-listed with CMSC 6910)
6932 Matrix Computations in Control (credit may only be obtained for one of 6932 or 6738)
6999 Master's Project

Scientific Computing:
24.21.6 Courses
Core Courses
Computer Science 6731 Topics in Numerical Methods
Mathematics 6201 Numerical Methods for Partial Differential Equations
Mathematics 6210 Numerical Solutions of Differential Equations
Scientific Computing 6009 Master's Project
Scientific Computing 6910 Matrix Computations and Applications or Computer Science 6732
6931 Matrix Computations and applications (credit may be obtained for only one of the CMSC 6910 and COMP 6732 and COMP 6931)
Scientific Computing 6920 Applied Scientific Programming
Scientific Computing 6930 Algorithms for Distributed and Shared Memory Computers
Scientific Computing 6950 Computer Based Tools and Applications (credit may be obtained for only one of CMSC 6950 and the former CMSC 6940)

**Additional Courses**
The following courses are identified as suitable for students in this program. Other courses may be permitted with the approval of the Program Chair.

**Biochemistry**
6000-6009 Special Topics in Biochemistry
6010-6019 Special Topics in Nutrition and Metabolism
6020-6029 Special Topics in Food Science
6400 Control of Intermediary Metabolism
6460 Structural Biochemistry
6520 Nutritional Biochemistry
6530 Food Biochemistry
6590 Cellular, Molecular and Developmental Biology (credit restricted with Biology 6590 and Medicine 6590)
6630 Marine Biochemistry
6680 Processing and Quality of Foods

**Chemistry**
6201 Bioinorganic Chemistry
6204 Mechanisms in Catalysis
6205 Photochemistry of Transition Metal Complexes
6210 Organometallic Chemistry
6300 Quantum Chemistry I
6301 Quantum Chemistry II
6302 Molecular Spectroscopy
6304 Computational Chemistry I
6310 Electronic Structure Theory
6323 Chemical Thermodynamics I
6324 Chemical Thermodynamics II
6340 Biophysical Chemistry
6350 Electrochemical Kinetics
6360 Solid State Chemistry
6380 Adsorption on Surfaces
6381 Surface and Interface Science
6382-6389 Selected Topics in Physical Chemistry
6390-6398 Selected Topics in Physical Chemistry
6399 Chemical Kinetics and Dynamics
6401 Organic Spectroscopic Analysis I
6402 Organic Spectroscopic Analysis II
6470 Physical Organic Chemistry
6590-6599 Selected Topics in Theoretical and Computational Chemistry
6600 Applications of Inorganic and Organometallic Chemistry to Toxicology

**Computer Science**
6722 6904 Advanced Computer Architectures (credit may be obtained for only one of 6904 and 6722)
6713 6905 Software Engineering (*credit may be obtained for only one of 6905 and 6713*)
6729 6729 Special Topics in Computer Systems - Computer Networks
6731 Topics in 6906 Numerical Methods (*credit may be obtained for only one of 6906 and 6731*)
6736 6739 Special Topics in Numerical Methods
6752 Applications 6909 Fundamentals of Computer Graphics (*credit may be obtained for only one of 6909 and 6752*)
6756 6918 Digital Image Processing (*credit may be obtained for only one of 6918 and 6756*)
6732 6931 Matrix Computations and Applications (*credit may be obtained for only one of 6732, 6931 and CMSC 6910*)

Earth Sciences
6141 Rotation of the Earth
6142 Theory of Global Geodynamics
6171 Advanced Exploration Seismology
6172 Borehole Seismic
6175 Gravity and Magnetic Methods
6177 Mathematical Formulations of Seismic Wave Phenomena
6918 Airborne and Borehole Electromagnetic Methods
6994 Special Topics in Earth Sciences - Geophysical Inversion and Applications
7110 Physics of the Solid Earth
7120 Crustal Geophysics

Engineering and Applied Science
9015 Ocean Engineering Hydrodynamics
9052 Ice Properties and Mechanics
9501 Finite Element Analysis with Engineering Applications
9713 Stochastic Hydrology
9815 Electromagnetic Propagation
9821 Digital Signal Processing
9826 Advanced Control Systems
9861 High-Performance Computer Architecture
9865 Advanced Digital Systems
9869 Advanced Concurrent Programming
9871 Information Theory and Coding

Mathematics and Statistics
6112-6119 Special Topics in Applied Mathematics
6201 Numerical Methods for Partial Differential Equations
6210 Numerical Solution of Differential Equations (required course for Scientific Computing)
6212 Numerical Methods for Initial Value Problems
6588 Selected Topics in Statistics and Probability - Generalized Additive Models with Applications in Scientific Visualization

Physics and Physical Oceanography
6000 Condensed Matter Physics I
6200 Nonlinear Dynamics
6308 Ocean Dynamics I
6309 Ocean Dynamics II
6310 Physical Oceanography
6316 Ocean Measurements and Data Analysis
6317 Ocean Acoustics
6318 Numerical Modelling
6320 Turbulence
6321 Coastal Oceanography
6323 Stability Theory
6400 Statistical Mechanics
6402 Theory of Phase Transitions
6800 Group Theory
6850 Quantum Mechanics I

**Scientific Computing**

601W Work Term 1
602W Work Term 2

6910 Matrix Computations and Applications (credit may be obtained for only one of CMSC 6910 and COMP 6732 and 6931) (cross-listed with COMP 6931)

6920 Applied Scientific Programming

6925 Tools of the Trade for Programming High Performance Computers (2 credit hours)

6930 Algorithms for Distributed and Shared Memory Computers

6950 Computer Based Tools and Applications (credit may be obtained for only one of CMSC 6950 and the former CMSC 6940)

**Computer Science (PhD section):**

**32.7.2 Courses**

A selection of the following graduate courses will be offered to meet the requirements of candidates, as far as the resources of the Department will allow.

6758-6769 Special Topics in Computer Applications

6770-6790 Special Topics in Computer Science

690A/B Research Methods in Computer Science

6901 Applied Algorithms (credit may be obtained for only one of 6901 and 6783)

6902 Computational Complexity (credit may be obtained for only one of 6902 and 6743)

6903 Concurrent Computing

6904 Advanced Computer Architecture (credit may be obtained for only one of 6904 and 6722)

6905 Software Engineering (credit may only be obtained for one of 6905 or 6713)

6906 Numerical Methods (credit may only be obtained for one of 6906 or 6731)

6907 Introduction to Data Mining (credit may be obtained for only one of 6907 and 6762)

6908 Database Technology and Applications (credit may be obtained for only one of 6908 and 6751)

6909 Fundamentals of Computer Graphics (credit may be obtained for only one of 6909 or 6752)

6910 Services Computing, Semantic Web and Cloud Computing

6911 Bio-inspired Computing

6912 Autonomous Robotics (credit may be obtained for only one of 6912 and 6778)

6913 Bioinformatics

6914 3D Modelling and Rendering

6915 Machine Learning

6916 Security and Privacy

6918 Digital Image Processing (credit may be obtained for only one of 6918 or 6756)

6921 Syntax and Semantics of Programming Languages (credit may be obtained for only one of 6921 or 6711)

6922 Compiling Methods (credit may be obtained for only one of 6922 and 6712)

6924 Formal Grammars, Automata and Languages

6925 Advanced Operating Systems

6926 Performance Evaluation of Computer Systems

6928 Knowledge-Based Systems (credit may be obtained for only one of 6928 or 6755)

6929 Advanced Computational Geometry (credit may be obtained for only one of 6929 or 6745)
6930 Theory of Databases *(credit may be obtained for only one of 6930 or 6742)*
6931 Matrix Computations and Applications *(credit may only be obtained for one of 6931 or 6732 and CMSC 6910) (cross-listed with CMSC 6910)*
6932 Matrix Computations in Control *(credit may only be obtained for one of 6932 or 6738)*
Hi Gail,

the three items have received six votes in favour (Ron, Yuanzhu, Alison, Stephanie, Ivan and myself), none against. These proposals can be submitted for the approval of the Faculty Council.

Regards,

-j

On 11/07/2016 02:06 PM, Kenny, Gail wrote:
> Thanks JC. Any news on this request? The agenda for Faculty Council will be put together on Wednesday and we should get these items on that agenda so that we meet the deadlines in other offices for these items. Thank you.
> Gail
> > -----Original Message-----
> > From: JC Loredo-Osti [mailto:jlcoredoosti@mun.ca]
> > Sent: November-04-16 9:14 AM
> > To: Brian E. Staveley <bestave@mun.ca>; Christina Bottaro
> > <cbottaro@mun.ca>; JC Loredo-Osti <jcoredoosti@mun.ca>; Kenny, Gail
> > <gkenny@mun.ca>; Len Zedel <zedel@mun.ca>; Ron Haynes
> > <rhaynes@mun.ca>; Rob Bertolo <rbertolo@mun.ca>; Ivan Booth
> > <ibooth@mun.ca>; Stephanie H. Curnoe <curnoe@mun.ca>; Cyr Couturier
> > <Cyr.Couturier@mi.mun.ca>; Carolyn Walsh <cwals@play.psych.mun.ca>;
> > Tom Chapman <tomic@mun.ca>; Courage, Mary <mcourage@mun.ca>; Yuanzhu
> > Chen <yzchen@mun.ca>; Alison Malcolm <amalcolm@mun.ca>; Matthew Rise
> > <mrise@mun.ca>
> > Subject: Fwd: GS Committee business
> >
> > Dear committee members,
> >
> > we have three proposals whose decision is yet to be made. If you have not answered my email related to these proposal, please, do so at your earliest convenience.
>
> >-j
> >
>
> >------ Forwarded Message ------
> > Subject: GS Committee business
> > Date: Wed, 2 Nov 2016 17:32:40 -0000
> > From: Kenny, Gail <gkenny@mun.ca>
> > To: JC Loredo-Osti <jlcoredoosti@mun.ca>, MathStat Graduate Officer
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: savs@mun.ca

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

Course No.: Phys 6413
Course Title: Solid Matter Physics

I. To be completed for all requests:

A. Course Type: ☑ Lecture course ☐ Laboratory course ☐ Directed readings ☐ Lecture course with laboratory ☐ Undergraduate course* ☐ Other (please specify) Project (report & presentation)

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: 39

F. Course description (reading list required):

This course introduces the essential principles of solid matter physics. Solid matter encompasses a wide range of materials: colloids, liquid crystals, polymers, surfactants, gels, and biomaterials such as proteins, lipids and cells. These principles are strengthened via experimental connections made via demonstrations and participatory laboratory experiments. See attached for a detailed description and reading list.

G. Method of evaluation:

<table>
<thead>
<tr>
<th>Written</th>
<th>Oral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class tests</td>
<td>20</td>
</tr>
<tr>
<td>Assignments</td>
<td>40</td>
</tr>
<tr>
<td>Other (specify): Project (report &amp; presentation)</td>
<td>20</td>
</tr>
<tr>
<td>Final examination:</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

* 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:
Instructor’s initials

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 20

Length of session if less than a semester:

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

[Signatures and dates]

Course instructor

[Signatures and dates]

Approval of the head of the academic unit

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

[Signatures and dates]

Secretary, Faculty/School/Council

Updated October 2011
Course Description

1. Brief Description
This course introduces the essential principles of soft matter physics. Soft matter encompasses a wide range of materials: colloids, liquid crystals, polymers, surfactants, gels, and biomaterials such as proteins, lipids and cells. These principles, delivered primarily in the lecture format (3 hours per week), are strengthened via experimental connections made via demonstrations and participatory laboratory experiments (examples of these Experimental Connections are listed below in the detailed course outline). End-of-term project presentations will be organized over a 2-week period.

2. Reading List
Course text will be chosen from one of the following:

Other Reading:

3. Detailed Description

Project: In-class presentation
During the course, each student will present 1 full-length in-class presentation in lecture format on an assigned topic. Project requirements will include an in-class presentation of an assigned reading as well as a written report (using latex, an open-source document preparation system that is common in the physical sciences). This could be a chapter in a book, or a review article, and will be assigned early in the course. These presentations will take place in the last 2 weeks of the course.

Course Content

1. Introduction to soft matter
- What is soft condensed matter?
- Colloids, polymers, amphiphiles, liquid crystals
- Forces, energies, timescales
- Experimental connection: rheology (viscosity and visco-elasticity)
2. Scattering
   - Scattering theory
   - Scattering techniques in soft matter
   - *Experimental connection:* analysis of scattering data

3. Phase transitions
   - Liquid-liquid unmixing
   - Spinodal decomposition
   - Nucleation and growth

4. Colloids
   - Colloidal interactions
   - Excluded volume, depletion interactions
   - van der Waals attractions, electrostatics, ions, and DLVO.
   - Tunable colloids and applications

5. Random walks and polymers
   - Random walks and the structure of macromolecules
   - Random walks and dynamics
   - *Experimental connection:* microscopy and Brownian motion

6. Focus topics and final project topics
   - Water
   - Directed motions: swimming in low-Reynolds-number liquids [reading: Purcell]
   - Diffusion in crowded environments
   - Liquid crystal phases
   - Gels
   - Proteins, polyelectrolytes, polymer brushes...
   - Glass transition, Kauzmann paradox
Hello everyone,

The Department of Physics and Physical Oceanography welcomes your comments and suggestions regarding the proposal attached to this email. This proposal involves a new graduate course in Soft Matter. The proposed course has already been taught as a special topics course in our Department for a number of years.

Sincerely,
Stephanie Curnoe

Stephanie H. Curnoe, Professor and Deputy Head (Graduate Studies)
Department of Physics and Physical Oceanography, Memorial University of Newfoundland, St. John's, NL, A1B 3X7, Canada
telephone: 1-709-864-8088 facsimile: 1-709-864-8739
curnoe@mun.ca http://www.physics.mun.ca/~curnoe/

[ Part 2, "" Application/PDF (Name: "soft-matter-prop.pdf") 74 KB. ]
[ Unable to print this part. ]
Hi Stephanie,

Thanks for your message. We have no concern about the proposal. The only question is when the course will be given if proposal is approved. The topics are interesting. We will recommended relevant graduate students in Engineering to take it.

All the best,

Helen

Chair of Engineering Graduate Studies Committee

----- Forwarded message from S H Curnoe <curnoe@mun.ca> ----- 

Date: Thu, 28 Jul 2016 11:49:16 -0230 (NDT)

From: S H Curnoe <curnoe@mun.ca>

Reply-To: S H Curnoe <curnoe@mun.ca>

Subject: Soft Matter (fwd)

To: biochead@mun.ca, chemhead@mun.ca, engrconsult@mun.ca

Hello everyone,

The Department of Physics and Physical Oceanography welcomes your comments and suggestions regarding the proposal attached to this email. This proposal involves a new graduate course in Soft Matter. The proposed course has already
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Sincerely,
Stephanie Curnoe

================================
Stephanie H. Curnoe, Professor and Deputy Head (Graduate Studies)
Department of Physics and Physical Oceanography, Memorial
University of Newfoundland, St. John's, NL, A1B 3X7, Canada
telephone: 1-709-864-8888 facsimile: 1-709-864-8739
curnoe@mun.ca http://www.physics.mun.ca/~curnoe/

----- End forwarded message -----
From bzhang@mun.ca Wed Aug 3 19:44:55 2016
Date: Wed, 3 Aug 2016 19:44:44 -0230
From: Baiyu Zhang <bzhang@mun.ca>
To: S H Curnoe <curnoe@mun.ca>
Cc: llye@mun.ca, Grad Studies 2015 -- Anand Yethiraj <ayethiraj@mun.ca>, Guy Quirion <gquirion@mun.ca>, Joy Simmons <jsimmons@mun.ca>, lev@mun.ca, Mykhalo Evstigneev <mevstigneev@mun.ca>, G. Todd Andrews <tandrews@mun.ca>
Subject: Re: Soft Matter (fwd)

Got it. Thanks Stephanie.

All the best,
Helen

> On Aug 3, 2016, at 7:15 PM, S H Curnoe <curnoe@mun.ca> wrote:
> >
> >
> > Dear Helen,
> >
> > Thank you for your comments.
> >
> > The course has already been offered several times in the past few years as a directed studies course, and we are planning to offer it again in Winter 2017. If it is approved, we will continue to offer it regularly.
> >
> > Sincerely,
> > Stephanie Curnoe
> >
> >
> >> On Wed, 3 Aug 2016, Helen Zhang wrote:
> >>
> >> Date: Wed, 3 Aug 2016 11:44:27 -0230
> >> From: Helen Zhang <bzhang@mun.ca>
> >> To: curnoe@mun.ca
> >> Cc: llye@mun.ca
> >> Subject: RE: Soft Matter (fwd)
> >> Hi Stephanie,
> >>
> >> Thanks for your message. We have no concern about the proposal. The only question is when the course will be given if proposal is approved. The topics are interesting. We will recommend relevant graduate students in Engineering to take it.
> >>
> >> All the best,
> >> Helen
> >> Chair of Engineering Graduate Studies Committee
> >>
> >> BAIYU (HELEN) ZHANG | Ph.D., P.Eng.
> >> Associate Professor, Civil Engineering
> >> Faculty of Engineering and Applied Science
> >> Memorial University of Newfoundland
> >> St. John’s, Newfoundland and Labrador, Canada, A1B 3X5
> >> Tel: +1(709)864-3301; Fax: +1(709)864-4042
> >> Email: bzhang@mun.ca
> >>
> >>
> >>
> >>
> >> ----- Forwarded message from S H Curnoe <curnoe@mun.ca> ----- 
> >> Date: Thu, 28 Jul 2016 11:49:16 -0230 (NDT)
> >> From: S H Curnoe <curnoe@mun.ca>
Hello everyone,

The Department of Physics and Physical Oceanography welcomes your comments and suggestions regarding the proposal attached to this email. This proposal involves a new graduate course in Soft Matter. The proposed course has already been taught as a special topics course in our Department for a number of years.

Sincerely,
Stephanie Curnoe

Stephanie H. Curnoe, Professor and Deputy Head (Graduate Studies)
Department of Physics and Physical Oceanography, Memorial University of Newfoundland, St. John's, NL, A1B 3X7, Canada
telephone: 1-709-864-8888 facsimile: 1-709-864-8739
curnoe@mun.ca http://www.physics.mun.ca/~curnoe/

----- End forwarded message -----
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.: PSYC 6117

Course Title: Mathematical Cognition

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)

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
   If yes, please specify:

D. Credit hours for this course: 3

E. Estimated number of contact hours per semester: 36

F. Course description (reading list required):
   This course examines the latest research regarding children's early learning of number and later learning of mathematics. Topics may include (but are not limited to) infants' numerical ability, counting, subitizing, basic arithmetic, fractions, conceptual versus procedural knowledge, individual differences in mathematics, gender differences, and selected topics in mathematics education

G. Method of evaluation:  

   Written   Percentage   Oral

   Class tests   60%   40%

   Assignments

   Other (specify):

   Final examination:

   Total  60%  40%

---

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

Recommended for offering in the

- Fall
- Winter ✔
- Spring

Length of session if less than a semester:

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

Course instructor: ____________________________

Signature: ____________________________

Date: ____________

Nov 4, 2016

Approval of the head of the academic unit: ____________________________

Signature: ____________________________

Date: ____________

Nov 4, 2016

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

Secretary, Faculty/School/Council: ____________________________

Date: ____________

Updated October 2011
PSYCHOLOGY 6117
Mathematical Cognition

Reading List

What follows is a list of articles that will be considered in the first half of the course. After going through these articles, students will then be required to go out and find more articles to read for the second half of the course.


Hello Gail,

PSYC-6117 has been approved with 8 votes in favour, none against (Ron, Cyr, Len, Mary, Tom, Carolyn, Christina and myself). However, the section (2) of the form need to be fixed: the number of hours should be 36 for a 3 credit course.

- j

--
JC Loredo-Osti, Professor
Department of Mathematics and Statistics Memorial University
Phone: +(709) 864 8729

"Wisdom comes to us when it can no longer do any good."
--Gabriel García Márquez (Love in the time of cholera).
Hi to all:

On behalf of Dr. Surprenant, I am attaching a proposal for graduate degree outcomes that SGS is proposing. The rationale and actual outcomes are reflected in the attached document. These are not intended to be learning outcomes, but rather reflect broad skills and competencies that we might expect of all advanced degree graduates.

We would appreciate your feedback from your Council by October 31, 2016.

Thank you
Annette

Annette Williams
Secretary to the Deans
School of Graduate Studies
IIC 2012, Bruneau Centre
Memorial University of Newfoundland
St. John’s, NL
A1C 5S7
Tel: 709-864-2478
Email: awilliam@mun.ca
Fax: 709-864-2358
Proposal to identify graduate degree outcomes at Memorial University
August 3, 2016

An increasing number of graduate students at Memorial decide to pursue degree programs for professional reasons. While obtaining work is not and should not be the sole purpose of advanced degrees, we should consider whether graduate education at Memorial is providing students with the knowledge and skills needed to contribute meaningfully to society (including as employees).

Students pursue graduate programs for many different reasons and graduate programs provide students with diverse skills and competencies in addition to knowledge-based learning. We should offer some indication of the skills our graduates attain during advanced education at Memorial. Graduate degree expectations can play a role here by clarifying what graduates are able to do in general terms and that represent the widest range of disciplines (COU, 2011). A number of universities, including all research universities in Ontario, the University of Saskatchewan, Oregon State University, Cornell University, SUNY Plattsburgh, and Texas A&M University have documented some type of expectations for graduate-level outcomes.

The proposed graduate degree outcomes are intended to be general enough to accommodate all degree programs (including new programs) at Memorial while highlighting transparency of appropriate skills development (i.e., what graduates can do) and the relevance of graduate education in the labour market and society in general. Graduate degree level outcomes focus on the high-level intellectual skills that are fundamental to university education and critical to the knowledge economy (COU, 2011). These are stated different from learning outcomes, which also describe what graduates know (which in turn vary by discipline and may be more appropriate for program-level expectations). These outcomes support the qualities Memorial expects of all graduates under the institution’s Teaching and Learning Framework (MUN, 2014) and align with the employability skills identified by the Conference Board of Canada (2016) as being necessary in today’s world of work.

References


New Calendar Regulations

4.5 Graduate degree outcomes

Graduate degree outcomes at Memorial University (Table 1) describe what graduates can do and are intended to be general enough to accommodate all degree programs (including new programs). They help to ensure graduates have the skills and abilities to contribute meaningfully in the labour market and to society in general. Individual programs may identify more specific outcomes (namely, learning outcomes, which include knowledge).

<table>
<thead>
<tr>
<th>Degree</th>
<th>Graduate diploma</th>
<th>Master</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research</td>
<td>- Exceptional ethical behaviour and academic integrity</td>
<td>- Exceptional ethical behaviour and academic integrity</td>
<td>- Exceptional ethical behaviour and academic integrity</td>
</tr>
<tr>
<td></td>
<td>- Able to recognize different dimensions of a problem</td>
<td>- Exceptional ability to recognize different dimensions of a problem</td>
<td>- Exceptional ability to recognize different dimensions of a problem</td>
</tr>
<tr>
<td></td>
<td>- Able to gather, analyze, and organize information</td>
<td>- Exceptional ability to use different research methods and forums for information</td>
<td>- Exceptional ability to gather, analyze, and organize information</td>
</tr>
<tr>
<td></td>
<td>- Able to engage complex issues and respond based on principles</td>
<td>- High level of ability to gather, analyze, and organize information</td>
<td>- Exceptional ability to use different research methods and forums for information</td>
</tr>
<tr>
<td></td>
<td>- High level of intellectual and professional independence</td>
<td>- High level of ability to engage complex issues and respond based on principles</td>
<td>- Exceptional ability to engage complex issues and respond based on principles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High level of intellectual and professional independence</td>
<td>- Exceptional ability to think originally and critically</td>
</tr>
<tr>
<td>Management</td>
<td>- Able to plan, manage time, and meet deadlines</td>
<td>- Exceptional ability to plan, manage time, and meet deadlines</td>
<td>- Exceptional ability to plan, manage time, and meet deadlines</td>
</tr>
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<td></td>
<td>- Able to work independently</td>
<td>- Exceptional ability to work independently</td>
<td>- Exceptional ability to work independently</td>
</tr>
<tr>
<td></td>
<td>- Able to carry out multiple tasks</td>
<td>- Exceptional ability to carry out multiple tasks</td>
<td>- Exceptional ability to carry out multiple tasks</td>
</tr>
<tr>
<td></td>
<td>- Able to plan, design, and carry out projects or tasks</td>
<td>- High level of ability to plan, design, and carry out projects or tasks</td>
<td>- Exceptional ability to plan, design, and carry out projects or tasks</td>
</tr>
<tr>
<td></td>
<td>- Able to evaluate solutions and make recommendations</td>
<td>- High level of ability to evaluate solutions and make recommendations</td>
<td>- Exceptional ability to evaluate solutions and make recommendations</td>
</tr>
<tr>
<td></td>
<td>- Able to take decisive action in complex situations</td>
<td>- High level of decisive action in complex situations</td>
<td>- Exceptional level of decisive action in complex situations</td>
</tr>
<tr>
<td></td>
<td>- Initiative and personal responsibility/accountability</td>
<td>- High level of initiative and personal responsibility/accountability</td>
<td>- Exceptional level of initiative and personal responsibility/accountability</td>
</tr>
<tr>
<td>Communication</td>
<td>- Able to read, synthesize, and understand information in different forms</td>
<td>- High level of ability to read, synthesize, and understand information in different forms</td>
<td>- Exceptional ability to read, synthesize, and understand information in different forms</td>
</tr>
<tr>
<td></td>
<td>- Able to ask effective questions</td>
<td>- High level of ability to ask effective questions</td>
<td>- Exceptional ability to ask effective questions</td>
</tr>
<tr>
<td></td>
<td>- Able to accept, respond to, and act upon feedback and criticism</td>
<td>- High level of ability to accept, respond to, and act upon feedback and criticism</td>
<td>- Exceptional ability to accept, respond to, and act upon feedback and criticism</td>
</tr>
<tr>
<td></td>
<td>- Able to communicate knowledge clearly in both oral and written forms</td>
<td>- High level of ability to communicate knowledge clearly in both oral and written forms</td>
<td>- Exceptional ability to communicate knowledge clearly in both oral and written forms</td>
</tr>
</tbody>
</table>
Mary,

Here's JC's brief response ... I'll collect all of the responses ... do you want a copy?

Len


Len Zedel
Physics Department
Memorial University
of Newfoundland
St. John's, NF
Canada A1B 3X7

More speed, less haste

------- Forwarded message -------
Date: Wed, 9 Nov 2016 19:40:31 -0330
From: MathStat Graduate Officer <mathgrad@mun.ca>
To: Len Zedel <zedel@mun.ca>
Subject: Re: Fwd: Degree Outcomes proposal - URGENT

Hi Len,
you have been copied with the answers from the committee members.
As you see, out of 11 committee members that responded to this call only one expressed support for it. The other 10 answers went from rejection to objections about the wording. The main concerns are that the superlatives used some how devalues the our degrees, these outcomes are not measurable with an objective metric, then making their evaluation subjective and not enforceable.
Some suggest re-word it and use as a guideline. There is a consensus opposition to make it a regulation in the calendar.

Best regards,
-j

On 08/11/16 02:05 PM, JC Loredo-Osti wrote:
Hi Len

Biochemistry's grad committee have reviewed the proposal and feel that it makes sense. There were no concerns or further commentary.

Mark

Mark D. Berry Ph.D.
Professor and Head
Dept. Biochemistry
Memorial University of Newfoundland
St. John's, NL, Canada
A1B 3X9

Associate Member
Beatrice Hunter Cancer Research Institute

Tel: +1-709-864-8529
E-mail: mberry@mun.ca; biohead@mun.ca
Wall, Mary

From: Brian E Staveley <bestave@mun.ca>
Sent: November-07-16 10:15 AM
To: Associate Dean of Science (Research); Dean of Science
Subject: Feedback requested on Degree Outcomes proposal

Dear Dr. Zedel,

The proposed "graduate degree outcomes" seem to be appropriate, fair and very representative of the traditional expectations of the streams of training under consideration.

yours,
Brian Staveley
November 3, 2016

To: Dr. Len Zedel, Associate Dean of Science (Graduate Studies and Research)

From: Dr. Travis D. Fridgen, Professor and Head, Department of Chemistry

Re: Proposal to identify graduate degree outcomes at Memorial University

The Department of Chemistry discussed the proposal to identify graduate degree outcomes at Memorial University at the faculty meeting on September 22, 2016.

In general, it is a worthwhile exercise to list and publish outcomes of our graduate degrees and we applaud the initiative. We do, however, have a few comments on the content of the proposal that are outlined below.

The statement, “obtaining work is not and should not be the sole purpose of advanced degrees,” we find to be odd. We feel that the main purpose of any degree, including a graduate degree is exactly for obtaining or bettering career opportunities.

As a whole, we felt that the degree outcomes were too specific when it comes to the level expected of the outcome. The word “exceptional,” we think, indicates that graduates must meet the highest possible standard of each of these outcomes—which we think is a pretty high and probably unattainable bar. Each student, whether PhD or MSc, will achieve these skills to varying degrees. What happens when a student graduates and they, or their employer find that they (for example) do not have an “exceptional ability to read, synthesize, and understand information in different forms” to their definition of “exceptional.” Since putting these in the calendar is akin to a contract between the university and the students, who is liable if a student doesn’t meet each outcome at the exceptional level? Who is responsible to ensure that this exceptional level is met for each one of these outcomes? What is the metric by which exceptional is measured? In reference letters, we would have to be able to verify these exceptional outcomes for all students who graduate, and any discrepancies could cause problems for the University and its graduates. We think that use of “exceptional” is also pretty vague.

Chemistry is opposed to this proposal in its current form. Perhaps removing the adjectives “exceptional” and “high level” might make the document more acceptable. For example, “Ability to read, synthesize, and understand information in different forms.” “Ability to evaluate solutions and make recommendations.” The different degrees or diplomas could be differentiated by the use of different outcomes.
Mary,

Chen’s email.

Len.

From: Yuanzhu Chen [mailto:yzchen@mun.ca]
Sent: September-29-16 10:07 PM
To: Associate Dean of Science (Research)
Cc: Minglun Gong
Subject: Fwd: REMINDER - Feedback by Faculty Council (fwd)

The Computer Science Departmental Graduate Studies Committee met today regarding the proposal. Our primary comment is on the readability of the table on Page 2. It would be easier for the readers if the common words of each column are extracted to create a new column for the description of the expected qualities, with the remaining columns only specifying the level of each quality.

Regards,
Yuanzhu Chen, on behalf of the GSC@CS

Yuanzhu Chen, Ph.D.

Associate Professor
Deputy Head, Graduate Studies
Department of Computer Science
Memorial University of Newfoundland
St. John's, NL, A1B 3X5, Canada
Phone: +1-709-864-6944
Fax: +1-709-864-2009
Web: http://www.cs.mun.ca/~yzchen/
Web: http://www.cs.mun.ca/~winemocol/

Begin forwarded message:

From: "R. Edwards" <redwards@mun.ca>
Subject: FW: REMINDER - Feedback by Faculty Council (fwd)
Date: September 20, 2016 at 4:05:18 PM GMT-2:30
To: yzchen@mun.ca
The graduate committee in Earth Sciences discussed this and sent the proposal to the faculty for approval. Neither discussion resulted in any comments on the proposal. The general feeling was that it wasn't overly useful, but certainly didn't hurt.

All the best,
Alison
Hi Len,

I should say at the outset that I dislike this stuff and so these views are mine alone and do not represent the Department as a whole, but I am pretty sure many faculty would agree with me!
While it may (?) make some sense for an undergraduate degree it is nonsense for a graduate degree.

Can you imagine saying to a brilliant Math (or Physics) PhD student who has written a groundbreaking thesis "I'm sorry but you cannot graduate because you have not met the Degree Outcome guideline 'Exceptional ability to plan, manage time and meet deadlines'". Now I'm exaggerating to make a point, but to make these 'outcomes' Calendar regulations is absurd.

All a supervisor in a Math department wants is for the student to be a good mathematician — finish their courses, write a good thesis and learn little about being a professional mathematician, all in a timely way. If they do learn other skills along the way, and I assume they will, then that is a bonus!

I also think that adding such a generic set of 'outcomes' as regulations devalues the graduate degrees by making them look like a formulaic one size fits all vocational degrees.

The other thing I dislike about such unnecessary regulation is that there will inevitably have to be some bureaucratic mechanism for monitoring our degrees to make sure they comply. If there isn't then why include what are at best guidelines as Calendar regulations?

Cheers,

Chris Radford.
Hello Len,

Below you will find a feedback to the SGS proposal (see below) from the departmental Graduate Studies Committee which has reviewed this proposal:

The Graduate Studies Committee reviewed the SGS proposal concerning calendar changes and degree outcomes and discussed it by email.

The proposal appears to be an insertion into the Calendar under "School of Graduate Studies/General Regulations" which would be placed between the current "Section 4.4 Program Requirements" and "Section 4.5 Provision for Waiver of Regulations."

Committee members agreed that the proposal seems to be an unnecessary addition to the Calendar.

Committee members identified several problems with the proposal (the following were raised by one or more members of the committee):

1. The proposal has no place in the "General Regulations" section because it does not involve regulations or anything that can be regulated.

2. The proposal does not describe the skill set that graduate students actually acquire, for example, not all of our PhD students acquire all of the "exceptional abilities" listed in the table. Students acquire these skills to varying degrees, depending on their program and the individual student. On the other hand, this list is not comprehensive: there are other valuable skills not listed in the table that students acquire during grad school that may be useful to employers. Also, there is no way to ensure that any student who graduates from our programs possesses any of these skills to any extent.

3. These learning outcomes do not align with the employability skills identified by the Conference Board of Canada in the referenced document, "Employability Skills 2000+", and the calendar change therefore fails in its primary goal.

4. The proposed calendar entry (the opening paragraph and the table) is poorly formatted. The table is overly redundant and includes a mixture of different kinds of entries (traits, skills and behaviours).

In addition I have also consulted with the department as a whole. Three people responded by email (and others gave me their verbal feedbacks). One was strongly in agreement with the above comments. Another expressed even stronger reservations regarding this proposal than given above stating that the document is worded poorly (for example, both nouns and adjectives...
are use in the table, the word exceptional is used too often etc). The last one was more favourably inclined stating that these types of skills development and learning outcomes should be explicitly addressed in the graduate programs (he noted that they have become very important in the Ontario system). He indicated that if we wanted to be more competitive with our graduate programs we should be able to assess the extent to which our programs help with these skill developments. He thought that, while the proposal had some technical flaws (as stated above) it was a reasonable first attempt. In general, with the exception of this one (relatively positive) comment, most people were less favourably inclined to this SGS proposal.

Jolanta

Jolanta  B. Lagowski, Professor and Head
Physics and Physical Oceanography
Memorial University
St. John’s, NL, Canada A1B 3X7
Email: jolantal@mun.ca
Phone: (709) 864-8738

From: Williams, Annette
Sent: September-20-16 1:08 PM
To: Arts; Dyck, Carrie; Foster, Dale; Coady, Peggy; Anderson, Kirk D.; Joy, Rhonda; Naterer, Greg; Lye, Leonard M.; dean@med.mun.ca; Sutherland, Ian D; Volk, Maureen; Gaudine, Alice; morelajo@mun.ca; Bishop, Lisa; Weber, John; Dean of Science; zedel@mun.ca; Klein, Ross; mbluehardt@grenfell.mun.ca; Glenn.Blackwood@mi.mun.ca; Kim, Andrew; Osmond, Tracy A.; Hunt, Tina; Hicks, Sue; Crocker, Moya; King, Yvonne; Hickey, Marie; Parsons, Peggy Ann; Kennedy, Darlene; rgs.assistantdean@med.mun.ca; rgs@med.mun.ca; O’Neill, Audrey; Calnes-Puddester, Michelle; Bugler, Heather; Wall, Mary; Cuff, Linda; Jody Burke; Emke, Ivan
Cc: Kim, Andrew
Subject: REMINDER - Feedback by Faculty Council

Hi to all:

On behalf of Dr. Surprenant, I am attaching a proposal for graduate degree outcomes that SGS is proposing. The rationale and actual outcomes are reflected in the attached document. These are not intended to be learning outcomes, but rather reflect broad skills and competencies that we might expect of all advanced degree graduates.

We would appreciate your feedback from your Council by October 31, 2016.

Thank you

Annette