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, April 27, 2016, at 1 p.m. in C-2045 (rescheduled from April 20).

AGENDA

1. Regrets
2. Adoption of the Minutes of March 16, 2016
3. Business Arising from the Minutes
4. Correspondence: None
5. Reports of Standing Committees:
   A. Undergraduate Studies Committee:
      a. Department of Physics and Physical Oceanography, calendar changes, paper 5.A.a (14 pages).
      b. Department of Chemistry, calendar changes, paper 5.A.b (9 pages).
      e. Department of Mathematics and Statistics, proposal for new course, MATH 4252/PHYS 4852, Quantum Information and Computing, paper 5.A.e (18 pages).
   B. Graduate Studies Committee:
   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
10. Adjournment

Mark Abrahams
Dean of Science
FACULTY OF SCIENCE
FACULTY COUNCIL OF SCIENCE
MINUTES OF MEETING OF MARCH 16, 2016

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, March 16, 2016, at 1:30 p.m. in room C-2045.

FSC 2419 Present
Biochemistry
Berry, M.

Biology
Hurford, A.

Chemistry
Fridgen, T. Kerton, F. Kozak, C.

Computer Science
Banzhaf, W. Bungay, S.

Earth Sciences
Hanchar, J.

Mathematics & Statistics
Loredo-Osti, J. Merkli, M. Radford, C. Sullivan, S.

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

Psychology
Neath, I. Thorpe, C.

Dean of Science
Abrahams, M. Foss, K. Foster, A. Harding, S. Mackenzie, T. J. Rideout

Economics
Waples, J.

Geography
Edinger, E.
DELTS
Todd, A.

Library
Ambi, A.

Arts
Finnis, J.

Engineering
Duan, X.

Faculty of Business
Cliff, T.

FSC 2420 Regrets
Mary Stordy Norm Carro
Danny Dyer Jillian Westcott

FSC 2421 Adoption of Minutes
Moved: Minutes of the February 17, 2016, meeting be adopted (Loredo-Osti/Sullivan). Carried. One abstention.

FSC 2422 Business Arising: None

FSC 2423 Correspondence: None

FSC 2424 Reports of Standing Committees:

A. Undergraduate Studies Committee: None
B. Graduate Studies Committee: None
C. Nominating Committee: None
D. Library Committee: None

FSC 2425 Reports of Chair in Teaching & Learning and Embedded DELTS Teaching Consultant: None

FSC 2426 Faculty of Science Strategic Plan – Annual Approval
Moved: Faculty of Science Strategic Plan be approved as presented with new information added pertaining to Biomedical Sciences and Health and Materials Science (Foster/Berry). Discussion took place about whether the last sentence in the Materials Science section was consistent with other sections in the strategic plan pertaining to research strengths. The motion was amended to include the deletion of the last sentence in the Materials Science section, “The faculty plans to expand upon areas of new materials synthesis and characterization methodology
as well as their materials characterization infrastructure.” Carried. One abstention.

FSC 2427 Reports of Delegates from Other Councils:
Report presented by Alison Ambi, representative from the Library Council.

The Library’s budgetary shortfall continues to impact the purchase of journals. Faculty members will be receiving a list of journals along with their prices so they can provide information to the Library about which subscriptions should be maintained. The list will be circulated from the Provost’s office and will be available soon.

FSC 2428 Report of the Dean
Presented by Mark Abrahams, Dean.

The Dean has been devoted to the completion of the Canada First Excellence Research Fund grant that is being developed collaboratively with Dalhousie University. Work on the grant is nearing completion as the mechanics have now been resolved of administering funding and the process for achieving mutual goals. The full grant is due on March 29 and the Dean is optimistic that success in this competition will bring significant benefits to the Faculty of Science and colleagues in the Faculty of Arts and the Marine Institute.

On Monday, March 7, the Dean was involved in a full day meeting with all other Deans and their Senior Administrative Officers for a pre-budget consultation. This day allowed every academic unit to tell the story that is shrouded by the financial details that are reviewed by the Provost’s office. While the day did not develop any specific financial plans that may be presented in the upcoming budget, it did make clear the financial challenges that are routinely confronted by each academic unit.

FSC 2429 Question Period

FSC 2430 Adjournment

The meeting adjourned at 1:47 p.m.
April 11, 2016

TO: 
All Members, Faculty Council of Science

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

SUBJECT: 
Calendar Changes and New Course Proposals

At a meeting held on April 8, 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 Physics and Physical Oceanography
   - Changes to course descriptions, including prerequisite changes, for Physics 2053 and 3400

2. Department of Chemistry
   (i) Change to prerequisite for Chemistry 1051
   (ii) Proposal for new course, Chemistry 4620-Environmental Chemistry

3. Department of Mathematics and Statistics
   (i) Change to course description of Statistics 4410
   (ii) Proposal for new course, Mathematics 4252 / Physics 4852- Quantum Information and Computing
Proposal from the Department of Physics and Physical Oceanography to Amend Several Course Calendar Entries

The Department of Physics and Physical Oceanography has initiated a review of all of its undergraduate course calendar entries.

These will be submitted for consultation and approval in blocks of 2-5 courses, by subject area, over the coming months.

Attached are amendment proposals for two courses: PHYS 2053 and PHYS 3400.

Feedback is requested by Feb. 15, 2015.

Thank you.

Martin Plumer, Chair, Undergraduate Studies Committee (plumer@mun.ca)

Jolanta Lagowski, Head (jolantal@mun.ca).

January 11, 2015.
Proposal
Amend Calendar Entry PHYS 2053

Executive Summary
Proposal contains minor revisions to course title and description.

Resource Implications: Instructional Costs

- None.

Consultations

- Faculty of Science.
- Grenfell Campus
- Marine Institute

Library Holdings and/or Other Resources Required

- No new Library 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

Course Number and Title
Physics 2053 Fluids and Thermal Physics

Abbreviated Course Title
Fluids and Thermodynamics

Calendar Change(s)

2053 Fluids and Thermal Physics - Thermodynamics examines elasticity, fluid mechanics, thermodynamics, kinetic theory and statistical mechanics. Introduces the student to basic concepts in fluid statics and dynamics as well as the fundamental concepts in thermal physics: kinetic theory, the laws of thermodynamics, thermodynamic processes, entropy, and heat engines and refrigerators.

CO: Mathematics 1001 and PHYS 1051 (or PHYS 1021 with a minimum average of 70%)
LH: 3
PR: Mathematics 1001 and PHYS 1051 (or PHYS 1021 with a minimum average of 70%)

Rationale
The new course title and description better describe the current course syllabus. PHYS 1021 is added as a possible replacement for the CO/PR PHYS 1051 since the material relevant to PHYS 2053 is covered in both of these first-year courses.
Consultations Sought From

- Faculty of Science.
- Grenfell Campus
- Marine Institute

Library Report Received

Comments Received

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

Name

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APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date:
Proposal
Amend Calendar Entry PHYS 3400

Executive Summary
Proposal contains minor revisions to course title and description.

Resource Implications: Instructional Costs
- None.

Consultations
- Faculty of Science.
- Grenfell Campus
- Marine Institute

Library Holdings and/or Other Resources Required
- No new Library 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

Course Number and Title
Physics 3400 Thermodynamics

Abbreviated Course Title
Thermal Physics

Calendar Change(s)

3400 Thermodynamics. **Thermal Physics** covers the first and second laws of thermodynamics. Entropy. Thermodynamics of real substances. Kinetic theory of matter. Introduction to statistical mechanics. Central concepts in thermodynamics and statistical mechanics, including temperature, entropy, the laws of thermodynamics, the Einstein model of solids, paramagnetism, Helmholtz and Gibbs free energies, chemical potential, thermodynamic identities, Boltzmann statistics, the partition function, and quantum statistics.

PR: Mathematics 2000, PHYS 2053 and PHYS 2750 (or 2056)

Rationale

Some material, such as basic Thermodynamics and Heat Engines, which is covered in PHYS 2053, will be removed from PHYS 3400 and additional material added (formerly in PHYS 4400), such as Boltzmann Statistics, the Partition Function, and Quantum Statistics. Previously, there was a lot of overlap between PHYS 2053 and PHYS 3400. New title better reflects the proposed syllabus.
Consultations Sought From

- Faculty of Science.
- Grenfell Campus
- Marine Institute

Library Report Received

- 

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:
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<td>12. Engineering</td>
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</table>
From: Travis Fridgen [chemhead@mun.ca]
Sent: January-19-16 10:43 AM
To: Martin Plumer
Subject: Re: Consultation calendar changes PHYS 2053 and 3400

Hi Martin,

Changes seem fine to me.

Travis
On 11/01/2016 10:09 AM, Martin Plumer wrote:
The Department of Physics and Physical Oceanography has initiated a review of all of its undergraduate course calendar entries.

These will be submitted for consultation and approval in blocks of 2-5 courses, by subject area, over the coming months.

Attached are amendment proposals for two courses: PHYS 2053 and PHYS 3400. Feedback is requested by Feb. 15, 2015.

Thank you.
Martin Plumer, Chair, Undergraduate Studies Committee (plumer@mun.ca)
Jolanta Lagowski, Head (jolantal@mun.ca).
January 11, 2015.

--
Travis D. Fridgen BSc, BEd, PhD
Professor and Head
Department of Chemistry
Memorial University
St. John's, NL, A1B 3X7
chemhead@mun.ca
709-864-3470
http://www.chem.mun.ca/zfac/tdf.php?
From: Fletcher, Garth [fletcher@mun.ca]  
Sent: January-13-16 1:14 PM  
To: plumer@mun.ca  
Subject: FW: FW: Consultation calendar changes PHYS 2053 and 3400

Hi Martin: see the following response from Annie our Undergraduate Officer.

Regards

Garth

From: Annie Mercier [mailto:amercier@mun.ca]  
Sent: January-13-16 11:45 AM  
To: Fletcher, Garth  
Subject: Re: FW: Consultation calendar changes PHYS 2053 and 3400

Hi Garth:

These changes currently do not directly affect our programs.

I did note that the rationale for the proposed changes (for both courses) was that the "New title better reflects the proposed syllabus" yet the Course Title is not showing any change (although a change does appear in the description, from the long course title to the abbreviated title appearing above).

Cheers,
Annie

On 12/01/2016 10:02 AM, Fletcher, Garth wrote:
Hi Annie: Could you have your committee look this over (if necessary) and get back to me please.

Thank you

Garth
From: Engineering Consultations [engrconsult@mun.ca]
Sent: January-21-16 8:31 AM
To: Martin Plumer
Subject: Re: Consultation PHYS 2053, 3400, 3900 & 4900

Dear Dr. Plumer,

Thank you for the opportunity to comment on the Calendar changes to four more Physics courses, PHYS 2053, 3400, 3900 and 4900.

At its meeting of January 20, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science determined that these proposed changes 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
[MIUGconsultations@mi.mun.ca]
Sent: January-11-16 1:22 PM
To: Martin Plumer
Subject: RE: Consultation calendar changes PHYS 2053 and 3400

Dr. Plumer,

Thank you for the opportunity to review and comment on the proposed changes to the two courses PHYS 2053 and 3400.

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

Derek

Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0586
FAX: 709-778-0394
Derek.Howse@mi.mun.ca
TO: Physics & Physical Oceanography
Martin Plumer, Chair, Undergraduate Studies Committee
Jolanta Lagowski, Head

FROM: Queen Elizabeth II Library Collections Division
Alison Ambi, Science Research Liaison Librarian

DATE: January 14, 2016

RE: Calendar changes to Thermal Physics courses

Upon review of the proposed calendar updates to PHYS 2053 and 3400, I have determined that the changes will have no impact on the collections activities of the Memorial University Libraries.
April 11, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on April 8, 2016, the Undergraduate Studies Committee of the Faculty of Science agreed that the following items be forwarded to Faculty Council for approval:

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Joan Burry
Associate Registrar and
Secretary: Committee on Undergraduate Studies,
Faculty of Science
Proposal
Prerequisite Changes for
CHEM 1051 (St. John’s Campus)

Executive Summary

This proposal is to allow students completing Chemistry 1200 with a 65% average on Grenfell campus access to Chemistry 1051 on St. John’s campus.

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)

1051 General Chemistry II builds on CHEM 1050 topics and on basic chemistry concepts from high school. Topics include solutions, kinetics, chemical equilibrium, equilibria involving acids and bases including polyprotic acids, buffers, acid-base indicators, titration curves, solubility and complex ion equilibrium, thermodynamics, and electrochemistry.
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 1001 and CHEM 1011
LC: 4
LH: 3
PR: CHEM 1050 or a grade of at least 65% in CHEM 1200
UL: only 6 science credit hours will be awarded for a major or honours in Chemistry from the following course groups: CHEM 1010/1011/the former 1031, or CHEM 1010/1050/1051, or CHEM 1810/1200/1001 (Grenfell Campus)
Clean Versions

Under 10.3 Chemistry (St. John’s)

1051 General Chemistry II builds on CHEM 1050 topics and on basic chemistry concepts from high school. Topics include solutions, kinetics, chemical equilibrium, equilibria involving acids and bases including polyprotic acids, buffers, acid-base indicators, titration curves, solubility and complex ion equilibrium, thermodynamics, and electrochemistry.

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 1001 and CHEM 1011

LC: 4

LH: 3

PR: CHEM 1050 or a grade of at least 65% in CHEM 1200

UL: only 6 science credit hours will be awarded for a major or honours in Chemistry from the following course groups: CHEM 1010/1011/the former 1031, or CHEM 1010/1050/1051, or CHEM 1810/1200/1001 (Grenfell Campus)

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The proposal is to allow students who complete the first course in the two course university level chemistry offerings (1200 and 1001 at Grenfell or 1050 and 1051 in St. John’s) to take the second course at the sister campus. Currently students are required to take both courses at the same campus. A proposal with complimentary changes to 1001 will be coming from Grenfell.
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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 email:

Original Message-----
From: Chris Flinn [mailto:cnflinn@mun.ca]
Sent: March-09-16 10:30 AM
To: associateupoffice@grenfell.mun.ca; MIUG Consultations; 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
Cc: Head of Chemistry
Subject: proposal for prerequisite change for chem 1051 for Grenfell chemistry course

Hello everyone,

Please see the attached proposal to change the prerequisites for chemistry 1051 which will smooth out students transitioning between the two campuses. Please send any comments you have to me at your earliest convenience.

sincerely,

Chris Flinn
Deputy Head, Undergraduate Studies
MUN Chemistry Department

Library report:

4 April 2016

To: Chris Flinn, Department of Chemistry
From: Erin Alcock, Science Research Liaison Librarian
Subject: Proposal for Prerequisite Change for CHEM 1051 (St. John’s Campus)

I have reviewed the proposal for the prerequisite change for Chemistry 1051 on the St. John’s campus and find that it will in no way impact the Memorial University of Newfoundland Libraries.

Responses from consulted faculties, science departments etc:

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 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

Ocean Sciences:

Hi Chris:

The proposed change to the prerequisites of CHEM 1051 seems like a sensible move. I don't see it affecting our Ocean Sciences programs other than in a positive way.

Cheers,
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:

Thank you for the opportunity to respond. Education fully supports your efforts to smooth out the transitioning between the two campuses.

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

Pharmacy:

Hello Dr. Flinn
Myself and Dr. Carla Dillon, Associate Dean, Undergraduate Studies have reviewed the above proposed calendar change. We support the change and have no comments or concerns. Thanks for the opportunity to offer feedback.
Regards,
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

Biochemistry:

Hi Chris

No concerns from Biochemistry. Good luck!

Mark D. Berry Ph.D.
Professor and Head
Dept. Biochemistry
Memorial University of Newfoundland
St. John’s, NL, Canada
A1B 3X9

Grenfell:

Dr. Flinn,

Some feedback in favor of the proposed changes for CHEM 1051.

Cheers,

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

From: Dust, Julian. M
Sent: Wednesday, March 9, 2016 11:43 AM
To: Gallant, Robert
Subject: Fw: proposal for prerequisite change for chem 1051 for Grenfell chemistry course

Dear Dr. Gallant,

These changes arise from recent meetings between Grenfell chemistry faculty and Dr. Fridgen, the Head of chemistry (STJC-MUN). The modification of the pre-requisite for chemistry 1051 (St. John’s) is in accord with what was agreed at that meeting. I support this change to improve transferability between the Campuses.

sincerely,
Dr. J.M. Dust
Asscc. Prof. chemistry and environmental Science,
GC-MUN

Physics:
Hi Chris,

Physics has no issues with this proposed PR change for CHEM 1051.

Cheers,
Martin

Biology:
Hi Chris,
The Biology Undergraduate Studies Committee reviewed the proposed change for CHEM 1051 and have no concerns with such a change.
Thanks
Karen

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

Marine Institute:

Chris,

Thank you for the opportunity to review and comment on the proposed change to CHEM 1051.

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

Derek Howse
Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0585
FAX: 709-778-0394
Derek.Howse@mi.mun.ca
April 11, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes and New Course Proposals

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Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal
New Course in Environmental Chemistry

Executive Summary

This is a proposal for a new special topics course in Environmental Chemistry that will be taught at the fourth year level.

Resource Implications: Instructional Costs

This course will be taught using existing teaching resources in the department of chemistry. The course is not a mandatory course and will be taught in a rotation like our other special topics courses, roughly every second or third year. Therefore, there are no resource implications.

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:________________________
Course Outline

1. Spheres: Properties and chemical composition
   a. Litho, Hydro, and Atmo
2. Abiotic reactions in the environment
   a. Oxidation mechanisms
      i. Gas-phase (OH, O₃, NO₃, Cl)
      ii. Hydrolysis
      iii. Photoysis (direct and indirect)
   b. Reduction
3. Biotic reactions in the environment
   a. Biodegradation (microbial degradation)
   b. Metabolism
4. Environmental partitioning
   a. Solubility
   b. Two-phase partitioning
      i. Environmental partitioning representation (K_{ow}, K_{oz}, K_{aw}, vapour pressure)
      ii. Real environmental partitioning (BAF, K_p, K_{oc}, BMF)
   c. Sorption processes
5. Chemistry of environmental processes
   a. Long-range transport
      i. Global distillation and contamination of the Arctic
      ii. Predictions of global transport from partitioning properties
   b. Stratospheric ozone
      i. O₃ depletion by NOx, halogens
      ii. Chemistry of the ozone hole
      iii. CFCs and CFC replacements
   c. Photochemical smog
      i. NOx vs VOC emission control
      ii. Aerosol chemistry (sources, composition, size distribution, particle nucleation, formation of secondary organic aerosol)
      iii. Sources of oxidants
   d. Climate change
      i. Greenhouse gases (radiative efficiency and the molecular characteristics that determine it)
      ii. Aerosol effects (black and brown carbon, cloud condensation nuclei)
      iii. Geoengineering
6. Environmental measurements
   a. Considerations in making environmental measurements
   b. In situ vs sample collection
   c. Examples of commonly used instrumentation (AMS, PTR-MS, DDAS, etc)
7. Environmental models
   a. Introduction to model types (thermodynamic, kinetic, multi-phase, climate, etc)
   b. Examples of application of models to environmental data
Evaluation

Assignments: 40%
Participation: 10%
Midterm: 15%
Final exam: 35%

Assignments:
There will be 4 assignments based on interpreting the course material through calculations and evaluation, as well as critical reviews of peer-reviewed literature.

Participation:
Evaluated through participation in weekly discussions based on current issues and peer-reviewed literature relating to the course material. These discussions will be held during regular class time. Participation will be evaluated based on contribution to the discussions.

Midterm:
There will be one midterm held during class at the regular time, written and handed back before the drop deadline.

3 h of lecture per week.

Texts

There is no required text. Students may wish to consult the following supplementary texts, which are already held at the Queen Elizabeth II library.


Instructor(s)

Dr. Cora Young
Chemistry 4620 – Environmental Chemistry

SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title: Environmental Chemistry – CHEM 4620
Abbreviated Course Title: Environmental Chemistry

Calendar Description

Under 10.3 Chemistry

4620 Environmental Chemistry applies fundamental principles of chemistry to reactions and processes in the environment. Reaction mechanisms, physical processes, and application of analytical techniques to environmental chemistry will be discussed. The course will cover the chemistry underpinning current environmental problems such as long-range transport of persistent pollutants, photochemical smog, and climate change.
CR: ENVS 4249
PR: CHEM 2400, CHEM 2301, CHEM 3110
CO: CHEM 3110

Secondary Calendar Changes

There are no secondary calendar changes.

Rationale

The Department of Chemistry does not currently have a course that applies fundamental chemistry principles to the reactions that happen in the environment. This course will build upon physical, organic, and analytical chemistry to provide an interdisciplinary approach to understanding environmental chemistry. Students will learn about the reaction mechanisms and physical processes that give rise to chemistry in the environment, as well as techniques used to monitor these processes. Upper level courses in environmental chemistry are offered in chemistry departments across the country, including at the University of Alberta and the University of Toronto. These courses are very popular, with high enrollment (often with a waiting list!).
Chemistry 4620 – Environmental Chemistry

<table>
<thead>
<tr>
<th>Consultations Sought From</th>
<th>Comments Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grenfell</td>
<td>yes</td>
</tr>
<tr>
<td>Marine Institute</td>
<td>yes</td>
</tr>
<tr>
<td>Mathematics and Statistics</td>
<td>no</td>
</tr>
<tr>
<td>Computer Science</td>
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<tr>
<td>Engineering</td>
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</tr>
<tr>
<td>Faculty of Education</td>
<td>yes</td>
</tr>
</tbody>
</table>

| Library Report Received           | yes/no            |

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

Name

FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair:

Secretary:

Date
Consultation email:

-----Original Message-----
From: Chris Flinn [mailto:cgflinn@mun.ca]
Sent: March-09-16 4:35 PM
To: associtevpooffice@grenfell.mun.ca; MIUG Consultations; Mellor, Judith; McLeod, Heather; mathconsult@mun.ca; cs.chair@mun.ca; Biochemistry Head; Karen Morris; Annie Mercier; psychology.head@mun.ca; Alison Leitch; Engineering Consultations; pharinfo@mun.ca; Lagowski, Jolanta
Cc: Head of Chemistry
Subject: Consultations on a new course proposal from chemistry

Hello everyone,

Chemistry is at it again with a consultation request for a new course, chemistry 4620, environmental chemistry. I look forward to hearing your comments.

sincerely,

Chris Flinn
Deputy Head, Undergraduate Studies
MUN Chemistry Department

Library Report:

Collection Development Division
Queen Elizabeth II Library

4 April 2016

To: Chris Flinn, Department of Chemistry

From: Erin Alcock, Science Research Liaison Librarian

Subject: New Course in Environmental Chemistry (CHEM 4620) Proposal

I have reviewed the proposal for a new special topics course in Environmental Chemistry, Chemistry 4620. While a course like this one hasn’t been offered specifically, much of the content, as indicated in the course outline, is well covered in our library collection (see Table 1 below). Additionally, we have thousands of periodical subscriptions and a number of article databases that will more than cover undergraduate research on this topic under existing budget allocations.

Table 1: Library Holdings Summary

<table>
<thead>
<tr>
<th>Catalogue Search Terms</th>
<th>Number of Results</th>
</tr>
</thead>
</table>

Responses from consulted faculties, science departments etc:

Education: From Judith Mellor

Thank you for the opportunity to respond. Education supports your new course development i.e. Chem 4620.

Biochemistry:

Hi Chris

Biochemistry has no concerns with the Environmental chemistry proposal and wish you success with its implementation.

Mark D. Berry Ph.D.
Professor and Head
Dept. Biochemistry
Memorial University of Newfoundland
St. John's, NL, Canada
A1B 3K9

Grenfell:

Dr. Flinn, some feedback regarding the chemistry 4620 proposal.

Cheers,
Chemistry 4620 – Environmental Chemistry

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

From: Dust, Julian. M
Sent: Friday, March 11, 2016 11:07 AM
To: Gallant, Robert
Cc: Parkinson, Don-Roger
Subject: Fw: Consultations on a new course proposal from chemistry

Dear Dr. Gallant,

I think the proposed course, Chemistry 4620, would be a good addition, as a special topics course, to the St. John's Campus-MUN (STJC-MUN) Chemistry B.Sc. program. Although no text is listed, the topics mostly conform to those of Environmental Organic Chemistry (2nd edition) by Schwarzenbach, Gschwend and Imboden (Wiley). I support the introduction of this course in STJC-MUN. However, much of the content overlaps that of Environmental Organic Chemistry (ENVS 4249) in the Environmental Chemistry Stream of the Environmental Science B.Sc. at Grenfell and, thus, warrants credit restriction. Therefore, I believe the calendar description should include: CR: ENVS 4249.

I also wonder why the pre-requisite list includes Chemistry 2400 rather than 2401. The course is at the 4th year level and I would think it would require a full year of organic chemistry as a pre-requisite. I would also anticipate that any student in the STJC-MUN Chemistry B.Sc. program would have completed CHEM 2401 prior to registering for a 4th year course. So including 2401 as a pre-requisite should not have any impact on subscription for the course.

Best wishes,

J. Dust

Assoc. Prof. Chemistry and Environmental Science

GC-MUN

MUN Response:

Dear Dr. Dust,

Thank you for providing comments on our proposed course, CHEM 4620 (Environmental Chemistry).

Based on the course description, I agree that ENVS 4249 warrants course restriction with CHEM 4620. We will add that to the course proposal. Thank you for bringing that to our attention.

CHEM 2401 was not included as a prerequisite because the material in that course isn't as relevant as CHEM 2400, because the focus of 2401 is more on spectroscopic interpretation rather than mechanisms. As you point out, most students would have completed CHEM 2401 prior to enrolling in CHEM 4620. However, there are cases where this may not be true, particularly for students enrolled in a minor in chemistry. I don't think these students would be at a disadvantage for CHEM 4620 and should be able to take the course.

Please don't hesitate to contact me if you would like to discuss further.
Chemistry 4620 – Environmental Chemistry

Thanks again and best wishes,
Cora

Physics:

Hi Chris,

Physics has no issues with this proposed new course.

Best,
Martin

Biology:

Hi Chris,

The Biology Undergraduate Studies Committee reviewed the new course proposal change for CHEM 4620 - Environmental Chemistry and have no majors concerns with the proposal. We do have one query with regard to the evaluation. Under the heading evaluation it states that 10% of the grade is for "participation in weekly discussions.....". It was not clear to us how that would be awarded (ie. what the students would have to do to get the 10% or portions thereof).

If it is not clear from the outset students may challenge the grade received for participation.

Thanks
Karen

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

Ocean Sciences:

Hi Chris:

Our undergrad studies committee has reviewed the proposed course. We agree that the course looks suitable and interesting. One faculty member had more specific comments, which I include below since they might be helpful.

"I'm a bit surprised that there is no textbook for this course, as there are excellent texts available (and quite a lot of basic content in the lectures based on the course outline). For example, Environmental Chemistry 5th Edition (Colin Baird and Michael Cann, c2012, W.H. Freeman) has been used in the past for Environmental Chemistry and Toxicology (ENVS 6002) at MUN. I put Baird and Cann on 2 hour reserve in the library for my ENVS 6002 lectures, but reserve books would probably not work for the prospective Chemistry 4620 (as the instructor anticipates high enrollment). The lecture topics are very basic, and seem to read like textbook chapters. I am curious as to the source of the "course material" mentioned on page 3 of the proposal, as the basic environmental chemistry would not likely be covered in the peer-reviewed literature that will be used in the course. If there will not be a recommended textbook, it might be helpful to
include examples of MUN library holdings (e.g. Baird and Cann, and many other books) on environmental chemistry in the proposal."

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

MUN Response:

Dear Chris,

I will respond to this and will add my recommended resource texts to the document. There will be a number, because none are suitable. Baird and Cann is far too low-level for a 4th year/grad chemistry course, as are all other texts that claim to be “environmental chemistry” textbooks.

With respect to participation, I normally include instructions for this in the course syllabus. Does this need to be addressed on the course proposal form?

Best wishes,
Cora

Cora J. Young
Assistant Professor
Department of Chemistry
Memorial University
St. John’s, NL A1B 3X7
(709) 864-7280

Marine Institute:

Chris,

Thank you for the opportunity to review and comment on the proposed new course in Environmental Chemistry, CHEM 4620.

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

Derek Howse

Derek Howse
Chair, Undergraduate Studies Committee
Marine Institute, Memorial University
TEL: 709-778-0586
Chemistry 4620 – Environmental Chemistry

FAX: 709-778-0394
Derek.Howse@mi.mun.ca

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 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
April 11, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on April 8, 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 Physics and Physical Oceanography
   - Changes to course descriptions, including prerequisite changes, for Physics 2053 and 3400

2. Department of Chemistry
   (i) Change to prerequisite for Chemistry 1051
   (ii) Proposal for new course, Chemistry 4520-Environmental Chemistry

3. Department of Mathematics and Statistics
   (i) Change to course description of Statistics 4410
   (ii) Proposal for new course, Mathematics 4252 / Physics 4852- Quantum Information and Computing

Joan Burry
Associate Registrar and
Secretary. Committee
on Undergraduate Studies,
Faculty of Science
Proposal
Calendar Change to Existing Course: Statistics 4410

Executive Summary

We propose to amend the course description for Statistics 4410 to better reflect current practices and the goals of the course.

Resource Implications: Instructional Costs

None.

Consultations

Comments were received from Grenfell Campus, the Marine Institute, the Faculty of Arts, the Department of Biology, the Department of Chemistry, and the Department of Ocean Sciences.

Library Holdings and/or Other Resources Required

As indicated in the attached memo from Alison Ambi, Collections Librarian (Mathematics and Statistics), these changes will not require additional library holdings.

Signature of Unit Head (if appropriate): __________________________________________

Date:  

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

Date:  

Course Number and Title: Statistics 4410 Statistical Inference II

Abbreviated Course Title

Statistical Inference II

Calendar Change

Under the Faculty of Science, page 530, 2015-2016 Calendar, 10.8.4 Statistics Courses, amend the course description for Statistics 4410 as follows:

"4410 Statistical Inference II covers multivariate normal distributions, quadratic forms of normal random variables, analysis of variance, multiple comparisons, distributions of quadratic forms, independence of quadratic forms, regression, distributions of order statistics, nonparametric statistics, decision theory, uniformly minimum variance estimators, sufficiency and completeness, likelihood theory and maximum likelihood estimation, other estimation methods including best linear unbiased estimation, estimating equations and Bayesian estimation, hypothesis testing and interval estimation, and applications of statistical inference methods under regression models and analysis of variance models.

PR: Mathematics 2051, STAT 3411"

Rationale

The contents in the current course description of Statistics 4410 overlap with other third- and fourth-year Statistics courses, including Statistics 3520 (Experimental Design I), Statistics 3521 (Regression), Statistics 4550 (Nonparametric Statistics) and Statistics 4560 (Continuous Multivariate Statistics). The proposed description has been written to better reflect the aim of the course. Statistics 4410 is a course in statistical inference and should focus on estimation methods and hypothesis testing in general. It is also a continuation of Statistics 3411 (Statistical Inference I) and, under this revision, would more clearly provide an advanced understanding of the contents of that course, while introducing additional statistical inference procedures. Many of the items listed in the existing description for Statistics 4410 could be considered as applications of statistical inference procedures and, as such, would still be covered as exercises for the techniques listed in the revised description.

Consultations Sought From

1. Grenfell Campus
2. Marine Institute
3. Faculty of Arts
4. Department of Biochemistry
5. Department of Biology
6. Department of Chemistry
7. Department of Computer Science

Comments Received

Yes
Yes
Yes
No
Yes
Yes
No
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<th>Department</th>
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<td>8. Department of Earth Sciences</td>
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<td>10. Department of Physics and Physical Oceanography</td>
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<td>11. Department of Psychology</td>
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</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: .................................................
Subject: Request for Consultation: Amended course description for Statistics 4410
From: Shannon Patrick Sullivan <shannon@mun.ca>
Date: 16/02/2016 1:08 AM
To: aambi@mun.ca

Hi Alison,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". I would appreciate it if you could review this proposal and comment on the availability of appropriate Library resources to support it.

Thanks,
Shannon

--
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

Attachments:

STAT 4410.pdf 16.6 kB
24 March 2016

TO: Dr. Shannon Patrick Sullivan

FROM: Alison Ambi, Liaison Librarian, Mathematics & Statistics

SUBJECT: Calendar change to existing course: Statistics 4410

Upon review of the proposal to amend the course description for Statistics 4410 to better reflect current practices, I have determined that the changes will have no impact on the collections activities of the Memorial University Libraries.

Alison Ambi
Science Research Liaison Librarian
Subject: Request for Consultation: Amended course description for Statistics 4410
From: Shannon Patrick Sullivan <shannon@mun.ca>
Date: 16/02/2016 1:07 AM
To: associatevpooffice@grenfell.mun.ca, miugconsultations@mi.mun.ca, staceym@mun.ca,
chemhead@mun.ca, cs-chair@mun.ca, jolantal@mun.ca, biohead@mun.ca, pmarino@mun.ca,
jhanchar@mun.ca, fletcher@mun.ca, psychology.head@mun.ca

Greetings,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
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

Attachments:

STAT 4410.pdf 16.6 kB
Subject: Fw: Request for Consultation: Amended course description for Statistics 4410
From: "Gallant, Robert" <rgallant@grenfell.mun.ca>
Date: 19/02/2016 11:40 AM
To: "shannon@mun.ca" <shannon@mun.ca>

Dr. Sullivan, some feedback on the Statistics course changes.

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

From: Dust, Julian. M
Sent: Wednesday, February 17, 2016 4:31 PM
To: Gallant, Robert
Subject: Fw: Request for Consultation: Amended course description for Statistics 4410

Dear Dr. Gallant,

I strongly support the revision of the course description to reflect that topics covered in this Statistics course. Elimination of overlap is to be commended, in my view. Ultimately, the course description should agree with the content taught and should provide the student with clarity as to the course content.

Regards,
Julian M. Dust, Ph.D.
Assoc. Prof. Chemistry/Environmental Science

From: Daniels, Karen
Sent: February 16, 2016 9:21 AM
To: Division of Science Faculty
Subject: Fw: Request for Consultation: Amended course description for Statistics 4410

Good Morning,

Please see attached and forward any comments to Dr. Robert Gallant.

Regards,

Karen

Karen Daniels
Division of Science

From: Associate VP Office - Academic
Sent: February-16-16 8:11 AM
To: Gallant, Robert
Cc: Noffall-Bennett, Sharon; Daniels, Karen
Subject: Fw: Request for Consultation: Amended course description for Statistics 4410
Good Morning,

Please see attached for consultation, thank you.

Nora Lundigan for

Dr. Jim Duffy
Acting Associate Vice-President (Grenfell Campus) Academic
Memorial University
Corner Brook, NL
A2H 6P9
Tel: 709 639-6526 Fax: 709 637-6218

From: Shannon Patrick Sullivan <shannon@mun.ca>
Sent: February 16, 2016 1:07 AM
To: Associate VP Office - Academic; miugconsultations@mi.mun.ca; staceyv@mun.ca; chemhead@mun.ca; cs-chair@mun.ca; jolantal@mun.ca; biohead@mun.ca; pmarino@mun.ca; jhanchar@mun.ca; fletcher@mun.ca; psychology.head@mun.ca
Subject: Request for Consultation: Amended course description for Statistics 4410

Greetings,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

---

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

This electronic communication is governed by the terms and conditions at http://www.mun.ca/cc/policies/electronic_communications_disclaimer_2011.php.

Attachment:

STAT 4410.pdf 16.6 kB
Subject: RE: Request for Consultation: Amended course description for Statistics 4410  
From: Dawn King <Dawn.King@mi.mun.ca>  
Date: 17/02/2016 2:37 PM  
To: "Shannon Patrick Sullivan (shannon@mun.ca)" <shannon@mun.ca>

Shannon,

Thank you for the opportunity to review and comment on the proposed description change to the course STAT 4410.

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

All the best,
Derek

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

-----Original Message-----  
From: Derek Howse  
Sent: Wednesday, February 17, 2016 1:14 PM  
To: Dawn King <Dawn.King@mi.mun.ca>  
Subject: FW: Request for Consultation: Amended course description for Statistics 4410

Dawn,

Please forward the following to Shannon Sullivan at <shannon@mun.ca>

Shannon,

Thank you for the opportunity to review and comment on the proposed description change to the course STAT 4410.

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

All the best,
Derek Howse  
Division of Academic and Student Affairs Fisheries and Marine Institute of Memorial University of Newfoundland  
Telephone: 709-778-0586  
Fax: 709-778-0394  
Email: Derek.howse@mi.mun.ca
Subject: RE: Request for Consultation: Amended course description for Statistics 4410
From: "Mercer, Stacey" <staceym@mun.ca>
Date: 19/02/2016 4:01 PM
To: "Sullivan, Shannon" <shannon@mun.ca>

Thank you for the opportunity to provide feedback. The Associate Dean of Arts (Undergraduate) wishes to indicate that in his opinion there are unlikely to be significant concerns about this proposal among members of the Faculty of Arts.

Stacey Griffiths
Office of the Dean of Arts
Memorial University of Newfoundland
St. John's, NL A1C 5S7
709-864-8255

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February 16, 2016 1:10 AM
To: associatevpooffice@grenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer, Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; Biochemistry Head; Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: Amended course description for Statistics 4410

Greetings,

Attached is a proposal to amend the course description for Statistics

4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,

Shannon

--

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 (mailto:shannon@mun.ca) *

http://www.ucs.mun.ca/~shannon>
Subject: Re: FW: Request for Consultation: Amended course description for Statistics 4410
From: Karen Morris <morrisk@mun.ca>
Date: 22/02/2016 3:48 PM
To: Shannon Patrick Sullivan <shannon@mun.ca>
CC: "Marino, Paul" <pmarino@mun.ca>

Hi Shannon,

The Biology Undergraduate Studies Committee reviewed the proposal for the amending the course description for Statistics 4410 Statistical Inference II. We have no issues or concerns with the proposal.

Thanks
Karen

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

On 16/02/2016 10:20 AM, Marino, Paul wrote:

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February-16-16 1:10 AM
To: associatevpoffice@prenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer,
Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; Biochemistry Head;
Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: Amended course description for Statistics 4410

Greetings,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
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
Subject: Re: Request for Consultation: Amended course description for Statistics 4410
From: Travis Fridgen <chemhead@mun.ca>
Date: 16/02/2016 6:02 AM
To: Shannon Patrick Sullivan <shannon@mun.ca>

Hi Shannon,

All looks fine!

T

On 16/02/2016 1:07 AM, Shannon Patrick Sullivan wrote:

Greetings,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

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

The proposed Calendar changes for Statistics 4410 will not affect Ocean Sciences curriculum.

Regards

Garth

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February-16-16 1:10 AM
To: associatepoffice@grenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer, Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; Biochemistry Head; Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: Amended course description for Statistics 4410

Greetings,

Attached is a proposal to amend the course description for Statistics 4410 "Statistical Inference II". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
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
April 11, 2016

TO: All Members, Faculty Council of Science

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

SUBJECT: Calendar Changes and New Course Proposals

At a meeting held on April 8, 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 Physics and Physical Oceanography
   - Changes to course descriptions, including prerequisite changes, for Physics 2053 and 3400

2. Department of Chemistry
   (i) Change to prerequisite for Chemistry 1051
   (ii) Proposal for new course, Chemistry 4620-Environmental Chemistry

3. Department of Mathematics and Statistics
   (i) Change to course description of Statistics 4410
   (ii) Proposal for new course, Mathematics 4252 / Physics 4852-Quantum Information and Computing

Joan Burry
Associate Registrar and
Secretary: Committee
on Undergraduate Studies,
Faculty of Science
Proposal
New Course: Mathematics 4252 / Physics 4852
Quantum Information and Computing

Executive Summary

We propose a new, cross-listed course in the Department of Mathematics and Statistics and the Department of Physics and Physical Oceanography which covers the mathematical formulation and physical interpretation of the principles of quantum information and quantum computing.

Resource Implications: Instructional Costs

None. The course will use teaching resources currently available in the Department of Mathematics and Statistics and the Department of Physics and Physical Oceanography.

Consultations

Comments were received from Grenfell Campus, the Marine Institute (who correctly observed that the proposed method of evaluation had been inadvertently omitted from the circulated draft of this proposal), the Faculty of Arts, the Faculty of Engineering and Applied Science, the Department of Biology, the Department of Chemistry, the Department of Ocean Sciences, and the Department of Physics and Physical Oceanography (which has also approved this proposal at the unit level).

Library Holdings and/or Other Resources Required

Forthcoming.

The costs, if any, associated with this change/these changes can be met from within the existing budget allocation or authorized new funding for the Faculty of Science.

Signature of Unit Head (if appropriate):

Date:

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

Date:
Sample Course Outline and Method of Evaluation

Students learn the mathematical formulation and physical interpretation of the principles of quantum information and quantum computing. By the end of the course, they are expected to understand the central concepts and to be able to solve basic problems in this field.

<table>
<thead>
<tr>
<th>Week</th>
<th>Subject</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review of linear algebra, Pauli matrices, spectral decomposition</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Postulates of quantum mechanics, density matrices, the qubit</td>
<td>2</td>
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<tr>
<td>3</td>
<td>Tensor products, quantum entanglement</td>
<td>1, 2</td>
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<tr>
<td>4</td>
<td>Quantum gates</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>No-cloning theorem, superdense coding, quantum teleportation</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Simple quantum algorithms</td>
<td>5</td>
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<tr>
<td>7</td>
<td>Quantum integral transforms</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Grover’s search algorithm</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>An introduction to open systems, decoherence</td>
<td>9</td>
</tr>
<tr>
<td>10, 11</td>
<td>Nuclear Magnetic Resonance quantum computer</td>
<td>12</td>
</tr>
</tbody>
</table>

Course evaluation: Assignments (approximately seven) 25%, midterm 25%, final exam 50%

Texts


Instructor(s)

M. Merkli (Mathematics and Statistics), S. Curnoe (Physics and Physical Oceanography)
SUMMARY PAGE FOR SENATE

Approval Form

Course Number and Title
Mathematics 4252 / Physics 4852 Quantum Information and Computing

Abbreviated Course Title
Quantum Information & Computing

Calendar Change(s)

Under the Faculty of Science, page 529, 2015-2016 Calendar, 10.8.3 Mathematics Courses, add the following:

“4252 Quantum Information and Computing (same as Physics 4852) covers postulates of quantum mechanics, matrix theory, density matrices, qubits, qubit registers, entanglement, quantum gates, superdense coding, quantum teleportation, quantum algorithms, open systems, decoherence, physical realization of quantum computers.

PR: MATH 2051 or Physics 3820”

Under the Faculty of Science, page 533, 2015-2016 Calendar, 10.10 Physics and Physical Oceanography Courses, add the following:

“4852 Quantum Information and Computing (same as Mathematics 4252) covers postulates of quantum mechanics, matrix theory, density matrices, qubits, qubit registers, entanglement, quantum gates, superdense coding, quantum teleportation, quantum algorithms, open systems, decoherence, physical realization of quantum computers.

PR: Mathematics 2051 or PHYS 3820”

Rationale

Quantum information and computing is a relatively new, active subject of interest that falls within the discipline of mathematical physics concerning the theory, development, implementation and exploitation of quantum computers. In a quantum computer, information is stored and processed in the quantum mechanical state of a system, which holds infinitely more possibilities than its classical binary counterpart. The theory of quantum computing emerged in the 1970s and was developed through the 1990s, and while the construction of quantum computers is still in its infancy, certain products are available commercially today, such as quantum cryptography and key distribution systems. This new technology promises to revolutionize fields that push the limits of computing power, speed and security, ranging from real-time aerospace navigation to finance modeling. Quantum Computing is a Focus Area in the Government of Canada’s “Seizing Canada’s Moment: Moving Forward in Science, Technology and Innovation 2014” initiative. The introduction of this course will ensure that students at
Memorial University of Newfoundland have the opportunity to be exposed to the enormous potential of this subject.

<table>
<thead>
<tr>
<th>Consultations Sought From</th>
<th>Comments Received</th>
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</thead>
<tbody>
<tr>
<td>1. Grenfell Campus</td>
<td>Yes</td>
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<tr>
<td>2. Marine Institute</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Faculty of Arts</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Faculty of Engineering and Applied Science</td>
<td>Yes</td>
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<td>5. Department of Biochemistry</td>
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<td>6. Department of Biology</td>
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<td>7. Department of Chemistry</td>
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</tr>
<tr>
<td>8. Department of Computer Science</td>
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</tr>
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<td>9. Department of Earth Sciences</td>
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</tr>
<tr>
<td>10. Department of Ocean Sciences</td>
<td>Yes</td>
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<tr>
<td>11. Department of Physics and Physical Oceanography</td>
<td>Yes</td>
</tr>
<tr>
<td>12. Department of Psychology</td>
<td>No</td>
</tr>
</tbody>
</table>

Library Report Received: No

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

Name

---

FOR OFFICE USE ONLY

APPROVAL GRANTED BY SENATE COMMITTEE ON UNDERGRADUATE STUDIES

Chair: 

Secretary: 

Date: 
Hi Alison,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". I would appreciate it if you could review this proposal and comment on the availability of appropriate Library resources to support it.

Thanks,
Shannon

--
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.uics.mun.ca/~shannon

---Attachments:---

MATH 4252.pdf 25.0 kb
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: Shannon Patrick Sullivan <shannon@mun.ca>
Date: 16/02/2016 1:02 AM
To: associatevpooffice@grenfell.mun.ca, miugconsultations@mi.mun.ca, stacey.mun.ca, chemhead@mun.ca, cs-chair@mun.ca, jolantal@mun.ca, engrconsult@mun.ca, biochead@mun.ca, pmarino@mun.ca, jhanchar@mun.ca, fletcher@mun.ca, psychology.head@mun.ca

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--

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

---

Attachments:

MATH 4252.pdf 25.0 kB
Subject: Re: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: "Gallant, Robert" <rgallant@grenfell.mun.ca>
Date: 19/02/2016 11:44 AM
To: "shannon@mun.ca" <shannon@mun.ca>

(Woops forgot to include message earlier)

Dr. Sullivan,
Some feedback below about MATH 4252/Physics 4852 below from a faculty in chemistry.

Having a cryptography background I'm aware that quantum computation is an exciting area of strength in Canada and such a course would be a fine addition to our calendar.

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

From: Gallant, Robert
Sent: Friday, February 19, 2016 11:39 AM
To: shannon@mun.ca
Subject: Fw: Request for Consultation: New Course Mathematics 4252 / Physics 4852

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

From: Dust, Julian. M
Sent: Wednesday, February 17, 2016 4:38 PM
To: Gallant, Robert
Subject: Fw: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Dear Dr. Gallant,

The contents of this proposed Mathematics course (cross-listed with Physics) are very up-to-date and interesting. The portion of the course allocated to "Nuclear Magnetic Resonance Quantum computing" may also be of interest to Chemistry students who would be well-versed in the applications of NMR to determination of organic chemical structure. The pre-requisites are not onerous and would not prevent such interested Chemistry students from registering for the course.

I think this is a fine addition to the suite of courses offered in STJC-MUN's Mathematics and Physics Department.

Sincerely,

Julian M. Dust, Ph.D.
Assoc. Prof. Chemistry and Environmental Science
GC-MUN. Corner Brook, NL A2H 5G4

From: Daniels, Karen
Sent: February 16, 2016 9:20 AM
To: Division of Science Faculty
Subject: FW: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Good Morning,

Please see attached and forward any comments to Dr. Robert Gallant.

Regards,

Karen

Kunn Daniels
Division of Science

From: Associate VP Office - Academic
Sent: February-16-16 8:10 AM
To: Gallant, Robert
Cc: Nofall-Bennett, Sharon; Daniels, Karen
Subject: Fw: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Good Morning,

Please see attached for consultation, thank you.

Nora Lundrigan for

Dr. James Duffy
Acting Associate Vice-President (Grenfell Campus) Academic
Memorial University
Corner Brook, NL
A2H 6P9
Tel:709 639-6526 Fax:709 637-6218

From: Shannon Patrick Sullivan <shannon@mun.ca>
Sent: February 16, 2016 1:02 AM
To: Associate VP Office - Academic; miuconsultations@mi.mun.ca; staceyw@mun.ca; chemhead@mun.ca; cs-chair@mun.ca; jolantal@mun.ca; engrconsult@mun.ca; biohead@mun.ca; pmarino@mun.ca; jhanchar@mun.ca; fletcher@mun.ca; psychology.head@mun.ca
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
Subject: Re: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: Derek Howse <Derek.Howse@mi.mun.ca>
Date: 18/02/2016 10:06 AM
To: Shannon Patrick Sullivan <shannon@mun.ca>

Many thanks Shannon.

Derek Howse
Division of Academic and Student Affairs
Fisheries and Marine Institute
of Memorial University of Newfoundland
Telephone: 709-778-0586
Fax: 709-778-0394
Email: Derek.howse@mi.mun.ca

On 2016-02-18, 1:07 AM, "Shannon Patrick Sullivan" <shannon@mun.ca> wrote:

Hi Derek,

Thanks for your comments. You're absolutely right that a section detailing the method of evaluation was inadvertently omitted from the proposal. This should have read:

"Course evaluation: Assignments (approximately seven) 25%, midterm 25%, final exam 50%.”

I'll ensure that it appears in all future iterations of the document.

With regards to the omission of a timeline and statements regarding academic misconduct and accommodations, although some units will include a full course syllabus when submitting a proposal for a new course, this is not mandatory. The formal instructions for such a proposal require only a sample course outline and method of evaluation. Nonetheless, I can assure you that any offering of Mathematics 4252 / Physics 4852 would certainly adhere to all appropriate Calendar regulations.

I hope this addresses your concerns. If you have any other questions or comments, please don't hesitate to contact me.

Cheers,
Shannon

On 17/02/2016 2:36 PM, MIUG Consultations wrote:
Shannon,

Thank you for the opportunity to review and comment on the proposed new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing".
This new course will have no impact on the programs at the Marine Institute.

Regarding the course outline, there is no proposed evaluation scheme nor timeline indicating that the 20% rule will be considered. Also, should paragraphs pertaining to Academic misconduct and accommodating students with disabilities be included?

Derek

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

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: Tuesday, February 16, 2016 1:03 AM
To: associatevo@ferrall.mun.ca; MIUG Consultations
MIUGConsultations@mi.mun.ca; stacey@mun.ca; chemhead@mun.ca; cs-chair@mun.ca;
joan@mun.ca; engrconsult@mun.ca; biochmed@mun.ca; pmarino@mun.ca;
jhanchar@mun.ca; fletcher@mun.ca; psychology.head@mun.ca
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
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

This email is governed by the Terms and Conditions found in our

--
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
Subject: RE: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: "Mercer, Stacey" <staceym@mun.ca>
Date: 17/02/2016 4:48 PM
To: "Sullivan, Shannon" <shannon@mun.ca>

Thank you for the opportunity to provide feedback. The Associate Dean of Arts (Undergraduate) wishes to indicate that in his opinion there are unlikely to be significant concerns about this proposal among members of the Faculty of Arts.

Stacey Griffiths
Office of the Dean of Arts
Memorial University of Newfoundland
St. John's, NL A1C 5S7
709-864-8255

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February 16, 2016 1:05 AM
To: associatevpooffice@grenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer, Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; engrconsult@mun.ca; Biochemistry Head; Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 Quantum Information and Computing”. If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--

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 <mailto:shannon@mun.ca> *
www.ucs.mun.ca/~shannon<http://www.ucs.mun.ca/~shannon>
Subject: Re: Request for Consultation: New Course Mathematics 4252 / Physics 4852  
From: Engineering Consultations <engrconsult@mun.ca>  
Date: 17/02/2016 1:56 PM  
To: Shannon Patrick Sullivan <shannon@mun.ca>

Dear Dr. Sullivan,

Thank you for the opportunity to comment on the proposed new course Mathematics 4252 / Physics 4852 "Quantum Information and Computing".

At its meeting of February 17, the Committee on Undergraduate Studies of the Faculty of Engineering and Applied Science determined that this proposed new course, while intriguing, 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

Quoting Shannon Patrick Sullivan <shannon@mun.ca>:

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,  
Shannon

--  
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.ucl.mun.ca/~shannon
Subject: Re: FW: Request for Consultation: New Course Mathematics 4252 / Physics 4852

From: Karen Morris <morrisk@mun.ca>
Date: 22/02/2016 3:44 PM
To: Shannon Patrick Sullivan <shannon@mun.ca>
CC: "Marino, Paul" <pmarino@mun.ca>

Hi Shannon,

The Biology Undergraduate Studies Committee reviewed the proposal for the new cross-listed course Mathematics 4252/Physics 4852 Quantum Information and Computing. We have no issues or concerns with the proposal.

Thanks
Karen

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

On 16/02/2016 10:20 AM, Marino, Paul wrote:

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February-16-16 1:05 AM
To: associatevpooffice@grenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer, Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; engrconsult@mun.ca; Biochemistry Head; Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--

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
Subject: Re: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: Travis Fridgen <chemhead@mun.ca>
Date: 16/02/2016 6:03 AM
To: Shannon Patrick Sullivan <shannon@mun.ca>

Hi Shannon,

Looks fine, no comments.

Take care,
T

On 16/02/2016 1:02 AM, Shannon Patrick Sullivan wrote:
Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
Travis D. Fridgen BSc, BEd, PhD
Professor and Head
Department of Chemistry
Memorial University
St. John's, NL, A1B 3X7
chemhead@mun.ca
709-864-3470
http://www.chem.mun.ca/zfac/tdf.php?
Subject: RE: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: "Fletcher, Garth" <fletcher@mun.ca>
Date: 16/02/2016 10:41 AM
To: "Sullivan, Shannon" <shannon@mun.ca>
CC: "amercier@mun.ca" <amercier@mun.ca>

Hi Shannon: The proposed new course will not have an effect on the Department of Ocean Sciences curriculum.

Regards
Garth

-----Original Message-----
From: Shannon Patrick Sullivan [mailto:shannon@mun.ca]
Sent: February-16-16 1:05 AM
To: associatevpooffice@grenfell.mun.ca; miugconsultations@mi.mun.ca; Mercer, Stacey; chemhead@mun.ca; cs-chair@mun.ca; Lagowski, Jolanta; engrconsult@mun.ca; Biochemistry Head; Marino, Paul; jhanchar@mun.ca; Fletcher, Garth; psychology.head@mun.ca
Subject: Request for Consultation: New Course Mathematics 4252 / Physics 4852

Greetings,

Attached is a proposal for a new cross-listed course Mathematics 4252 / Physics 4852 "Quantum Information and Computing". If you have any comments on this proposal, we would appreciate receiving your responses no later than Tuesday, March 15th.

Thanks,
Shannon

--
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
Subject: Re: Request for Consultation: New Course Mathematics 4252 / Physics 4852
From: "Lagowski, Jolanta" <jolantal@mun.ca>
Date: 24/03/2016 12:42 PM
To: "Sullivan, Shannon" <shannon@mun.ca>
CC: Martin Plumer <plumer@mun.ca>

Hi Shannon,
I have consulted both with the departmental USC and the department as a
whole (see emails below) and have received the approval from both, the USC
and the department, regarding the proposed course (Math4252/Physics4852)
content and the cross-linking of it with the Department of Mathematics and
Statistics.
Regards,
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

On 2016-03-22, 9:07 PM, "Shannon Patrick Sullivan" <shannon@mun.ca> wrote:

Hi Jolanta,

I'm currently preparing the final package regarding Math 4252 / Physics
4852 for submission to the Faculty of Science Undergraduate Studies
Committee. It's important that this package includes a response from
Physics to our request for consultation, indicating that your Department
has approved the cross-listing of this proposed new course. (Otherwise,
it would technically appear that Mathematics is trying to impose a
cross-listed course on you!)

Could you please provide this response?

Thanks,
Shannon

On 2016-03-23, 1:12 PM, "Lagowski, Jolanta" <jolantal@mun.ca> wrote:

HI All,
Please find attached a proposal for a new Quantum Information and
Computing course (QuantumInformationProposal.pdf). This senior, fourth
year level course (PHYSIC 4852) is meant to be cross-listed with Math
Department Course (see MATH-4252.pdf attachment). It is expected that Math
Dept. will be teaching this course first (possibly next academic year). As
you can see from the email below the proposal has been approved by the
departmental (physics) Undergraduate Studies Committee. It has also been
approved by the Math Department. Please let me know by 12 pm tomorrow
(Thursday, March 24) if you approve of this course and the cross-listing of it. I will take no response (silence) as an approval for this proposal and cross-listing. Thank you.

Jolanta

-----Original Message-----
From: Martin Plumer [mailto:plumer@mun.ca]
Sent: January-05-16 10:28 AM
To: jolanta@mun.ca; 'S H Curnoe'
Subject: QuantumComputingMarco-Dec16.odt (fwd)

Hi Jolanta,

This morning, the department USC approved the proposal for the new course in Quantum Information and Computing (attached).

Best,
Martin

-----

No virus found in this message.
Checked by AVG - www.avg.com
Version: 2016.0.7442 / Virus Database: 4542/11857 - Release Date: 03/21/16

Attachments:

winmail.dat 126 kB
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.: Chemistry 6620

Course Title:

I. To be completed for all requests:

A. Course Type:
   ☑ Lecture course
   ☐ Laboratory course
   ☐ Directed readings
   ☐ Lecture course with laboratory
   ☐ Undergraduate course¹
   ☐ Other (please specify) Participation

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: 36

F. Course description (reading list required):
   Environmental Chemistry applies fundamental principles of chemistry to reactions and processes in the environment.
   Reaction mechanisms, physical processes, and application of analytical techniques to environmental chemistry will be
discussed. The course will cover the chemistry underpinning current environmental problems such as long-range transport
of persistent pollutants, photochemical smog, and climate change.

G. Method of evaluation:

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<th>Percentage</th>
<th>Oral</th>
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<td>Final examination:</td>
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<td>Total</td>
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<td>15</td>
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</table>

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:

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]

Course Instructor

[Signature]

Approval of the head of the academic unit

[Signature]

Date April 5, 2016

Date April 5, 2016

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

[Signature]

Secretary, Faculty/School/Council

Date

Updated October 2011
Proposal
New Graduate Course in Environmental Chemistry

Executive Summary

This is a proposal for a new graduate course in Environmental Chemistry – CHEM 6620.

Resource Implications: Instructional Costs

This course will be taught using existing teaching resources in the department of chemistry. The course is not a mandatory course and will be taught in a rotation like our other graduate courses, roughly every second or third year. Therefore, there are no resource implications.

Library Holdings and/or Other Resources Required

There are no added library costs associated with the new course.
Chemistry 6620 – Environmental Chemistry

Course Outline

1. Spheres: Properties and chemical composition
   a. Litho, Hydro, and Atmo
2. Abiotic reactions in the environment
   a. Oxidation mechanisms
      i. Gas-phase (OH, O₃, NO₃, Cl)
      ii. Hydrolysis
      iii. Photolysis (direct and indirect)
   b. Reduction
3. Biotic reactions in the environment
   a. Biodegradation (microbial degradation)
   b. Metabolism
4. Environmental partitioning
   a. Solubility
   b. Two-phase partitioning
      i. Environmental partitioning representation (K_{ow}, K_{ca}, K_{av}, vapour pressure)
      ii. Real environmental partitioning (BAF, K_p, K_OC, BMF)
   c. Sorption processes
5. Chemistry of environmental processes
   a. Long-range transport
      i. Global distillation and contamination of the Arctic
      ii. Predictions of global transport from partitioning properties
   b. Stratospheric ozone
      i. O₃ depletion by NOx, halogens
      ii. Chemistry of the ozone hole
      iii. CFCs and CFC replacements
   c. Photochemical smog
      i. NOx vs VOC emission control
      ii. Aerosol chemistry (sources, composition, size distribution, particle nucleation, formation of secondary organic aerosol)
      iii. Sources of oxidants
   d. Climate change
      i. Greenhouse gases (radiative efficiency and the molecular characteristics that determine it)
      ii. Aerosol effects (black and brown carbon, cloud condensation nuclei)
      iii. Geoengineering
6. Environmental measurements
   a. Considerations in making environmental measurements
   b. In situ vs sample collection
   c. Examples of commonly used instrumentation (AMS, PTR-MS, DOAS, etc)
7. Environmental models
   a. Introduction to model types (thermodynamic, kinetic, multi-phase, climate, etc)
   b. Examples of application of models to environmental data
Chemistry 6620 – Environmental Chemistry

Evaluation
Assignments: 50%
Participation: 5%
Midterm: 15%
Final exam: 30%

Assignments:
There will be 4 assignments based on interpreting the course material through calculations and evaluation, as well as critical reviews of peer-reviewed literature. In addition, students will be expected to lead a discussion for the rest of the class based on a current issue/peer-reviewed literature article of their choice.

Participation:
Evaluated through participation in weekly discussions based on current issues and peer-reviewed literature relating to the course material. These discussions will be held during regular class time.

Midterm:
There will be one midterm held during class at the regular time.

3 h of lecture per week.

Texts

There is no required text. Students may wish to consult the following supplementary texts, which are already held at the Queen Elizabeth II library.


Instructor(s)

Dr. Cora Young

Rationale

The Department of Chemistry does not currently have a graduate course in environmental chemistry, despite a strong research focus in this area. This course will apply fundamental chemistry principles in physical, organic, and analytical chemistry to the reactions that happen in the environment. Students will learn about the reaction mechanisms and physical processes that drive chemistry in the environment, as well as techniques used to monitor these processes. This course will provide essential background for students engaged in research with an application to the environment.
Chemistry 6620 – Environmental Chemistry

SUMMARY PAGE FOR SENATE

Approval Form

Calendar Changes

25.8.2 Courses
6001 Master’s Seminar
6004 Project Seminar
6110 Analytical Chemistry II
6150 Advanced Spectroscopic Techniques
6151 Analytical Separations and Organic Mass Spectrometry
6152 Electroanalytical Techniques
6153 Techniques in Sampling, Trace Analysis and Chemometrics
6154 Business Management and Good Laboratory Practice
6155 Computers in Instrumental Analysis and Basic Electronics (same as Med 6070)
6156 Analytical Method Development and Sampling
6160 Laboratory Projects in Sampling, Electroanalysis and Trace Analysis
6161 Laboratory Projects in Analytical Separations and Spectroscopic Techniques
6190-9 Selected Topics in Analytical Chemistry
6201 Bioinorganic Chemistry
6202 Main Group Chemistry
6204 Mechanisms in Catalysis
6205 Photochemistry of Transition Metal Complexes
6206 Green Chemistry
6210 Organometallic Chemistry
6290-9 Selected Topics in Inorganic 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
6370 Nanoscale Phenomena
6380 Adsorption on Surfaces
6381 Surface and Interface Science
6382-9 Selected Topics in Physical Chemistry
6390-8 Selected Topics in Physical Chemistry
6399 Chemical Kinetics and Dynamics
6401 Organic Spectroscopic Analysis I
6402 Organic Spectroscopic Analysis II
6421 Natural Products Chemistry
6460 Organic Synthesis
6470 Physical Organic Chemistry
6490-9 Selected Topics in Organic Chemistry
6590-9 Selected Topics in Theoretical and Computational Chemistry
6600 Applications of Inorganic and Organometallic Chemistry to Toxicology
6620 Environmental Chemistry

32.5.2 Courses
6002 Doctoral Seminar
6003 Doctoral Research Seminar
6110 Analytical Chemistry II
6150 Advanced Spectroscopic Techniques
6151 Analytical Separations and Organic Mass Spectrometry
Chemistry 6620 – Environmental Chemistry

6152 Electroanalytical Techniques
6153 Techniques in Sampling, Trace Analysis and Chemometrics
6154 Business Management and Good Laboratory Practice
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6600 Applications of Inorganic and Organometallic Chemistry to Toxicology
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