



Faculty of Science

Office of the Dean
St. John's, NL Canada A1B 3X7
Tel: 709 864 8154 Fax: 709 864 3316
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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, 2022, at 1:00 p.m. by WebEx and in-person (Room: C- 2045).

AGENDA

1. **Regrets**
2. **Adoption of the Minutes of October 19, 2022**
3. **Business Arising from the Minutes**
4. **Correspondence:** None
5. **Reports of Standing Committees:**
 - A. **Undergraduate Studies Committee:**

Presented by Mark Hatcher, Deputy Chair, Under Graduate Studies Committee

 - a. Department of Biology – Calendar Changes, Amend Course – Biology 3050, Paper 5. A. a. (pages 7-9)
 - b. Department of Biology – Calendar Changes, Amend Program Regulations – Biology Concentrations, Paper 5. A. b (pages 10-15)
 - c. Department of Biology – Calendar Changes, Amend Course Descriptions, Paper 5. A. c. (pages 16-31)
 - d. Department of Biology – Calendar Changes, Amend Course – Biology 4245, Paper 5. A. d. (pages 32-36)
 - e. Department of Mathematics and Statistics – Calendar Changes, Amend Course – Math 1001, Paper 5. A. e (pages 37-57)
 - f. Department of Mathematics and Statistics – Calendar Changes, Amend Course Prerequisites – Math 4133, Paper 5. A. f. (pages 58-61)
 - g. Department of Mathematics and Statistics – Calendar Changes, Amend Course Prerequisites – Math 4180, Paper 5. A. g. (pages 62-67)
 - B. **Graduate Studies Committee**

Presented by Dawn Bignell, Chair, Graduate Studies Committee

 - a. Department of Biology – Calendar Change – Comprehensive Examinations, Paper 5. B. a. (pages 68-70)
 - b. Department of Psychology – Calendar Change – Removing GRE as application requirement for Psy.D Program, Paper 5. B. b. (pages 71-72)
 - C. **Library Committee:** No business
6. **Reports of Delegates from Other Councils:** None
7. **Report of the Dean**

8. Question Period

9. Adjournment

A handwritten signature in black ink, appearing to read "Travis Fridgen", with a long horizontal stroke extending to the right.

Travis Fridgen, Ph.D.
Acting Dean of Science



Faculty of Science

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**FACULTY OF SCIENCE
FACULTY COUNCIL OF SCIENCE
Minutes of Meeting of October 19, 2022**

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, October 19, 2022, at 1:00 p.m. using a hybrid model of Webex and in-person (C-2045).

FSC 2972

Present

Business Administration

A. Stapleton

Biochemistry

M. Berry, V. Booth, S. Christian

Biology

D. Bignell, A. Chaulk, S. Dawe, L. Pena-Castillo, Y. Wiersma

Chemistry

C. Bottaro, L. Cahill, M. Katz, F. Kerton, C. Kozak, S. Pansare, S. Smith,

Computer Science

C. Dohey, A. Fiech, O. Meruvia-Pastor, T. Tricco

Earth Sciences

H. Corlett, G. Dunning, A. Langille, A. Leitch, M. Miskell

Mathematics & Statistics

J. Alam, D. Dyer, C. Evans, D. Harvey, A. Hatefi, R. Haynes, J.C. Loredó-Osti, S. MacLachlan, M. Strong, T. Stuckless, K. Welford, Y. Yilmaz-Cigsar

Ocean Sciences

I. Fleming, P. Gagnon, E. Ignatz, D. Nichols, M. Rise

Physics & Physical Oceanography

D. Coombs, H. Neilson, L. Zedel

Psychology

A. Brown, G. Sherren

Registrar's Office

T. Edmunds

Dean of Science Office

J. Blundell, J. Bowering, C. Hussey, S. Dufour, M. Fitzpatrick, K. Foss, T. Fridgen, G. Jackson, J. Kavanagh

Student Representatives:

W. Kinden

FSC 2973 Regrets:

C. Onodenaloro, L. Fowler, X. Jiang, J. Lagowski, T. Mackenzie, D. McIlroy, R. Nicholas, S. Sullivan, A. Vardy

FSC 2974 Adoption of Minutes

Moved: Minutes of the meeting of September 21, 2022, be adopted. (Berry/Rise) **Carried.**

FSC 2975 Business Arising: None

FSC 2976 Correspondence: None

FSC 2977 Reports of Standing Committees:

A. Undergraduate Studies Committee: No business.

B. Graduate Studies Committee:

Presented by Dawn Bignell, Chair, Graduate Studies Committee:

- a. Department of Earth Science, Special Topics Course, EASC 6906, Gem Deposits, approved by the committee and presented to Faculty Council for information only.
- b. Department of Earth Science, Request for Approval of a Graduate Course EASC 6060, Gem Deposits (Bignell/Rise) **Carried.**
- c. Department of Earth Science, Request for Approval of a Graduate Course EASC 6620 Groundwater Modeling (Bignell/Loredo-Osti) **Carried.**
- d. Department of Biochemistry, Calendar change – supervisory committee meetings (Bignell/Berry) **Carried.**

C. Library Committee: No business.

FSC 2978 Committee Matrix:

Presented by Suzanne Dufour, Associate Dean of Ungraduated and Administration:
The committee matrix is updated on-line.

FSC 2979 Report of the Dean:

Presented by Jacqueline Blundell, Associate Dean of Graduate and Research:
The Sea conference is in early stages of planning. A survey with three possible dates will be circulated and the date with a majority vote will be picked.

Due to the hurricane Fiona, the deadline for NSERC applications for Atlantic Canadians is extended to November 7.

A second RIIG consultation with Dr. Paul Adjei, Associate Vice President (Indigenous Research) is scheduled for November 2, at 12:00pm. All faculty, staff and students are encouraged to attend.

Research week begins November 21. The Faculty of Science will be hosting 3MT (Three Minute Thesis) for graduate students on November 21 at 11:30am. During Research week, the Faculty of Science will be hosting an On the Menu hosted by Julie Bowering: Presenting your Research to a Non-Expert Audience.

The Faculty of Science will also be hosting a social during research week. Updates for be circulated.

FSC 2980 Question Period

The Dean said that the only update is that the second portion of the IUGS decision is deferred to the end of the budget cycle. The faculty positions will remain on hold and decisions will be made in the coming weeks.

No update on the list of deficiencies in the core science building.

The Dean provided the President with the motion for an open phase for the provost search that was approved at the last faculty council and received a thank you, but no other update.

The next MUNFA bargaining meeting is in early November, with more issues to be discussed. The Dean is optimistic that things are progressing.

The plan for the Chemistry/Physics building is for the remaining HSS departments currently in the Science building to eventually move to the Chemistry/Physics building.

There will be an invitation to the President to attend the next Faculty of Science Faculty Council meeting or special faculty council meeting to discuss the budget.

FSC 2981 Adjournment

The meeting adjourned at 1:25 p.m.



Office of the Registrar

St. John's, NL Canada A1C 5S7
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www.mun.ca

October 24, 2022

TO: All Members of Faculty Council, Faculty of Science

FROM: Tracey Edmunds, Secretary, Faculty of Science Committee on Undergraduate Studies

SUBJECT: **Proposals for Calendar Changes**

A virtual meeting held on October 14th, 2022 the Faculty of Science Committee on Undergraduate Studies agreed that the following item should be forwarded to Faculty Council for approval:

1. **Department of Biology – Calendar Changes**
 - a. Amend Course – Biology 3050
 - b. Amend Program Regulations – Biology Concentrations
 - c. Amend Course Descriptions
 - d. Amend Course – Biology 4245

2. **Department of Mathematics and Statistics – Calendar Changes**
 - a. Amend Course – Math 1001
 - b. Amend Course Prerequisites – Math 4133
 - c. Amend Course Prerequisites – Math 4180

Tracey Edmunds

Tracey Edmunds

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s): *BIOL 3050 – Introduction to Microbiology*
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

By signing below, you are confirming that the attached Calendar changes have obtained all necessary Faculty/School approvals, and that the costs, if any, associated with these changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Senate Summary Page for Courses

COURSE NUMBER AND TITLE

Biology 3050 – Introduction to Microbiology

RATIONALE

Changes made to this course's PR list in a previous calendar change left this course available to second-year students. This change will ensure students are prepared for the course by ensuring they will have had to take the relevant second-year core.

CALENDAR CHANGES

3050

Introduction to Microbiology

is a course in which the basic principles underlying microbial life are studied. Aspects include structure, function, bioenergetics and growth with an emphasis on prokaryotes. Also studied are viruses, microbial diseases, introductory principles of immunology and the control of microorganisms. The laboratory sessions provide training in culture and determinative techniques using microorganisms.

LH: 3

PR: Science 1807 and Science 1808; ~~BIOL 1001 and 1002~~ BIOL 2250 (or Biochemistry 2100 or Biochemistry 2200); Biochemistry 2201 or the former Biochemistry 2101

CALENDAR ENTRY AFTER CHANGES

3050

Introduction to Microbiology

is a course in which the basic principles underlying microbial life are studied. Aspects include structure, function, bioenergetics and growth with an emphasis on prokaryotes. Also studied are viruses, microbial diseases, introductory principles of immunology and the control of microorganisms. The laboratory sessions provide training in culture and determinative techniques using microorganisms.

LH: 3

PR: Science 1807 and Science 1808; BIOL 2250 (or Biochemistry 2100 or Biochemistry 2200); Biochemistry 2201 or the former Biochemistry 2101

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

From

Grenfell campus
Faculty of Business Administration
Faculty of Education
Faculty of Engineering & Applied Science
Faculty of Humanities & Social Sciences
Faculty of Science
Department of Biochemistry
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Ocean Sciences
Department of Physics and Physical Oceanography
Department of Psychology
Marine Institute
School of Human Kinetics and Recreation
School of Medicine
School of Nursing
School of Pharmacy
School of Social Work

Response Received

Yes, approve

LIBRARY REPORT

Not applicable.

RESOURCE IMPLICATIONS

There are no resource implications – PR modification only

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s):
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

By signing below, you are confirming that the attached Calendar changes have obtained all necessary Faculty/School approvals, and that the costs, if any, associated with these changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Senate Summary Page for Regulations

SECTION OF CALENDAR

Indicate the section of the Calendar impacted by the proposed change(s):

- Glossary of Terms Used in the Calendar
- Admission/Readmission to the University (Undergraduate)
- General Academic Regulations (Undergraduate)
- Faculty of:
- School of:
- Department of: Biology
- Other:

RATIONALE

The Biology Undergraduate program recently developed a series of optional Concentrations. Each consists of a list of courses from which students can choose six courses (18 credit hours). We have identified additional BIOL courses that fit under the concentrations and wish to amend the regulations to include these here.

NOTE: course names are indicated in square brackets for reference only in the section below.

CALENDAR CHANGES

11.2.5 Biology Concentrations

11.2.5.1 Applied Ecology and Conservation

Students selecting an Applied Ecology and Conservation concentration are required to complete 18 credit hours from the following courses:

1. Biology 3610 [**Boreal Ecology**], 4122, 4306 [**Applied Biology**], 4307, 4360, 4405, 4605 [**Quantitative Methods**], 4650, 4651, 4710, 4810, 4820, 4911

11.2.5.2 Aquatic Life

Students selecting an Aquatic Life concentration are required to complete 18 credit hours from the following courses:

1. Biology 3014, 3050, 3630 [**Freshwater Biology**], 3709, 3710, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4912

11.2.5.3 Biological Tools and Techniques

Students selecting a Biological Tools and Techniques concentration are required to complete 18 credit hours from the following courses:

1. Biology 3050, 3709, 3950, 3951, 4270, 4360, 4405, 4605, 4606, 4607, 4710, 4770, 4810, 4820

11.2.5.4 Biology for Health Professions

Students selecting a Biology for Health Professions concentration are required to complete 18 credit hours from the following courses:

1. Biology 3050, 3052, 3500, 3530, 4010, 4050, 4200, 4241, 4245, 4404, 4550, **4605 [Quantitative Methods]**
2. Medicine 310A/B

11.2.5.5 Comparative Biology

Students selecting a Comparative Biology concentration are required to complete 18 credit hours from the following courses:

1. Biology 3202, 3300, 3401, 3402, 3640, 3715, 3750, 4122, 4620, 4630, 4701, 4770, 4910

11.2.5.6 Evolutionary Ecology

Students selecting an Evolutionary Ecology concentration are required to complete 18 credit hours from the following courses:

1. Biology 3295, 3715, 3811, 3951, 4005 [**Biology of Islands**], 4250, 4270, 4505, **4605 [Quantitative Methods]**, 4620, 4630, 4701, 4710, 4800, 4910

11.2.5.7 Molecular, Microbial, and Cell Biology

Students selecting a Molecular, Microbial and Cell Biology concentration are required to complete 18 credit hours from the following courses:

1. Biology 3050, 3052, 3401, 3402, 3530, 3950, 3951, 4050, 4241, 4250, 4251, 4404, 4606, 4052 [**Fundamentals of Plant Pathology**]
2. Biochemistry 3207

SECONDARY CALENDAR CHANGES

11.2.5 Biology Concentrations

11.2.5.1 Applied Ecology and Conservation

Students selecting an Applied Ecology and Conservation concentration are required to complete 18 credit hours from the following courses:

2. Biology 3610 (**Boreal Ecology**), 4122, 4306 (**Applied Biology**), 4307, 4360, 4405, **4605 (Quantitative Methods)**, 4650, 4651, 4710, 4810, 4820, 4911

11.2.5.2 Aquatic Life

Students selecting an Aquatic Life concentration are required to complete 18 credit hours from the following courses:

2. Biology 3014, 3050, 3630 (**Freshwater Biology**), 3709, 3710, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4912

11.2.5.3 Biological Tools and Techniques

Students selecting a Biological Tools and Techniques concentration are required to complete 18 credit hours from the following courses:

2. Biology 3050, 3709, 3950, 3951, 4270, 4360, 4405, 4605, 4606, 4607, 4710, 4770, 4810, 4820

11.2.5.4 Biology for Health Professions

Students selecting a Biology for Health Professions concentration are required to complete 18 credit hours from the following courses:

3. Biology 3050, 3052, 3500, 3530, 4010, 4050, 4200, 4241, 4245, 4404, 4550, 4605 (**Quantitative Methods**)
4. Medicine 310A/B

11.2.5.5 Comparative Biology

Students selecting a Comparative Biology concentration are required to complete 18 credit hours from the following courses:

2. Biology 3202, 3300, 3401, 3402, 3640, 3715, 3750, 4122, 4620, 4630, 4701, 4770, 4910

11.2.5.6 Evolutionary Ecology

Students selecting an Evolutionary Ecology concentration are required to complete 18 credit hours from the following courses:

2. Biology 3295, 3715, 3811, 3951, 4005 (**Biology of Islands**), 4250, 4270, 4505, 4605 (**Quantitative Methods**), 4620, 4630, 4701, 4710, 4800, 4910

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Students selecting a Molecular, Microbial and Cell Biology concentration are required to complete 18 credit hours from the following courses:

3. Biology 3050, 3052, 3401, 3402, 3530, 3950, 3951, 4050, 4241, 4250, 4251, 4404, 4606, 4052 (**Fundamentals of Plant Pathology**)
4. Biochemistry 3207

CALENDAR ENTRY AFTER CHANGES

11.2.5 Biology Concentrations

11.2.5.1 Applied Ecology and Conservation

Students selecting an Applied Ecology and Conservation concentration are required to complete 18 credit hours from the following courses:

3. Biology 3610, 4122, 4306, 4307, 4360, 4405, 4605, 4650, 4651, 4710, 4810, 4820, 4911

11.2.5.2 Aquatic Life

Students selecting an Aquatic Life concentration are required to complete 18 credit hours from the following courses:

3. Biology 3014, 3050, 3630, 3709, 3710, 3711, 3712, 3714, 3715, 4122, 4601, 4710, 4750, 4912

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Students selecting a Biological Tools and Techniques concentration are required to complete 18 credit hours from the following courses:

3. Biology 3050, 3709, 3950, 3951, 4270, 4360, 4405, 4605, 4606, 4607, 4710, 4770, 4810, 4820

11.2.5.4 Biology for Health Professions

Students selecting a Biology for Health Professions concentration are required to complete 18 credit hours from the following courses:

5. Biology 3050, 3052, 3500, 3530, 4010, 4050, 4200, 4241, 4245, 4404, 4550, 4605
6. Medicine 310A/B

11.2.5.5 Comparative Biology

Students selecting a Comparative Biology concentration are required to complete 18 credit hours from the following courses:

3. Biology 3202, 3300, 3401, 3402, 3640, 3715, 3750, 4122, 4620, 4630, 4701, 4770, 4910

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3. Biology 3295, 3715, 3811, 3951, 4005, 4250, 4270, 4505, 4605, 4620, 4630, 4701, 4710, 4800, 4910

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Students selecting a Molecular, Microbial and Cell Biology concentration are required to complete 18 credit hours from the following courses:

5. Biology 3050, 3052, 3401, 3402, 3530, 3950, 3951, 4050, 4241, 4250, 4251, 4404, 4606, 4052
Biochemistry 3207

SECONDARY CALENDAR CHANGES

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

From	Response Received
Grenfell campus	
Faculty of Business Administration	
Faculty of Education	
Faculty of Engineering & Applied Science	
Faculty of Humanities & Social Sciences	
Faculty of Science	
Department of Biochemistry	Yes, approve
Department of Chemistry	
Department of Computer Sciences	
Department of Earth Sciences	
Department of Economics	
Department of Geography	
Department of Mathematics and Statistics	
Department of Physics and Physical Oceanography	
Department of Psychology	
Marine Institute	
School of Human Kinetics and Recreation	
School of Medicine	
School of Nursing	
School of Pharmacy	
School of Social Work	

RESOURCE IMPLICATIONS

There are no resource implications associated with the proposed changes.

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s):

BIOL 2040 - Modern Biology and Human Society I
BIOL 2041 - Modern Biology and Human Society II
BIOL 2060 - Principles of Cell Biology
BIOL 2122 - Biology of Invertebrates
BIOL 2210 - Biology of Vertebrates
BIOL 2250 - Principles of Genetics
BIOL 2600 - Principles of Ecology
BIOL 2900 - Principles of Evolution and Systematics
BIOL 3014 - Biology and Ecology of Boreal and Arctic Seaweeds
BIOL 3052 - Food Microbiology
BIOL 3202 - Comparative Vertebrate Anatomy
BIOL 3295 - Population and Evolutionary Ecology
BIOL 3300 - Introductory Entomology
BIOL 3401 - Comparative Animal Physiology
BIOL 3402 - Principles of Plant Physiology
BIOL 3715 - Ecology and Evolution of Fishes
BIOL 3811 - Paleontology
BIOL 3950 - Research Methods in Genetic Biotechnology
BIOL 4200 - Immunology
BIOL 4241 - Advanced Genetics
BIOL 4307 - Global Change Biology

- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

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Signature of Dean/Vice-President:

Date:

Date of approval by Faculty/Academic Council:

**Memorial University of Newfoundland
Undergraduate Calendar Change Proposal Form
Senate Summary Page for Courses**

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

COURSE NUMBER AND TITLE

BIOL 2040 - Modern Biology and Human Society I
BIOL 2041 - Modern Biology and Human Society II
BIOL 2060 - Principles of Cell Biology
BIOL 2122 - Biology of Invertebrates
BIOL 2210 - Biology of Vertebrates
BIOL 2250 - Principles of Genetics
BIOL 2600 - Principles of Ecology
BIOL 2900 - Principles of Evolution and Systematics
BIOL 3014 - Biology and Ecology of Boreal and Arctic Seaweeds
BIOL 3052 - Food Microbiology
BIOL 3202 - Comparative Vertebrate Anatomy
BIOL 3295 - Population and Evolutionary Ecology
BIOL 3300 - Introductory Entomology
BIOL 3401 - Comparative Animal Physiology
BIOL 3402 - Principles of Plant Physiology
BIOL 3715 - Ecology and Evolution of Fishes
BIOL 3811 - Paleontology
BIOL 3950 - Research Methods in Genetic Biotechnology
BIOL 4200 - Immunology
BIOL 4241 - Advanced Genetics
BIOL 4307 - Global Change Biology

RATIONALE

We propose several small amendments to ensure descriptions for courses in Biology are as uniform in structure as possible, and adhere to regulations designating time spent in labs, seminars, tutorials, and otherwise. Many references to former courses are removed as well. A single prerequisite change (for BIOL 4241) is also included.

ADMINISTRATIVE AUTHORIZATION

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changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President:

Date:

Date of approval by Faculty/Academic Council:

CALENDAR CHANGES

12.2 Biology

2040 Modern Biology and Human Society I

examines various aspects of the human body, and the implications of modern biological research for human beings. Topics include cancer; diet and nutrition and associated diseases; circulatory disease, immunity, human genetics, biorhythms, new diseases, genetic engineering and reproductive engineering.

~~OR: seminars~~

UL: not acceptable as one of the required courses for the Minor, Major or Honours programs in Biology

2041 Modern Biology and Human Society II

examines the origins and consequences of the environmental crisis of the 20th century. Topics include the population explosion, energy, material cycles, air and water and land pollution, global food supplies, the fisheries, wildlands, renewable and non-renewable resources, environmental ethics.

~~OR: seminars~~

UL: not acceptable as one of the required courses for the Minor, Major or Honours programs in Biology

2060 Principles of Cell Biology

is a modern view of the biology of eukaryotic cells, organelles and molecules and their interactions in the functioning of living organisms.

~~CR: the former BIOL 3060~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2250 OR Biochemistry 2200

2122 Biology of Invertebrates

is a study of the invertebrates with emphasis on structure and function, adaptations and life histories. The laboratories will present a broad survey of the major invertebrate groups.

~~CR: the former BIOL 3122~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001, 1002

2210 Biology of Vertebrates

is a study of the vertebrates, with emphasis on structure and function, adaptations and life histories.

~~CR: the former BIOL 3210~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001, 1002

2250 Principles of Genetics

is an introduction to Mendelian and molecular genetics. Phenotype and genotype, behaviour of alleles in genetic crosses, chromosome theory of inheritance, genetic linkage, molecular biology of DNA, RNA and protein, molecular basis of mutation, recombinant DNA, applications of genetic biotechnology.

CR: Biochemistry 2100 and Biochemistry 2200, ~~the former BIOL 3250~~
~~LH: 3~~

LH: 3 hour labs alternating weekly with tutorials

PR: Science 1807 and Science 1808; BIOL 1001 and 1002; Chemistry 1050 (or 1200)

2600 Principles of Ecology

is a conceptual course introducing the principles of ecology, including theoretical, functional and empirical approaches.

CR: ~~the former BIOL 3600~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001 and 1002, or BIOL 2120 and admission to a major in Environmental Physics

2900 Principles of Evolution and Systematics

is an introduction to the processes and patterns of evolution, and the principles of classification. Natural selection and other microevolutionary processes, variation and adaptation, species and speciation, phylogenetic systematics, reconstruction of phylogeny, macro-evolutionary patterns in the fossil record and their interpretation.

CR: ~~the former BIOL 3900~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2250

3014 Biology and Ecology of Boreal and Arctic Seaweeds

is a field course examination of seaweed biology and ecology with special study of living specimens in estuarine, fiordic and exposed coastal sites, demonstrating their physiological and ecological adaptations to cold-water habitats.

CR: ~~the former BIOL 4014~~

OR: this course is offered at the Bonne Bay Marine Station during the Summer semester with two weeks of instruction followed by a week to complete course requirements

PR: Science 1807 and Science 1808; BIOL 2600 or equivalent

3052 Food Microbiology

(same as Biochemistry 3052) is the study of the microbiology of water and food with regard to the beneficial and detrimental roles of microorganisms on interaction with these systems. Emphasis will be on the microbiology of food, fermentations, food spoilage and food borne vectors of human disease.

CR: Biochemistry 3052 and the former Biochemistry 3054, Biochemistry 3401

LC: ~~three hours per week~~

LH: ~~three hours per week~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 3050

3202 Comparative Vertebrate Anatomy

examines the phylogenetic development and comparative anatomy of the vertebrates.

CR: ~~the former BIOL 3200 or the former BIOL 3201~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001 and 1002

3295 Population and Evolutionary Ecology

is an introduction to the theory and principles of evolutionary ecology and population dynamics.

CR: ~~the former BIOL 4290~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2600; at least one of BIOL 2010, 2122 or 2210

3300 Introductory Entomology

is a study of the classification and ecology of insects within an evolutionary framework. Topics will include molecular biological and classical morphological issues surrounding insect taxonomy, evolutionary based higher systematics, and the ecological roles of insects in a variety of ecosystems.

CR: ~~BIOL 4150 and the former BIOL 4140~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2600. It is recommended that students have successfully completed BIOL 2900

3401 Comparative Animal Physiology

is a comparative study of the basic physiological processes, with special attention paid to those strategies invoked by animals which enable them to adapt to environmental changes.

CO: Biochemistry 3106 or 3206

CR: ~~the former BIOL 4401~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2060 and 2210

PR: Biochemistry 3106 or 3206

3402 Principles of Plant Physiology

is a consideration of the principles of plant physiology, including water relations, nutrition, metabolism, growth and development.

CO: Biochemistry 3106 or 3206

CR: ~~the former BIOL 4403~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2010 and 2060

PR: Biochemistry 3106 or 3206

3715 Ecology and Evolution of Fishes

(same as the former BIOL 4600) examines the evolutionary history and ecology of the world's fishes, with particular emphasis on those of ecological, economical and cultural importance to Eastern Canada. Topics will include taxonomy, life histories, behaviour, zoogeography, evolutionary ecology, population biology, contemporary evolution, and conservation biology.

CR: ~~the former BIOL 4600 (same as the former BIOL 4600)~~

LH: 3

PR: Science 1807 and Science 1808; BIOL 2600 and 2900

3811 Paleontology

(same as Earth Sciences 3811) is taught and administered by the Department of Earth Sciences and outlines the major changes in life forms from Archean times through the Phanerozoic to the present day, including details of invertebrate and vertebrate faunas and major floral groups; mechanisms and effects of mega- and micro-evolution in the fossil record; biology and classification of organisms and summaries of their geological significance in biostratigraphy, paleoecology and rock-building; relationships between major cycles of evolution and extinction to global processes.

CR: Earth Sciences 3811, ~~the former BIOL 3800, and the former Earth Sciences 3801~~

LH: 3

PR: either Earth Sciences 1002 and BIOL 2120 (or BIOL 1001 and 1002); or BIOL 2122 and 2210

3950 Research Methods in Genetic Biotechnology

~~(same as the former BIOL 4900)~~ will include covers DNA extraction, DNA amplification by the Polymerase Chain Reaction (PCR), DNA cloning, DNA sequence analysis and Bioinformatics. Additional modules in gene expression and re-sequencing chip technologies may be included. Theory and methods will be introduced in a research framework.

~~CR: the former BIOL 4900~~

LH: Three hours of lecture and three hours of laboratory per week or a three week on-campus course that embodies equivalent instructor time

PR: Science 1807 and Science 1808; BIOL 2060 and 2250

4200 Immunology

(same as Biochemistry 4105 and Pharmacy 3006) is an introduction to the cells and organs of the innate and adaptive immune systems. The molecular and cellular basis of allergy, autoimmunity, vaccination and cancer immunology will also be discussed.

~~CR: Biochemistry 4105, Pharmacy 3006, and the former Pharmacy 4105~~

PR: Science 1807 and Science 1808; BIOL 2060

4241 Advanced Genetics

has advanced topics in modern genetic analysis, including regulation of gene expression, developmental genetics, molecular basis of inherited disease, genomics, immunogenetics, behavioural genetics, and molecular evolution.

~~LH: 3~~

OR: 3 hours of seminar/discussion group each week

~~PR: Science 1807 and Science 1808; BIOL 2250 (or BIOC 2100 or 2200) and Biochemistry 2201 or the former 2101~~

4307 Global Change Biology

examines the evolution of biosphere, global role of photosynthesis in oxygen and carbon dioxide balance, glacial-interglacial oscillations, carbon sources and sinks in modern biosphere, greenhouse gases emissions, population dynamics, origin and global impact of agriculture, global changes in Holocene and Anthropocene.

~~LH: 3~~

OR: 3 hours of seminar/discussion group each week

PR: BIOL 2600, BIOL 2900 or permission of the instructor

CALENDAR ENTRY AFTER CHANGES

12.2 Biology

2040 Modern Biology and Human Society I

examines various aspects of the human body, and the implications of modern biological research for human beings. Topics include cancer; diet and nutrition and associated diseases; circulatory disease, immunity, human genetics, biorhythms, new diseases, genetic engineering and reproductive engineering.

UL: not acceptable as one of the required courses for the Minor, Major or Honours programs in Biology

2041 Modern Biology and Human Society II

examines the origins and consequences of the environmental crisis of the 20th century. Topics include the population explosion, energy, material cycles, air and water and land pollution, global food supplies, the fisheries, wildlands, renewable and non-renewable resources, environmental ethics.

UL: not acceptable as one of the required courses for the Minor, Major or Honours programs in Biology

2060 Principles of Cell Biology

is a modern view of the biology of eukaryotic cells, organelles and molecules and their interactions in the functioning of living organisms.

LH: 3

PR: Science 1807 and Science 1808; BIOL 2250 OR Biochemistry 2200

2122 Biology of Invertebrates

is a study of the invertebrates with emphasis on structure and function, adaptations and life histories. The laboratories will present a broad survey of the major invertebrate groups.

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001, 1002

2210 Biology of Vertebrates

is a study of the vertebrates, with emphasis on structure and function, adaptations and life histories.

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001, 1002

2250 Principles of Genetics

is an introduction to Mendelian and molecular genetics. Phenotype and genotype, behaviour of alleles in genetic crosses, chromosome theory of inheritance, genetic linkage, molecular biology of DNA, RNA and protein, molecular basis of mutation, recombinant DNA, applications of genetic biotechnology.

CR: Biochemistry 2100

LH: 3 hour labs alternating weekly with tutorials

PR: Science 1807 and Science 1808; BIOL 1001 and 1002; Chemistry 1050

2600 Principles of Ecology

is a conceptual course introducing the principles of ecology, including theoretical, functional and empirical approaches.

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001 and 1002, or BIOL 2120 and admission to a major in Environmental Physics

2900 Principles of Evolution and Systematics

is an introduction to the processes and patterns of evolution, and the principles of classification. Natural selection and other microevolutionary processes, variation and adaptation, species and speciation, phylogenetic systematics, reconstruction of phylogeny, macro-evolutionary patterns in the fossil record and their interpretation.

LH: 3

PR: Science 1807 and Science 1808; BIOL 2250

3014 Biology and Ecology of Boreal and Arctic Seaweeds

is a field course examination of seaweed biology and ecology with special study of living specimens in estuarine, fiordic and exposed coastal sites, demonstrating their physiological and ecological adaptations to cold-water habitats.

OR: this course is offered at the Bonne Bay Marine Station during the Summer semester with two weeks of instruction followed by a week to complete course requirements

PR: Science 1807 and Science 1808; BIOL 2600 or equivalent

3052 Food Microbiology

(same as Biochemistry 3052) is the study of the microbiology of water and food with regard to the beneficial and detrimental roles of microorganisms on interaction with these systems. Emphasis will be on the microbiology of food, fermentations, food spoilage and food borne vectors of human disease.

CR: Biochemistry 3052

LH: 3

PR: Science 1807 and Science 1808; BIOL 3050

3202 Comparative Vertebrate Anatomy

examines the phylogenetic development and comparative anatomy of the vertebrates.

LH: 3

PR: Science 1807 and Science 1808; BIOL 1001 and 1002

3295 Population and Evolutionary Ecology

is an introduction to the theory and principles of evolutionary ecology and population dynamics.

PR: Science 1807 and Science 1808; BIOL 2600; at least one of BIOL 2010, 2122 or 2210

3300 Introductory Entomology

is a study of the classification and ecology of insects within an evolutionary framework. Topics will include molecular biological and classical morphological issues surrounding insect taxonomy, evolutionary based higher systematics, and the ecological roles of insects in a variety of ecosystems.

LH: 3

PR: Science 1807 and Science 1808; BIOL 2600. It is recommended that students have successfully completed BIOL 2900

3401 Comparative Animal Physiology

is a comparative study of the basic physiological processes, with special attention paid to those strategies invoked by animals which enable them to adapt to environmental changes.

CO: Biochemistry 3106 or 3206

LH: 3

PR: Science 1807 and Science 1808; BIOL 2060 and 2210

PR: Biochemistry 3106 or 3206

3402 Principles of Plant Physiology

is a consideration of the principles of plant physiology, including water relations, nutrition, metabolism, growth and development.

CO: Biochemistry 3106 or 3206

LH: 3

PR: Science 1807 and Science 1808; BIOL 2010 and 2060

PR: Biochemistry 3106 or 3206

3715 Ecology and Evolution of Fishes

(same as the former BIOL 4600) examines the evolutionary history and ecology of the world's fishes, with particular emphasis on those of ecological, economical and cultural importance to Eastern Canada. Topics will include taxonomy, life histories, behaviour, zoogeography, evolutionary ecology, population biology, contemporary evolution, and conservation biology.

LH: 3

PR: Science 1807 and Science 1808; BIOL 2600 and 2900

3811 Paleontology

(same as Earth Sciences 3811) is taught and administered by the Department of Earth Sciences and outlines the major changes in life forms from Archean times through the Phanerozoic to the present day, including details of invertebrate and vertebrate faunas and major floral groups; mechanisms and effects of mega- and micro-evolution in the fossil record; biology and classification of organisms and summaries of their geological significance in biostratigraphy, paleoecology and rock-building; relationships between major cycles of evolution and extinction to global processes.

CR: Earth Sciences 3811

LH: 3

PR: either Earth Sciences 1002 and BIOL 2120 (or BIOL 1001 and 1002); or BIOL 2122 and 2210

3950 Research Methods in Genetic Biotechnology

covers DNA extraction, DNA amplification by the Polymerase Chain Reaction (PCR), DNA cloning, DNA sequence analysis and Bioinformatics. Additional modules in gene expression and re-sequencing chip technologies may be included. Theory and methods will be introduced in a research framework.

LH: Three hours of lecture and three hours of laboratory per week or a three week on-campus course that embodies equivalent instructor time

PR: Science 1807 and Science 1808; BIOL 2060 and 2250

4200 Immunology

(same as Biochemistry 4105 and Pharmacy 3006) is an introduction to the cells and organs of the innate and adaptive immune systems. The molecular and cellular basis of allergy, autoimmunity, vaccination and cancer immunology will also be discussed.

CR: Biochemistry 4105, Pharmacy 3006

PR: Science 1807 and Science 1808; BIOL 2060

4241 Advanced Genetics

has advanced topics in modern genetic analysis, including regulation of gene expression, developmental genetics, molecular basis of inherited disease, genomics, immunogenetics, behavioural genetics, and molecular evolution.

OR: 3 hours of seminar/discussion group each week

PR: Science 1807 and Science 1808; BIOL 2250 (or BIOC 2100 or 2200)

4307 Global Change Biology

examines the evolution of biosphere, global role of photosynthesis in oxygen and carbon dioxide balance, glacial-interglacial oscillations, carbon sources and sinks in modern biosphere, greenhouse gases emissions, population dynamics, origin and global impact of agriculture, global changes in Holocene and Anthropocene.

OR: 3 hours of seminar/discussion group each week

PR: BIOL 2600, BIOL 2900 or permission of the instructor

SECONDARY CALENDAR CHANGES

Grenfell Campus

13.3 Biology

2122 Biology of Invertebrates

is a study of the invertebrates with emphasis on structure and function, adaptations and life histories. The laboratories will present a broad survey of the major invertebrate groups.

~~CR: the former BIOL 3122~~

LH: 3

PR: BIOL 1001 and BIOL 1002; Science 1807 and Science 1808

2210 Biology of Vertebrates

is a study of the vertebrates, with emphasis on structure and function, adaptations and life histories.

~~CR: the former BIOL 3210~~

LH: 3

PR: BIOL 1002; Science 1807 and Science 1808

2250 Principles of Genetics

is an introduction to Mendelian and molecular genetics. Phenotype and genotype, behaviour of alleles in genetic crosses, chromosome theory of inheritance, genetic linkage, molecular Biology of DNA, RNA and protein, molecular basis of mutation, recombinant DNA, applications of genetic biotechnology.

CO: Chemistry 2440 or Chemistry 2400

~~CR: the former BIOL 3250~~

LH: 3

PR: Chemistry 2440 or Chemistry 2400, BIOL 1001 and 1002, Chemistry 1010, the former 1011 or 1050/1051; Science 1807 and Science 1808

2600 Principles of Ecology

is a conceptual course introducing the principles of ecology, including theoretical, functional and empirical approaches.

~~CR: the former BIOL 3600~~

LH: 3

PR: BIOL 1002; Science 1807 and Science 1808

12.1 Biochemistry

3052 Food Microbiology

(same as Biology 3052) is the study of the microbiology of water and food with regard to the beneficial and detrimental roles of microorganisms on interaction with these systems. Emphasis will be on the microbiology of food, fermentations, food spoilage and food borne vectors of human disease.

CR: Biology 3052, and the former ~~BIOC 3054, BIOC 3401~~

~~LC: three hours per week~~

LH: 3

PR: Biology 3050 and Science 1807 and Science 1808

4105 Immunology

(same as Biology 4200 and Pharmacy 3006 ~~and the former Pharmacy 4105~~) is an introduction to the cells and organs of the innate and adaptive immune systems. The molecular and cellular basis of allergy, autoimmunity, vaccination and cancer immunology will also be discussed.

CR: Biology 4200, Pharmacy 3006, ~~the former Pharmacy 3105, the former Pharmacy 4105~~

PR: BIOC 2201 or the former 2101

12.5 Earth Sciences

12.5.3 Third Year

3811 Paleontology

(same as Biology 3811) outlines the major changes in life forms from Archean times through the Phanerozoic to the present day, including details of invertebrate and vertebrate faunas and major floral groups; mechanisms and effects of mega- and micro-evolution in the fossil record; biology and classification of organisms and summaries of their geological significance in biostratigraphy, paleoecology and rock-building; relationships between major cycles of evolution and extinction to global processes.

CR: Biology 3811 ~~or either the former EASC 3801 or the former Biology 3800~~

LH: 3

PR: either Biology 2120 (or Biology 1001 and 1002) and EASC 1002; or Biology 2122 and 2210

CONSULTATIONS SOUGHT

From

Grenfell campus
Faculty of Business Administration
Faculty of Education
Faculty of Engineering & Applied Science
Faculty of Humanities & Social Sciences
Faculty of Science
Department of Biochemistry
Department of Chemistry
Department of Computer Sciences
Department of Earth Sciences
Department of Economics
Department of Geography
Department of Mathematics and Statistics
Department of Ocean Sciences
Department of Physics and Physical Oceanography
Department of Psychology
Marine Institute
School of Human Kinetics and Recreation
School of Medicine
School of Nursing
School of Pharmacy
School of Social Work

Response Received

Supportive – amendments made
Supportive

LIBRARY REPORT

Not applicable.

RESOURCE IMPLICATIONS

There are no resource implications associated with the proposed changes.

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s):
 - **BIOL 4245 Physical Biology**
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

By signing below, you are confirming that the attached Calendar changes have obtained all necessary Faculty/School approvals, and that the costs, if any, associated with these changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Senate Summary Page for Courses

COURSE NUMBER AND TITLE

BIOL 4245 – Biophysics

REVISED COURSE NUMBER AND TITLE

BIOL 4245 – Physical Biology

ABBREVIATED COURSE TITLE

Phys Biol

RATIONALE

This course has been inactive for some time. With a new hire, we have a faculty member who can teach this topic, but with a slightly different focus than what is in the previous calendar description. The new calendar description and name change matches the way the new hire plans to teach this course. We anticipate this will be a regular offering. In addition we have elected to drop on prerequisite that is no longer necessary given the intended course content. The nature of the new course means that it will not fulfill the requirement as one of a possibly physiology courses; this change is reflected in the secondary calendar changes.

CALENDAR CHANGES

13.2 Biology

~~4245 Biophysics~~ 4245 Physical Biology

is an examination of introduction to the physics that govern the smallest scales of life and is intended for students interested in interdisciplinary scienceal properties involved in defining diffusion, membrane properties, electrochemical potentials and the processes of bioenergetics within cells and organelles. Selected Major topics will include 1) diffusion and viscosity-driven effects and how these shape the lives of microorganisms, and 2) entropy and how entropic effects govern the molecular machinery in living cells and tissues in biomechanics and the functioning of whole organisms with respect to size, shape, support, orientation, transport and motility.

LH: 3

PR: Science 1807 and Science 1808; ~~BIOL 2060 and Biochemistry 2201~~ or the former 2101

CALENDAR ENTRY AFTER CHANGES

4245 Physical Biology

is an introduction to the physics that govern the smallest scales of life and is intended for students interested in interdisciplinary science. Major topics will include 1) diffusion and viscosity-driven effects and how these shape the lives of microorganisms, and 2) entropy and how entropic effects govern the molecular machinery in living cells and tissues.

LH: 3

PR: Science 1807 and Science 1808; Biochemistry 2201 or the former 2101

SECONDARY CALENDAR CHANGES

10.2 Joint Honours

10.2.3 Biochemistry and Cell Biology Joint Honours

6. Biology 2060, 2250, 2600, 2900, 3530, 4241, plus one of Biology 3401, 3402, 4245-or 4404;

10.2.8 Biology and Earth Sciences Joint Honours

4. Biology 2060, 2250, 2600, 2900, one of 3401, 3402, 4245-or 4404; plus Biology 3710, 3711, and 4505. In addition, further Biology courses at the 2000, 3000, or 4000 level must be selected by the student in consultation with the supervisor to make up a minimum of 42 credit hours in Biology not including Biology 499A or 499B.

10.2.9 Biology and Psychology Joint Honours

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of 3401, 3402, 4245-or 4404; four Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.

10.2.10 Biology and Psychology (Behavioural Neuroscience) Joint Honours

1. Biology 1001, 1002, 2060, 2250, 2600, 2900; one of 3401, 3402, 4245-or 4404; five Biology electives at the 2000, 3000 or 4000 level not including Biology 499A or 499B.

10.2.11 Biology and Statistics Joint Honours

6. Biology 2060, 2250, 2600, 2900, one of 3401, 3402, 4245-or 4404. In addition, further Biology courses at the 2000, 3000 or 4000 level must be selected by the student in consultation with the supervisor to make up a minimum of 42 credit hours in Biology but not including Biology 499A or 499B;

11 Program Regulations

11.2.3.1 Major in Biology

All students majoring in Biology are required to complete a minimum of 45 credit hours in courses from the Department of Biology offering. Those 45 credit hours must include: Biology 1001 and 1002 or their equivalents; the 15 credit hours in core courses listed below; and 24 credit hours in Biology electives at the 2000, 3000 or 4000 level except Biology 2040, 2041, 2120, 3053, and 3820.

Biology Core (15 credit hours): Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, ~~4245~~ or 4404.

11.2.4.1 Honours in Biology

1. Biology Course Requirements:

Students seeking an honours degree in Biology are required to successfully complete a minimum of 69 credit hours in courses from the Department of Biology offering. Those 69 credit hours must include:

- a. Biology 1001 and 1002 or their equivalents;
- b. 15 credit hours in the following core courses:
Biology 2060, 2250, 2600, 2900, plus one of Biology 3401, 3402, ~~4245~~ or 4404;

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

From	Response Received
Grenfell campus	
Faculty of Business Administration	
Faculty of Education	
Faculty of Engineering & Applied Science	
Faculty of Humanities & Social Sciences	
Faculty of Science	
Department of Biochemistry	
Department of Chemistry	
Department of Computer Sciences	
Department of Earth Sciences	
Department of Economics	
Department of Geography	
Department of Mathematics and Statistics	
Department of Physics and Physical Oceanography	yes, supportive
Department of Psychology	
Marine Institute	
School of Human Kinetics and Recreation	
School of Medicine	
School of Nursing	
School of Pharmacy	
School of Social Work	

RESOURCE IMPLICATIONS

This course makes use of the computer teaching lab in CSF; although the Biology teaching lab is in high demand, we have an available slot to offer for this course's lab slot.

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s): Math 1001 Calculus II
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

By signing below, you are confirming that the attached Calendar changes have obtained all necessary Faculty/School approvals, and that the costs, if any, associated with these changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland

Undergraduate Calendar Change Proposal Form

Senate Summary Page for Courses

COURSE NUMBER AND TITLE

Math 1001 Calculus II

RATIONALE

The math department is currently reviewing its calculus sequence, which has been largely unchanged since the 1990s. The proposed changes to Math 1001 are motivated by two main goals. First, we want to show students that integration is an important tool with real-world applications, not just a collection of techniques and formulas to learn for the final exam. Second, we want students to be exposed to differential equations earlier in the calculus sequence. While this will be beneficial to all students, it is particularly important to those for whom Math 1001 will be their final math course, as they otherwise might not be exposed to this important topic.

We have accomplished this by removing some of the more involved integration techniques, and reduced the number of lectures on volumes of revolution. This allows us to add two lectures on probability (as an application of integration) and five lectures on ordinary differential equations. Further motivation and a detailed syllabus can be found in the attached document.

CALENDAR CHANGES

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, and improper integrals and first order differential equations. Applications include: exponential growth and decay, areas between curves, and volumes of solids of revolution, probability functions and modelling with differential equations.

PR: MATH 1000 or the former MATH 1081

CALENDAR ENTRY AFTER CHANGES

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, improper integrals and first order differential equations. Applications include: area between curves, volumes of solids of revolution, probability functions and modelling with differential equations.

PR: MATH 1000 or the former MATH 1081

SECONDARY CALENDAR CHANGES

Grenfell Campus 13.21 Mathematics and Statistics

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, improper integrals and first order differential equations. Applications include: area between curves, volumes of solids of revolution, probability functions and modelling with differential equations.

LH: 1.5

PR: MATH 1000 or the former MATH 1081

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

Academic Unit	Response Received
Humanities and Social Sciences	
Business Administration	
Education	
Engineering and Applied Science	Yes
Human Kinetics and Recreation	Yes
Marine Institute	
Medicine	Yes
Music	
Nursing	
Pharmacy	Yes
Science	
Biochemistry	
Biology	
Computer Science	
Earth Sciences	
Mathematics and Statistics	
Ocean Sciences	
Physics and Physical Oceanography	
Psychology	Yes
Social Work	
Library	

Academic Unit	Response Received
Grenfell - Arts and Social Science	
Grenfell - Science and the Environment	Yes
Grenfell - Fine Arts	
Labrador Institute	

LIBRARY REPORT**RESOURCE IMPLICATIONS**

None

Revising 1001 as part of the Calculus Sequence

Introduction

Modulo a few minor modifications, our calculus courses are unchanged since the early 1990s. However we think that they were likely in their current configuration for at least a decade before that. In 40 years, calculus hasn't changed but the world has changed around it. Hence it is worth rethinking the content of these courses.

In approaching potential revisions, it is important to realize that MUN has a fairly unusual calculus sequence. Most universities cover this material in three rather than four courses. In particular our 1000-1001-2000-3202 are usually covered in Calc I, Calc II and Calc III. Typically, Calc I covers our M1000 plus the first section of integration (Riemann sums, fundamental theorem of calculus, u-substitution), Calc II includes sequences and series (in 4 weeks) and then Calc III does multivariable and vector calculus. Each of our courses covers less material than the corresponding course at virtually all other Canadian universities.

Though the number of calculus courses that we have is unusual, we are not proposing a reduction to the typical Calc I-II-III. Rather we propose reducing the coverage of some existing topics in those courses to lengths more comparable to what other universities do and then making use of the freed space to add in other material. Even after these revisions we will likely still be covering less material in each course than other universities (though hopefully with the side-effect that our students come out of these courses with a better understanding of the material).

A core principle underlying all of these revisions is the recognition that these courses should serve not only the needs of our minors/majors but also those of a much larger group: the students of other departments and programs. Each course in the sequence is the last calculus course that a significant number of students will take. For example, biochemistry, many earth science students¹, economics and most engineering students (except naval architecture) take 1001 as their last calculus course with us. Chemistry, computer science and some earth science finish with M2000. A primary goal in this and future revisions is to arrange the material so as to round out these students' experience with the mathematics introduced in these courses.

As applied to M1001, we believe that a student who finishes with Calculus II should realize that differential equations exist and that there are more applications of integration than just the volume of solids of revolution. Ultimately, we believe that these are more important goals than spending a lot of time on the details of complicated integration techniques which, in the modern world, can easily be looked up if necessary.

At this time, we are bringing the M1001 changes forward. Proposals for M2000 and M3202 will follow in the Fall and build from the new M1001. The changes are small enough (maybe around 10-15%) that we should not need to renumber M1001.

¹ They can choose between Math 2000 or Stats 2550.

Note: As part of our discussions, we also considered possible changes to M1000. However, it was ultimately agreed that the balance of topics and applications in the current M1000 is already quite good and there were not any obvious changes to be made. Further, making significant changes to M1000 would cause complications with the high school calculus stream as significant numbers of our students now come from high school with credit for M1000.

1001 Summary: Save about 6 lectures from volumes of revolutions and more algebraically complicated integration techniques. Save 2 from exponential growth as a standalone topic. Redeploy 5 of these lectures principally into intro ODEs (1st order separable) where exponential growth also finds a more natural home, as well as 2 into probability functions. There is a net saving of 1 lecture which can be used as needed from offering to offering.

Proposed Revision for M1001

Old Calendar Language: *Calculus II is an introduction to integral calculus, including Riemann sums, techniques of integration and improper integrals. Applications include exponential growth and decay, areas between curves and volumes of solids of revolution.*

New Calendar Language: *Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, improper integrals and first order differential equations. Applications include: area between curves, volumes of solids of revolution, probability functions and modelling with differential equations.*

The changes are small enough (about two weeks of material) that we would keep the same course number. In fact, the changes are consistent with the current calendar language. However, we feel that it is valuable to modify the language to reflect the change of emphasis in the course.

GUIDING PRINCIPLE: Provide a more interesting (and useful) set of applications for integration. Leave the students with the impression that integration is more than just a cookbook of complicated algebra. Make sure that students who take this as their last math course know that differential equations exist!

Detailed Changes

Change	Net Change in Lectures	Rationale
Reduce volumes of revolution to discs around the x-axis.	-2	This is a complicated application and as one of only two current examples, quite specialized and not very interesting (or useful) for most students. Historically it was part of a section on 3D geometry, along with surface area and arclength. It is probably not worth the current 3-4 lectures (which is about 10% of the entire course).
Focus trig integrals on sine/cosine combinations. Tangent/secant only as an example (not tested).	-2	The sine/cosine combinations show up much more often in applications and convey the concept. Including all the tangent/secant cases significantly increase complexity without a corresponding increase in usefulness.
Focus trig substitution on basic examples.	-1	This would centre on the three basic types of substitutions.
Focus on non-repeated factor partial fractions. Repeated factors only as examples (not tested).	-1	Repeated factors significantly increase the algebraic complexity but probably not the understanding.
Delete exponential growth as standalone section.	-2	It fits in better as a solution to a separable DE.
Add introduction to first order ODEs, focusing on separable DEs.	+5	Useful and interesting. Fits in well. Exponential growth would appear as an example in this section.
Add probability densities.	+2	These are good and more broadly useful. Also, they are straightforward. It gives a little look forward to stats courses.

NOTES:

- 1) Realizing that differential equations exist is more important to applications and understanding than being able to calculate volumes of revolution by two different methods.
- 2) Physics and engineering need volumes (centres of mass etc.) but they probably don't need multiple methods around both the x and y axis. This is specialized stuff and if students need more, it can be learned later. For most, discs around the x-axis is enough.
- 3) By this proposal we'd spend less time on the more complex trig integrals, trig substitution and partial fractions. Students need to understand the concepts behind these but the more complicated examples probably obscure rather than clarify the concepts. Details can always be looked up (or obtained from a computer) if needed in the future.
- 4) The probability density sections from Stewart are nice applications, relatively easy and establish a link to our Statistics courses. Hence a good application all around!

Rough Outline of Old vs New Version of Course

The number of lectures listed below as “Current” is approximately what Ivan Booth spent in Fall 2020. They are provided to give an example of the relative time that would be spent on topics pre- and post-revision. Other people will distribute their time differently. Section numbers are taken from Stewart 8th/9th edition.

Section 1 *First Steps (Chapter 5)*

Area (5.1), Definite Integral/Riemann Sums (5.2), Fundamental Theorem of Calculus (5.3), Indefinite Integral (5.4), u-substitution (5.5)

Current: 12 lectures, **Proposed:** 12 lectures

Net: +0 lectures

Notes: Unchanged

Section 2 *Techniques of Integration (Chapter 7)*

Integration by Parts (7.1), Trigonometric Integrals (7.2), Trigonometric Substitution (7.3), Partial Fractions (7.4), Strategy (7.5), Improper Integrals (7.6)

Current: 16 lectures, **Proposed:** 12 lectures,

Net: -4 lectures

Notes: As outlined above, the reduction comes a bit each from secant/tangent trig integrals along with the more complicated trig substitutions and partial fractions. The goal is to retain the conceptual ideas while reducing emphasis on the more involved techniques (which most students will quickly forget).

Section 3 *First Order ODEs (Chapter 9)*

Modelling with DEs (9.1), Separable DEs (9.3), Population Growth (9.4), Predator-Prey (9.6)

Current: 2 lectures, **Proposed:** 5 lectures

Net: +3 lectures

Notes: New material. Exponential growth/decay moves from applications to here (that’s the 2 lectures in the current version).

Section 4 *Other Applications (Chapter 6 and 8)*

Area between curves (6.1), Volume of Solids of Revolution: Disc/Washer (6.2), Probability (8.5)

Current: 4 lectures, **Proposed:** 4 lectures

Net: +0 lectures

Notes: Cylinder Method (6.3) removed. Probability (8.5) added.

Total old: 34 lectures

Total new: 33 lectures



From: Math Consult mathconsult@mun.ca

Subject: Proposals from Math & Stats for consultation

Date: May 18, 2022 at 8:32 AM

To: hss@mun.ca, eoldford@mun.ca, efurey@mun.ca, engrconsult@mun.ca, hkrdean@mun.ca, deanofmedicine@med.mun.ca, kbulmer@mun.ca, deanNurse@mun.ca, pharminfo@mun.ca, deansci@mun.ca, adeanugradswk@mun.ca, univlib@mun.ca, ssedean@grenfell.mun.ca, thennessey@grenfell.mun.ca, miugconsultations@mi.mun.ca, ashlee.cunsolo@mun.ca, ipercy@grenfell.mun.ca

Dear colleagues,

Three proposals from Mathematics and Statistics are attached for consultation. In summary, they are:

Math 1001 - revision of Calculus II course to include applications to differential equations and probability

Math 4133 - change of prerequisites to improve course accessibility and transparency of the calendar description

Math 4180/Phys 4205 - change of prerequisites to improve course accessibility and transparency of the calendar description

Please send your feedback to mathconsult@mun.ca by Friday, June 17.

Best,
Graham



Math1001.pdf



Math4133.pdf



Math4180_Phys
4205.pdf

Dr. Graham Cox (he/him)
Assistant Professor
Deputy Head (Undergraduate)
Department of Mathematics and Statistics
Memorial University of Newfoundland and Labrador

From: Engineering Consult engrconsult@mun.ca
Subject: Re: Proposals from Math & Stats for consultation
Date: June 16, 2022 at 11:14 AM
To: Math Consult mathconsult@mun.ca



Hi,

The Faculty of Engineering and Applied Science CUGS has the following comments:

1. MATH 1001: FEAS CUGS are supportive of the proposed changes, more emphasis on ODE will be beneficial for engineering students.
2. MATH 4133: FEAS will have no impact due to the proposed changes.
3. MATH 4180: Fluid Mechanics courses are offered in four engineering departments, namely, CIVIL, Mechanical, Ocean & Naval, and Process Engineering. FEAS CUGS would request credit restrictions for one or more of the courses offered in engineering. This is specifically important for ONAE students who can do a minor in Mathematics. Engineering CUGS would be happy to provide further details about the courses offered in engineering if the Department of Mathematics considers the proposed credit restrictions.

Thanks,

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

On 2022-05-18 08:32, Math Consult wrote:

Dear colleagues,
Three proposals from Mathematics and Statistics are attached for consultation. In summary, they are:
Math 1001 - revision of Calculus II course to include applications to differential equations and probability
Math 4133 - change of prerequisites to improve course accessibility and transparency of the calendar description
Math 4180/Phys 4205 - change of prerequisites to improve course accessibility and transparency of the calendar description
Please send your feedback to mathconsult@mun.ca by Friday, June 17, Best,
Graham
Dr. Graham Cox (he/him)
Assistant Professor
Deputy Head (Undergraduate)
Department of Mathematics and Statistics
Memorial University of Newfoundland and Labrador

From: HKR Dean hkrdean@mun.ca
Subject: Re: Proposals from Math & Stats for consultation
Date: May 24, 2022 at 1:27 PM
To: Math Consult mathconsult@mun.ca



Hello Graham,

Thank you for the opportunity to review. HKR has reviewed and has no concerns or comments.

Anne-Marie

Anne-Marie Sullivan (she/her), PhD, CTRS
Interim Dean, School of Human Kinetics & Recreation
Memorial University, St. John's, NL, A1S 5S7
(p) 709-864-8129; (e) hkrdean@mun.ca

We acknowledge that the lands on which Memorial University's campuses are situated are in the traditional territories of diverse Indigenous groups, and we acknowledge with respect the diverse histories and cultures of the Beothuk, Mi'kmaq, Innu, and Inuit of this province.

From: Math Consult <mathconsult@mun.ca>
Date: Wednesday, May 18, 2022 at 8:32 AM
To: Faculty of Humanities and Social Sciences <hss@mun.ca>, "Oldford, Erin" <eoldford@mun.ca>, "Furey, Edith" <efurey@mun.ca>, "engrconsult@mun.ca" <engrconsult@mun.ca>, HKR Dean <hkrdean@mun.ca>, "deanofmedicine@med.mun.ca" <deanofmedicine@med.mun.ca>, Karen Bulmer <kbulmer@mun.ca>, DeanNurse <DeanNurse@mun.ca>, "pharminfo@mun.ca" <pharminfo@mun.ca>, Dean of Science <deansci@mun.ca>, adeanugradswk <adeanugradswk@mun.ca>, Library Correspondence <univlib@mun.ca>, "ssedean@grenfell.mun.ca" <ssedean@grenfell.mun.ca>, "thennessey@grenfell.mun.ca" <thennessey@grenfell.mun.ca>, "miugconsultations@mi.mun.ca" <miugconsultations@mi.mun.ca>, Ashlee Cunsolo <ashlee.cunsolo@mun.ca>, "ipericy@grenfell.mun.ca" <ipericy@grenfell.mun.ca>
Subject: Proposals from Math & Stats for consultation

Dear colleagues,

Three proposals from Mathematics and Statistics are attached for consultation. In summary, they are:

Math 1001 - revision of Calculus II course to include applications to differential equations and probability

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Math 4180/Phys 4205 - change of prerequisites to improve course accessibility and transparency of the calendar description

Please send your feedback to mathconsult@mun.ca by Friday, June 17.

From: medvicedean medvicedean@mun.ca
Subject: Re: Proposals from Math & Stats for consultation
Date: May 25, 2022 at 11:02 AM
To: mathconsult@mun.ca
Cc: DeanofMedicine@med.mun.ca



Hi I have reviewed and have no concerns with the proposed course revisions wrt the Faculty of Medicine. Thx Dolores

Dolores M McKeen MD FRCPC MSc CCPE
Vice Dean | Education & Faculty Affairs
Professor | Memorial University of Newfoundland
President | Canadian Anesthesiologists' Society
@dolores_mckeen

Faculty of Medicine

Memorial University of Newfoundland
Faculty of Medicine Building | Rm 2M315
300 Prince Philip Drive
St. John's NL CA A1B 3V6
T: 709 864 6417 | F: 709 864 6336

From: Math Consult <mathconsult@mun.ca>
Date: May 18, 2022 at 8:31:58 AM NDT
To: hss@mun.ca, eoldford@mun.ca, efurey@mun.ca, engrconsult@mun.ca, hkrdean@mun.ca, "Steele, Dr. Margaret: Dean of Medicine" <DeanofMedicine@med.mun.ca>, kbulmer@mun.ca, deanNurse@mun.ca, pharminfo@mun.ca, deansci@mun.ca, adeanugradswk@mun.ca, univlib@mun.ca, ssedean@grenfell.mun.ca, thennessey@grenfell.mun.ca, miugconsultations@mi.mun.ca, "Cunsolo, Ashlee" <ashlee.cunsolo@mun.ca>, ipercy@grenfell.mun.ca
Subject: Proposals from Math & Stats for consultation

Dear colleagues,

Three proposals from Mathematics and Statistics are attached for consultation. In summary, they are:

Math 1001 - revision of Calculus II course to include applications to differential equations and probability

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Math 4180/Phys 4205 - change of prerequisites to improve course accessibility and transparency of the calendar description

Please send your feedback to mathconsult@mun.ca by Friday, June 17.

Best,
Graham

From: Davis,Erin emdavis@mun.ca 
Subject: FW: Proposals from Math & Stats for consultation
Date: May 25, 2022 at 2:08 PM
To: mathconsult@mun.ca



Hi Graham,

Thank you for the opportunity to review the proposed changes. We do not believe these changes will impact pharmacy and therefore have no concerns.

Thanks,
Erin

--

Erin Davis, BSc(Pharm), PharmD

Associate Professor | School of Pharmacy
Associate Dean, Undergraduate | School of Pharmacy
Chair, Committee on Undergraduate Studies | School of Pharmacy
Clinical Assistant Professor | Faculty of Medicine, Discipline of Family Medicine

Memorial University of Newfoundland and Labrador
School of Pharmacy
Health Sciences Centre
300 Prince Phillip Dr. | Rm H3443
St. John's NL | A1B 3V6

T 709 864 8815 | F 709 864 6941

From: Math Consult [<mailto:mathconsult@mun.ca>]

Sent: Wednesday, May 18, 2022 8:32 AM

To: Faculty of Humanities and Social Sciences <hss@mun.ca>; Oldford, Erin <eoldford@mun.ca>; Furey, Edith <efurey@mun.ca>; engrconsult@mun.ca; HKR Dean <hkrdean@mun.ca>; deanofmedicine@med.mun.ca; Karen Bulmer <kbulmer@mun.ca>; DeanNurse <DeanNurse@mun.ca>; pharminfo@mun.ca; Dean of Science <deansci@mun.ca>; adeanugradswk <adeanugradswk@mun.ca>; Library Correspondence <univlib@mun.ca>; ssedean@grenfell.mun.ca; thennessey@grenfell.mun.ca; miugconsultations@mi.mun.ca; Ashlee Cunsolo <ashlee.cunsolo@mun.ca>; ipercy@grenfell.mun.ca

Subject: Proposals from Math & Stats for consultation

Dear colleagues,

Three proposals from Mathematics and Statistics are attached for consultation. In summary, they are:

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Math 4133 - change of prerequisites to improve course accessibility and transparency of the calendar description

Math 4180/Phys 4205 - change of prerequisites to improve course accessibility and transparency of the calendar description

From: Deputy Head, Department of Psychology psychdeputyhead@mun.ca
Subject: Re: FW: Proposals from Math & Stats for consultation
Date: June 2, 2022 at 3:46 PM
To: Dean of Science deansci@mun.ca, mathconsult@mun.ca



Hi Graham-

Psychology supports these proposed changes.

Best,
Carolyn

On 2022-06-02 14:26, Dean of Science wrote:

Hello everyone.
Please review the email below and attachments. This email was received in mid-May and my apologies for my oversight in not sending it on to you.
Gail

--

Carolyn Walsh, PhD (she/her)
Associate Professor
Deputy Head, Psychology
Memorial University
St. John's, NL,
A1B 3X9
phone: 709-864-4738
fax: 709-864-2430
e-mail: psychdeputyhead@mun.ca

We acknowledge that the lands on which Memorial University's campuses are situated are in the traditional territories of diverse Indigenous groups, and we acknowledge with respect the diverse histories and cultures of the Beothuk, Mi'kmaq, Innu, and Inuit of this province.

From: Milley, Rebecca rmilley@grenfell.mun.ca
Subject: Proposals from Math & Stats
Date: June 8, 2022 at 10:18 AM
To: mathconsult@mun.ca



Feedback from the Computational Mathematics unit (School of Science and the Environment) at Grenfell Campus:

We agree with the proposed changes to Math 1001 and will adopt the same. The proposed calendar change can also be updated in the Grenfell section of the calendar, although please note that the Grenfell entry would need "LH: 1.5" at the bottom.

We have no objection to the other proposed changes.

Rebecca Milley, PhD
Chair, Computational Mathematics
Grenfell Campus, Memorial University of Newfoundland
Corner Brook, NL, Canada
(709) 639-2596 AS 3011

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s): Math 1001 Calculus II
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

By signing below, you are confirming that the attached Calendar changes have obtained all necessary Faculty/School approvals, and that the costs, if any, associated with these changes can be met from within the existing budget allocation or authorized new funding for the appropriate academic unit.

Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland

Undergraduate Calendar Change Proposal Form

Senate Summary Page for Courses

COURSE NUMBER AND TITLE

Math 1001 Calculus II

RATIONALE

The math department is currently reviewing its calculus sequence, which has been largely unchanged since the 1990s. The proposed changes to Math 1001 are motivated by two main goals. First, we want to show students that integration is an important tool with real-world applications, not just a collection of techniques and formulas to learn for the final exam. Second, we want students to be exposed to differential equations earlier in the calculus sequence. While this will be beneficial to all students, it is particularly important to those for whom Math 1001 will be their final math course, as they otherwise might not be exposed to this important topic.

We have accomplished this by removing some of the more involved integration techniques, and reduced the number of lectures on volumes of revolution. This allows us to add two lectures on probability (as an application of integration) and five lectures on ordinary differential equations. Further motivation and a detailed syllabus can be found in the attached document.

CALENDAR CHANGES

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, and improper integrals and first order differential equations. Applications include: exponential growth and decay, areas between curves, and volumes of solids of revolution, probability functions and modelling with differential equations.

PR: MATH 1000 or the former MATH 1081

CALENDAR ENTRY AFTER CHANGES

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, improper integrals and first order differential equations. Applications include: area between curves, volumes of solids of revolution, probability functions and modelling with differential equations.

PR: MATH 1000 or the former MATH 1081

SECONDARY CALENDAR CHANGES

Grenfell Campus 13.21 Mathematics and Statistics

MATH 1001 Calculus II is an introduction to integral calculus, including Riemann sums and the Fundamental Theorem of Calculus, techniques of integration, improper integrals and first order differential equations. Applications include: area between curves, volumes of solids of revolution, probability functions and modelling with differential equations.

LH: 1.5

PR: MATH 1000 or the former MATH 1081

Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

Academic Unit	Response Received
Humanities and Social Sciences	
Business Administration	
Education	
Engineering and Applied Science	Yes
Human Kinetics and Recreation	Yes
Marine Institute	
Medicine	Yes
Music	
Nursing	
Pharmacy	Yes
Science	
Biochemistry	
Biology	

Academic Unit	Response Received
Computer Science	
Earth Sciences	
Mathematics and Statistics	
Ocean Sciences	
Physics and Physical Oceanography	
Psychology	Yes
Social Work	
Library	
Grenfell - Arts and Social Science	
Grenfell - Science and the Environment	Yes
Grenfell - Fine Arts	
Labrador Institute	

LIBRARY REPORT

RESOURCE IMPLICATIONS

None

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- Amended or deleted course(s): Math 4133 Numerical Optimization
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

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Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland

Undergraduate Calendar Change Proposal Form

Senate Summary Page for Courses

COURSE NUMBER AND TITLE

Math 4133 Numerical Optimization

RATIONALE

The current prerequisites for this course (Math 4131 and 4132) have not been offered in several decades, and are not expected to be offered in the near future. This means every student who takes this course needs a prerequisite waiver. In order to make the course more accessible and make the requirements more transparent, we propose changing the prerequisites to Math 3132 Numerical Analysis I, as this course (and its prerequisites) cover all of the material needed for success in Math 4133.

CALENDAR CHANGES

4133 Numerical Optimization is numerical methods for functions of one variable, for functions of several variables including unrestricted search, sequential uniform search, irregular search, non-gradient methods, gradient methods with and without constraints, geometric programming, selection of other topics from dynamic programming, integer programming, etc., solution of applied problems by numerical optimization.

PR: ~~MATH 4131, 4132~~, MATH 3132

CALENDAR ENTRY AFTER CHANGES

4133 Numerical Optimization is numerical methods for functions of one variable, for functions of several variables including unrestricted search, sequential uniform search, irregular search, non-gradient methods, gradient methods with and without constraints, geometric programming, selection of other topics from dynamic programming, integer programming, etc., solution of applied problems by numerical optimization.

PR: MATH 3132

Memorial University of Newfoundland

Undergraduate Calendar Change Proposal Form Appendix Page

CONSULTATIONS SOUGHT

Academic Unit	Response Received
Humanities and Social Sciences	
Business Administration	
Education	
Engineering and Applied Science	Yes
Human Kinetics and Recreation	Yes
Marine Institute	
Medicine	Yes
Music	
Nursing	
Pharmacy	Yes
Science	
Biochemistry	
Biology	

Academic Unit	Response Received
Computer Science	
Earth Sciences	
Mathematics and Statistics	
Ocean Sciences	
Physics and Physical Oceanography	
Psychology	Yes
Social Work	
Library	
Grenfell - Arts and Social Science	
Grenfell - Science and the Environment	Yes
Grenfell - Fine Arts	
Labrador Institute	

LIBRARY REPORT**RESOURCE IMPLICATIONS**

None

Memorial University of Newfoundland Undergraduate Calendar Change Proposal Form Cover Page

LIST OF CHANGES

Indicate the Calendar change(s) being proposed by checking and completing as appropriate:

- New course(s):
- X Amended or deleted course(s): Math 4180 Introduction to Fluid Mechanics
- New program(s):
- Amended or deleted program(s):
- New, amended or deleted Glossary of Terms Used in the Calendar entries
- New, amended or deleted Admission/Readmission to the University (Undergraduate) regulations
- New, amended or deleted General Academic Regulations (Undergraduate)
- New, amended or deleted Faculty, School or Departmental regulations
- Other:

ADMINISTRATIVE AUTHORIZATION

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Signature of Dean/Vice-President: _____

Date: _____

Date of approval by Faculty/Academic Council: _____

Memorial University of Newfoundland

Undergraduate Calendar Change Proposal Form

Senate Summary Page for Courses

COURSE NUMBER AND TITLE

Math 4180 Introduction to Fluid Mechanics

RATIONALE

The current prerequisites for Math 4180 (Physics 3220 and Math 4160) are overly restrictive, and limit the course to a very narrow audience. We propose modifying these prerequisites to Math 2260 and 3202, as these cover all of the mathematical skills needed to enter Math 4180, namely ordinary differential equations and vector calculus. Historically about half the students in Math 4180 did not satisfy the current prerequisites, but were waived into the course and performed satisfactorily. Eliminating unnecessary prerequisites will make the course accessible to a broader group of students. In addition, this will increase transparency in the calendar description and reduce administrative burden by removing the need to grant waivers to approximately half of the students in the course. Based on feedback from Engineering, we have also added a credit restriction with ONAE 4020 (Marine Fluid Dynamics), as their program allows for a minor in Mathematics.

CALENDAR CHANGES

4180 Introduction to Fluid Dynamics (same as Physics 4205) covers basic observations, mass conservation, vorticity, stress, hydrostatics, rate of strain, momentum conservation (Navier-Stokes equation), simple viscous and inviscid flows, Reynolds number, boundary layers, Bernoulli's and Kelvin's theorems, potential flows, water waves, thermodynamics.

CR: Physics 4205, ONAE 4020

PR: ~~Physics 3220 and either MATH 4160 or the former Physics 3821~~, MATH 2260 (or the former MATH 3260) and 3202

CALENDAR ENTRY AFTER CHANGES

MATH 4180 Introduction to Fluid Dynamics (same as Physics 4205) covers basic observations, mass conservation, vorticity, stress, hydrostatics, rate of strain, momentum conservation (Navier-Stokes equation), simple viscous and inviscid flows, Reynolds number, boundary layers, Bernoulli's and Kelvin's theorems, potential flows, water waves, thermodynamics.

CR: Physics 4205, ONAE 4020

PR: MATH 2260 (or the former MATH 3260) and 3202

SECONDARY CALENDAR CHANGES

PHYS 4205 Introduction to Fluid Dynamics (same as Mathematics 4180) covers basic observations, mass conservation, vorticity, stress, hydrostatics, rate of strain, momentum conservation (Navier-Stokes equation), simple viscous and inviscid flows, Reynolds number, boundary layers, Bernoulli's and Kelvin's theorems, potential flows, water waves, thermodynamics.

CR: Mathematics 4180, ONAE 4020

PR: ~~PHYS 3220 and either Mathematics 4160 or the former PHYS 3821 or waiver approved by the instructor,~~ Mathematics 2260 (or the former Mathematics 3260) and Mathematics 3202

ONAE 4020 Marine Fluid Dynamics (same as the former ENGI 4020) includes fluid statics; fluid flow phenomena, in general and in marine applications; control volume analysis of fluid motion; conservation of mass, momentum and energy; differential approach to flow analysis; head losses; applications of conservation laws; external vs. internal flow; dimensional analysis and scaling; fluid-structure interaction concepts; potential flow theory, lift and Kutta-Joukowski theorem; viscous flow, boundary layers and drag.

CR: the former ENGI 4020, Mathematics 4180, Physics 4205

LH: at least four 3-hour sessions per semester

OR: tutorial 1 hour per week

PR: ONAE 3054 or the former ENGI 3054

**Memorial University of Newfoundland
Undergraduate Calendar Change Proposal Form
Appendix Page**

CONSULTATIONS SOUGHT

Academic Unit	Response Received
Humanities and Social Sciences	
Business Administration	
Education	
Engineering and Applied Science	Yes
Human Kinetics and Recreation	Yes
Marine Institute	
Medicine	Yes

Academic Unit	Response Received
Music	
Nursing	
Pharmacy	Yes
Science	
Biochemistry	
Biology	
Computer Science	
Earth Sciences	
Mathematics and Statistics	
Ocean Sciences	
Physics and Physical Oceanography	
Psychology	Yes
Social Work	
Library	
Grenfell - Arts and Social Science	
Grenfell - Science and the Environment	Yes

Academic Unit	Response Received
Grenfell - Fine Arts	
Labrador Institute	

LIBRARY REPORT

RESOURCE IMPLICATIONS

None

Department of Biology Graduate Studies Calendar Change Proposal

Proposal

Currently, the Department of Biology only allows two members of a graduate student's Supervisory Committee to serve on the Comprehensive Examination Committee. We propose to change this to allow up to three members of a Supervisory Committee to serve on the Comprehensive Examination Committee.

We also propose some cleaning up of the Comprehensive Examination description for the Department of Biology.

Rationale

The Department of Biology consists of faculty members with diverse areas of expertise, including Microbiology, Botany, Plant Physiology, Evolutionary Genetics, Marine Biology and Conservation Ecology, among others. As such, the current regulation of only allowing up to two members of a student's Supervisory Committee (including the supervisor) to serve on the Comprehensive Examination Committee can make it very difficult to find examiners with the appropriate expertise in the subject area of an examination. The proposed change will provide greater flexibility in selecting Examination Committee members with suitable subject area knowledge to ensure that a student undergoes a fair and thorough examination.

Updates to the Comprehensive Examination description are also proposed in order to improve the clarity of the description and to match the description of the examination process with the current departmental guidelines.

PROPOSED CALENDAR CHANGES

43.4.1 Program of Study

9. Comprehensive Examination
 - a. Timing of Examination
 - i. Timing of the comprehensive examination shall follow General Regulation, 1. under **Comprehensive Examination, Ph.D. Comprehensive Examination** governing the Degree of Doctor of Philosophy. A student registered in a full-time Ph.D. program in the Faculty of Science, Department of Biology shall normally take the comprehensive examination during the first year of the program, and no later than one year after completion of the prescribed courses.
 - ii. The procedure shall be initiated by the student's Supervisor who will notify the Department of Biology, in writing, of the student's readiness. Failure to meet the above requirement can result in the student being required to withdraw from the program.
 - b. Examination Committee

The Examination Committee shall be appointed by the Dean of Graduate Studies on the recommendation of the Department of Biology according to Regulation **Comprehensive Examinations, Ph.D. Comprehensive Examination**, 2. of the **General Regulations** of the School of Graduate Studies. ~~No more than two~~ Up to three members of the Examination Committee may be members of the student's Supervisory Committee. The committee shall meet and recommend to the Department in writing an examination ~~seminar~~ topic within the student's previously determined subdiscipline(s).
 - c. Examination Procedure

The Department shall provide the student the examination date and ~~the seminar~~ topic in writing ~~not more than six nor less than four~~ seven weeks prior to the examination. The student shall provide each member of the Examination Committee a written paper on the ~~seminar~~ topic ~~one week~~ two weeks prior to the examination. The Examination Committee will have one week to determine if the paper is of sufficient merit to allow the oral component of the exam to proceed. At the beginning of the examination, the student will give an oral presentation on the examination topic. The Examination Committee shall evaluate the student's presentation and response to questions put to the student during the Oral Examination both on the examination topic ~~seminar~~ and within the student's subdiscipline(s) of Biology.
 - d. Subsequent Action

The Examination Committee will meet in camera to arrive at its conclusions. The Chair shall report the results of the Examination to the Head and the Dean of Graduate Studies for transmission to the student. The report will include one of the following decisions: a) the student passed or failed. b) if failed and it is the first examination whether the student may be re-examined.
 - e. Re-examination

Comprehensive Re-examination if permitted will occur not sooner than one month and not more than six months after the first. The student and the Supervisory Committee shall be informed of the deficiencies found. The format for the second examination will be determined by the Examination Committee with the approval of the Biology Graduate Studies Committee. The student will be informed of the topic and format ~~four to six~~ seven weeks prior to the examination. The examination will follow the procedure outlined in ~~89~~.c and d. above. A failure will require the student to withdraw from the program.

CALENDAR ENTRY AFTER CHANGES

9. Comprehensive Examination
 - a. Timing of Examination
 - i. Timing of the comprehensive examination shall follow General Regulation, 1. under **Comprehensive Examination, Ph.D Comprehensive Examination** governing the Degree of Doctor of Philosophy. A student registered in a full-time Ph.D. program in the Faculty of Science, Department of Biology shall normally take the comprehensive examination during the first year of the program, and no later than one year after completion of the prescribed courses.
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 - b. Examination Committee

The Examination Committee shall be appointed by the Dean of Graduate Studies on the recommendation of the Department of Biology according to Regulation **Comprehensive Examinations, Ph.D. Comprehensive Examination**, 2. of the **General Regulations** of the School of Graduate Studies. Up to three members of the Examination Committee may be members of the student's Supervisory Committee. The committee shall meet and recommend to the Department in writing an examination topic within the student's previously determined subdiscipline(s).
 - c. Examination Procedure

The Department shall provide the student the examination date and topic in writing seven weeks prior to the examination. The student shall provide each member of the Examination Committee a written paper on the topic two weeks prior to the examination. The Examination Committee will have one week to determine if the paper is of sufficient merit to allow the oral component of the exam to proceed. At the beginning of the examination, the student will give an oral presentation on the examination topic. The Examination Committee shall evaluate the student's presentation and response to questions put to the student during the Oral Examination both on the examination topic and within the student's subdiscipline(s) of Biology.
 - d. Subsequent Action

The Examination Committee will meet in camera to arrive at its conclusions. The Chair shall report the results of the Examination to the Head and the Dean of Graduate Studies for transmission to the student. The report will include one of the following decisions: a) the student passed or failed. b) if failed and it is the first examination whether the student may be re-examined.
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Department of Psychology

Memorial University of Newfoundland
 Science Building Room 2065
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Date: November 3, 2022

TO: School of Graduate Studies

FR: Department of Psychology

RE: Proposed Calendar Changes to Remove the GRE from the Admissions Process for the Psy.D. Program and Update Language

Our department has decided to remove the GRE as an application requirement for the Psy.D. program. To fully accomplish this, we need to make some calendar changes to section 44.2.3, which describes the admission process for the Psy.D. and specifically refers to the GRE. This proposed calendar change will eliminate this reference to the GRE. We are also taking the opportunity to update some of the language describing this process (e.g., we are allowing for interviews to happen virtually).

In the space below, we detail the necessary changes to the calendar, both in a marked version and a clean version with the changes incorporated.

Marked Calendar changes:

44.2 Admission Criteria

1. Students with Master's level degrees who wish to be considered for the program must have completed the undergraduate degree in Psychology and the undergraduate course requirements described below.
2. Applicants are required to have an undergraduate Honours degree in psychology that includes an Honour's thesis as well as courses in each of the following areas:
 - a. abnormal psychology
 - b. cognition
 - c. developmental psychology
 - d. history and systems
 - e. learning theory
 - f. neuroscience
 - g. research design
 - h. social psychology
 - i. statistics
3. Admission to the program is competitive. Applicants will be ranked according to academic aptitude, personal and interpersonal competence, clinical and professional potential, and availability of a supervisor. The application shall include academic transcripts, ~~results of the Graduate Record Examination (verbal, quantitative and analytical subtests)~~, three letters of recommendation and a statement of interests and objectives. One letter of recommendation must specifically address the suitability of the applicant for clinical work. Applicants who are short-listed will be interviewed, either in person or ~~via telephone~~ virtually. Work experience, research experience, extra-curricular activities, and clinically relevant ~~public service~~ experience will be taken into consideration.

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Clean Version:

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