



**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, March 15, at 1:00 p.m. by WebEx and in-person (Room: C- 2045).

**AGENDA**

- 1. Regrets**
- 2. Adoption of the Minutes of December 6, 2022**
- 3. Business Arising from the Minutes**
- 4. Correspondence:** No Correspondence
- 5. Reports of Standing Committees:**
  - A. Undergraduate Studies Committee:** No business
  - B. Graduate Studies Committee:**

Presented by Alison Leitch, Chair, Graduate Studies Committee

    - a. Faculty of Medicine – Calendar Change - secondary changes for Biology (re; cross listing of courses), Paper 5.B.a. (pages 6-52)
    - b. Science Interdisciplinary Programs – Master’s of Data Science – Calendar Changes - DSCI 6659 and DSCI 6619 are the DSCI designations for STAT 6559 and STAT 6519, DSCI 6650 is the new, graduate version of MATH 4650, with which it will be run concurrently, Paper 5.B.b. (pages 53-60)
  - C. Library Committee:** No business
- 6. Reports of Delegates from Other Councils:** No report
- 7. Report of the Dean:** No report
- 8. Question Period**
- 9. Adjournment**

A handwritten signature in black ink, appearing to read "Travis Fridgen".

Travis Fridgen, Ph.D.  
Acting Dean of Science



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# FACULTY OF SCIENCE FACULTY COUNCIL OF SCIENCE Minutes of Meeting of December 6, 2022

A meeting of the Faculty Council of the Faculty of Science was held on Wednesday, December 6, 2022, at 1:00 p.m. using a hybrid model of Webex and in-person (C-2045).

## FSC 2992 Present

### **Biochemistry**

M. Berry, V. Booth, R. Bertolo, R. Brown, J. Brunton, S. Cheema, S. Christian, Z. Farahnak, M. Codner, S. Harding, D. Hunt, S. Mayengbam, M. Mulligan, J. Park, F. Shahidi, A. Todd, K. Wilson

### **Biology**

D. Bignell, A. Chaulk, S. Dawe, E. Edinger

### **Chemistry**

C. Bottaro, L. Cahill, H. Grover, k. Jobst, M. Katz, F. Kerton, C. Kozak, S. Pansare, B. Power, H. Reader, N. Ryan, S. Smith, J. Stockmann, H. Therien-Aubin

### **Computer Science**

S. Anthony, A. Fiech, M. Hatcher, C. Hyde, T. Tricco

### **Earth Sciences**

H. Corlett, G. Dunning, A. Langille, A. Leitch, M. Miskell, P. Morrill, K. Welford

### **Mathematics & Statistics**

I. Booth, D. Dyer, C. Evans, D. Harvey, A. Hatefi, R. Haynes, J.C. Loredó-Osti, T. Sheel, S. Sullivan, M. Strong, A. Variyath, Y. Yilmaz-Cigsar

### **Ocean Sciences**

I. Fleming, P. Gagnon, M. Rise

### **Physics & Physical Oceanography**

D. Coombs, E. Hayden, J. LeBlanc, L. Men, H. Neilson, L. O'Brien, K. Poduska, I. Siaka-Voivod, K. Shorlin, A. Yethiraj, S. Walling, L. Zedel,

### **Psychology**

A. Brown, D. Hallett, C. Hyde, G. Sherren, A. Swift-Gallant, C. Thorpe, C. Walsh

**Registrar's Office**

T. Edmunds

**Dean of Science Office**

J. Blundell, J. Bowering, C. Hussey, S. Dufour, K. Foss, J. Major, T. Fridgen, G. Jackson, J. Kavanagh, R. Newhook, T. Mackenzie, K. White

**Student Representatives:**

E. Dormody, W. Kinden, G. Sherren

**FSC 2993      Regrets:**

**FSC 2994      Adoption of Minutes**

**Moved:** Minutes of the meeting of November 16, 2022, be adopted. (Berry/Power)  
**Carried.**

**FSC 2995      Business Arising:** None

**FSC 2996      Correspondence:** None

**FSC 2997      Reports of Standing Committees:**

**A.      Undergraduate Studies Committee:**

Presented by Shannon Sullivan, Chair, Undergraduate Studies Committee

- a. Department of Biology – Calendar Changes, New Course – Biology 4720, (Sullivan/Katz) **Carried.**
- b. Department of Biology – Calendar Changes, Amend Course – Biology 4306, (Sullivan/Berry) **Carried.**
- c. Department of Biology – Calendar Changes, Amend Courses- Biology 3750 and 4701, (Sullivan/Booth) **Carried.**
- d. Department of Biology – Calendar Changes, Amend Courses - Biology 3710, 3711, 3714, and 3715, (Sullivan/Booth) **Carried.**  
Minor change to OSC section, BIOL should be spelled out
- e. Department of Biology – Calendar Changes Amend Courses - Biology 4650/GEOG 4650, (Sullivan/Harding) **Carried.**  
Minor changes – in the calendar change entry, the old course number should be struck-out, the other field (OR) does not appear and is should be clear as to whether it should be deleted, appear with strike-through or kept, appear as is.
- f. Department of Biology – Calendar Changes, Amend Courses - Biology 4651, (Sullivan/Berry) **Carried.**
- g. Department of Biology – Calendar Changes, Amend Course – Biology 3710, (Sullivan/Gagnon) **Carried.**  
Remove references about OSC 2000

- h. Department of Biology – Calendar Changes, Amend Program Regulations – Major and Honours in Biology and Joint Majors Marine Biology, (Sullivan/Berry) **Carried.**
  - i. Department of Mathematics and Statistics - Calendar Changes, New Course – Statistics 1500, (Sullivan/ Loredo-Osti) **Carried.**
  - j. Department of Mathematics and Statistics - Calendar Changes, New Course – Statistics 4504, (Sullivan/ Loredo-Osti) **Carried.**
  - k. Department of Mathematics and Statistics - Calendar Changes, Amend Course- Mathematics 2260, (Sullivan/ Loredo-Osti) **Carried.**
  - l. Department of Psychology – Calendar Changes, Amend Programs - 11.11.2, 11.11.4, and 11.11.6, (Sullivan/Blundell) **Carried.**
  - m. Department of Psychology – Calendar Changes, Amend Programs, - 10.2.10, (Sullivan/Blundell) **Carried.**
  - n. Department of Psychology – Calendar Changes, Amend Course Psychology 4910, (Sullivan/Blundell) **Carried.**
  - o. Department of Psychology – Calendar Changes, Amend Course Psychology 3810, (Sullivan/Blundell) **Carried.**
  - p. Department of Computer Science – Calendar Changes, New Course – Computer Science 3730, (Sullivan/Hatcher) **Carried.**
  - q. Department of Earth Sciences – Calendar Changes, Amend Courses – Earth Sciences 4171, 4173, 4179, (Sullivan/Morrill) **Carried.**
  - r. Department of Earth Sciences - New Course – Earth Sciences 2100, (Sullivan/Morrill) **Carried.**
  - s. Department of Physics – Calendar Changes, Amend Course – Physics 2750, (Sullivan/Saika-Voivod) **Carried.**
  - t. Department of Chemistry – Calendar Changes, New Course – Chemistry 4432, (Sullivan/Katz) **Carried.**
  - u. Department of Ocean Sciences – Calendar Changes, Amended programs (s): Majors/Honours in Ocean Sciences and Joint Major/Honours in Marine Biology, (Sullivan/Dufour) **Carried.**
  - v. Department of Ocean Sciences – Calendar Changes, Amend Course – Ocean Sciences 3600, (Sullivan/Dufour) **Carried.**
  - w. Department of Ocean Sciences – Calendar Changes, Amend Course – Ocean Sciences 2000, (Sullivan/Dufour) **Carried.**
  - x. Department of Ocean Sciences – Calendar Changes, Amend Courses – Ocean Sciences 4910, 4920, 4921, 4940, (Sullivan/Dufour) **Carried.**
  - y. Department of Biochemistry – Calendar Changes, New Program - BSc in Human Biosciences, (Sullivan/Berry) **Carried.**
- B. Graduate Studies Committee: No Business**
- C. Library Committee: No business.**

**FSC 2999**     **Report of the Dean:** None

**FSC 3000**     **Question Period:** None

**FSC 3001**     **Adjournment**  
Meeting adjourned at 1:55 pm.

Good morning:

Kindly find attached the following agenda items for the next ACE meeting. All of the following items were *approved* at Faculty Council (Faculty of Medicine) on Tuesday, December 20<sup>th</sup>, 2022:

1. **Graduate Courses** - Cancer & Development graduate course changes/updates:
  - MED6590 (existing course revision) *Imaging and Spectroscopy for Biomedical Science*
  - MED6591 (existing course revision) *Current Approaches to Biomedical Research*
  - MED6578 (new regular course) *Gross Anatomy I*
  - MED6579 (new regular course) *Gross Anatomy II – Offered over Special Timeframe (winter and spring)*

**Rationale for MED6579 to be offered over a special timeframe:**

Dr. Andronowski is a new faculty member with the Division of BioMedical Sciences, Faculty of Medicine. Dr. Andronowski currently teaches gross anatomy (lectures and labs) to undergraduate medical students. Currently, there are no graduate course offerings appropriately reflecting her research area of forensic anthropology which requires a sound knowledge of human anatomy. These specialized courses in Gross Anatomy will not require any additional resources as they are already a part of the Medical School curriculum. Gross Anatomy I is offered in the fall term while Gross Anatomy II content is distributed across the winter and spring terms, in alignment with the undergraduate anatomy lectures schedule. The Gross Anatomy graduate courses have unique requirements for graduate program course credit.

The Gross Anatomy I & II courses were offered in 2021-22 as Special topics courses with low enrolment based on anatomy resources and pandemic restrictions at the time; however, it is anticipated these courses in Gross Anatomy for graduate students will be attractive to a larger cohorts of students in the future (Anthropology students, for example). Subsequently, the anatomy courses are being converted to regular courses in the academic calendar and included in the list of courses that serve the degree requirements for the BioScience of Health and Disease graduate programs (MSc and PhD).

**2. Calendar Changes**

- Cancer & Development program proposed program name change to **Bioscience of Health and Disease** with respective calendar description updates for the program (MSc, PhD) and the course offerings.
- Human Genetics & Genomics program – minor calendar edits with reference to updated courses MED6590 and MED6591 course changes.

**Rationale** for Cancer & Development graduate course changes, calendar changes and proposed program name change is to reflect the expanded faculty membership and expertise in the faculty group that support these graduate programs (MSc and PhD).

\*\*\*\*\*

Thank you!

Rhonda

*On behalf of Dr. Ann Dorward, Associate Dean of Graduate Studies (Medicine)*

**RHONDA ROEBOTHAM | ACADEMIC PROGRAM ADMINISTRATOR**

Office of Research and Graduate Studies | Faculty of Medicine  
Memorial University | Faculty of Medicine Building  
Suite 2M409 | St. John's, Newfoundland  
T 709 864 6307 | [rgs.thesis@med.mun.ca](mailto:rgs.thesis@med.mun.ca)  
[www.med.mun.ca/](http://www.med.mun.ca/)



SCHOOL OF  
GRADUATE STUDIES

# Request for Approval of a Graduate Course

*Adobe Reader, minimum version 8, is required to complete this form.* Download the latest version: <http://get.adobe.com/reader>. (1) Save the form by clicking on the diskette icon on the upper left side of the screen; (2) Ensure that you are saving the file in PDF format; (3) Specify where you would like to save the file, e.g. Desktop; (4) Review the [How to create and insert a digital signature](#) webpage for step by step instructions; (5) Fill in the required data and save the file; (6) Send the completed form by email to: [sgs@mun.ca](mailto:sgs@mun.ca).

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

**Course No.:** Med 6590

**Course Title:** Imaging and spectroscopy for biomedical science

**I. To be completed for all requests:**

**A. Course Type:**     Lecture course     Lecture course with laboratory  
                                Laboratory course     Undergraduate course<sup>1</sup>  
                                Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**     Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**     Yes     No

**E. Credit hours for this course:** 3

**F. Course description (please attach course outline and reading list):**

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests		
Assignments		70
Other (specify):		
Final examination:	30	
<b>Total</b>	<b>100</b>	

<sup>1</sup> Must specify the additional work at the graduate level

II. To be completed for special/selected topics course requests only

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

- |  |                              |
|--|------------------------------|
|  | <b>Instructor's initials</b> |
| 1. duplication of thesis work              | EJK<br>_____                 |
| 2. double credit                           | EJK<br>_____                 |
| 3. work that is a faculty research product | EJK<br>_____                 |
| 4. overlap with existing courses           | EJK<br>_____                 |

Recommended for offering in the                      Fall                      **Winter**                      Spring                      2023

Length of session if less than a semester:

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

\_\_\_\_\_  
Course instructor 

22 10 05  
\_\_\_\_\_  
Date

\_\_\_\_\_  
RGS approval, Associate Dean of Graduate Studies (Medicine) 

8 November 2022  
\_\_\_\_\_  
Date

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

*Tracy Osmond*  
\_\_\_\_\_  
Secretary, Faculty Council (Medicine)

December 20, 2022  
\_\_\_\_\_  
Date

**Course Name: Med 6590. Imaging and spectroscopy for biomedical science**

This course is intended for Biologists and Physicists who require grounding in non-invasive measurement using radiation (em and acoustic). The course will explore the principles of acquiring data using the techniques as well as the features and limitations of that data.

The course organizer is Professor E. Kendall. Guest instructors may deliver some of the material.

Evaluation: 70% of marks will be obtained from assignments, 30% of marks will be obtained from the end of course assessment. This will be multiple choice or short answer and consist of 30 questions. The assigned reading list will be provided at the first lecture.

**Outline:**

1. Introduction.
  - a. Objectives, definitions
  - b. General image characteristics
2. X-rays
  - a. Production/Interactions
  - b. Detection
  - c. Planar Imaging
  - d. Computed tomography
  - e. Synchrotron imaging techniques
    - i. Phase contrast imaging
    - ii. Diffraction enhanced imaging
  - f. Dosimetry
3. Ultrasound:
  - a. Properties and production
  - b. Detection
  - c. Applications
4. MRI/MRS:
  - a. Phenomenon
  - b. Origins of contrast
  - c. Instrumentation
  - d. Applications
5. Nuclear Imaging
  - a. Tracers
  - b. Planar Imaging
  - c. SPECT, SPECT/CT
  - d. PET PET/CT
  - e. Radio-pharmaceuticals
  - f. Image Quality
  - g. Dosimetry
6. Signal processing/ analysis:
  - a. Noise reduction
  - b. Feature extraction
  - c. AI applications

Please note each time the course is delivered the emphasis provided each topic will be based on student interest as surveyed in the first class.

**Reference texts.**

Review of Radiologic Physics 4th Ed by Walter Huda

Medical Imaging Physics 4th Ed. by William Hendee and Russell Ritenour

The Essential Physics of Medical Imaging 3rd Ed Jerrold Bushberg, Anthony Seibert, Edwin Leidholdt, John Boone.

Physics in Nuclear Medicine 4th Ed. Simon Cherry, James Sorenson, Michael Phelps

An introduction to synchrotron radiation: techniques and applications. 2nd ed. Philip Willmott 2019



SCHOOL OF  
GRADUATE STUDIES

## Request for Approval of a Graduate Course

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

(this submission reflects major edits  
to an existing course offering)

Course No.: MED6591 (cross-listed BIOL6591)

Course Title: Current approaches to biomedical research (formerly Molecular biology II)

I. To be completed for all requests:

A. Course Type:     Lecture course     Lecture course with laboratory  
                            Laboratory course     Undergraduate course<sup>1</sup>  
                            Directed readings     Other (please specify)

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

C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?     Yes     No  
 If yes, please specify:

D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?     Yes     No

E. Credit hours for this course: 3 credit hours

F. Course description (please attach course outline and reading list):  
please see attached

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests		
Assignments	100%	
Other (specify):		
Final examination:		

Total 100%

<sup>1</sup> Must specify the additional work at the graduate level

II. To be completed for special/selected topics course requests only

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

- |  |                       |
|--|-----------------------|
|  | Instructor's initials |
| 1. duplication of thesis work              | <u>AD JB</u>          |
| 2. double credit                           | <u>AD JB</u>          |
| 3. work that is a faculty research product | <u>AD JB</u>          |
| 4. overlap with existing courses           | <u>AD JB</u>          |

Recommended for offering in the                      Fall                      Winter                      Spring                      20 23

Length of session if less than a semester:

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

*Thomas Belbin* *[Signature]*  
**Ann Dorward**      Digitally signed by Ann Dorward  
 Date: 2022.10.19 15:55:58 -02'30'

October 19, 2022

Course instructor

Date



8 November 2022

Approval of the head of the academic unit

Date

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

*Tracy Osmond*  
 Secretary, Faculty/School/Council

December 20, 2022

Date

Fall offering

**MED6591****Current approaches to biomedical research**

The purpose of this graduate course is to review current methods in biomedicine and apply this information through individual, weekly assignments. Subject areas include:

- Informatics (Introduction to R and Bioconductor)
- Imaging and microscopy
- Gene expression assays
- DNA sequencing technologies
- Genome editing strategies
- Protein detection assays
- Methods for cellular signaling
- Animal models in biomedical research
- Stem cells
- Common biostatistical approaches for biomedical data

**Assessment:** Ten session assignments (10 x 10% = 100%)

**Location and Timing:** Faculty of Medicine seminar room. In-person lectures will be offered Tuesday afternoons, 2 -5 pm, Fall semester.

**D2L course shell MED6591**

Class announcements, course materials & assignments will made accessible via D2L/ Brightspace.

Please direct content questions to the relevant instructor (see course schedule). General questions are directed to the course co-chairs. Please contact the co-chairs if you are unable to attend class in-person.

**Email Contact List:**

Instructor	Email
Dr. Ann Dorward (Course co-chair)	<a href="mailto:ann.dorward@mun.ca">ann.dorward@mun.ca</a>
Dr. Thomas Belbin (Course co-chair)	<a href="mailto:tbelbin@mun.ca">tbelbin@mun.ca</a>
Dr. Touati Benoukraf	<a href="mailto:tbenoukraf@mun.ca">tbenoukraf@mun.ca</a>
Dr. Jessica Esseltine	<a href="mailto:jesseltine@med.mun.ca">jesseltine@med.mun.ca</a>
Dr. Curtis French	<a href="mailto:curtis.french@med.mun.ca">curtis.french@med.mun.ca</a>
Dr. Zhiwei Gao	<a href="mailto:zgao@mun.ca">zgao@mun.ca</a>
Dr. Ken Kao	<a href="mailto:kkao@mun.ca">kkao@mun.ca</a>
Dr. Michael Leitges	<a href="mailto:mleitges@mun.ca">mleitges@mun.ca</a>
Dr. Matthew Parsons	<a href="mailto:Matthew.Parsons@med.mun.ca">Matthew.Parsons@med.mun.ca</a>

## MED/BIOL 6591 - Syllabus, Schedule and Assessment Plan

Session #	Session Title	Instructor(s)	Session format and assessment (value %)	Session Objectives
1	Course Introduction/ Assessment overview	Dr. Tom Belbin Dr. Ann Dorward	Discussion and infrastructure tour	<ul style="list-style-type: none"> <li>• Introduction to the course &amp; assessment strategy</li> <li>• Review of scientific resources with Dr. Patricia Cousins</li> </ul>
2	Protein detection methods	Dr. Ken Kao	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>• Review basic protein structure and synthesis</li> <li>• Review antibodies and utility to study proteins</li> <li>• Review methods to identify proteins and protein interactions</li> </ul>
3	Cellular signaling pathways	Dr. Michael Leitges	lecture, individual student presentations & discussion (10%)	<ul style="list-style-type: none"> <li>• Review of the driver mechanisms of cell signaling pathways</li> <li>• Overview of methods to analyze cell signaling pathways</li> </ul>
4	Animal models in biomedical research	Dr. Ann Dorward	lecture, individual student presentations & discussion (10%)	<ul style="list-style-type: none"> <li>• Compare and contrast the common organisms used in biomedical research;</li> <li>• Benefits and limitations of animal models - gene x gene interactions, gene x environment interactions; sex-specific analyses, complex disorders (physiological perturbations vs. protein mutations)</li> <li>• Nobel prize in Physiology or Medicine reviews</li> </ul>

## MED/BIOL 6591 - Syllabus, Schedule and Assessment Plan

5	CRISPR genome editing (theory)	Dr. Curtis French	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>History of gene editing techniques</li> <li>CRISPR mechanism; use in animal models; high impact articles</li> <li>Genetic compensation due to CRISPR editing (Genetic “buffering”)</li> </ul>
6	Practical skills with CRISPR genome editing	Dr. Curtis French	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>Review the IDT CRISPR design website</li> <li>Optimal CRISPR targeting</li> <li>Protein blast to identify functional domains</li> <li>Use of NCBI primerBLAST for primer design</li> <li>Methods to detect INDELS (T7 endonuclease assay, sanger sequencing, high resolution melt analysis)</li> <li>Methods to assess the functional consequence of your induced INDEL (qPCR, western, cell base reporter assays)</li> </ul>
7	Induced pluripotent stem cell (iPSC) technology	Dr. Jessica Esseltine	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>Understand the distinctions between embryonic stem cells and iPSCs</li> <li>Discuss molecular strategies for development of iPSCs</li> <li>Review clinical applications of iPSC development</li> </ul>
8	Imaging techniques/ Biophotonics	Dr. Matthew Parsons	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>Advantages &amp; disadvantages of a variety of commonly-used imaging techniques</li> <li>Imaging technique selection</li> <li>Learn how researchers are using light to manipulate biological systems</li> <li>Learn basic operations in ImageJ (or FIJI) freeware</li> </ul>

## MED/BIOL 6591 - Syllabus, Schedule and Assessment Plan

9	Common data formats and analysis strategies in biomedicine	Dr. Zhiwei Gao	lecture (no assignment)	<ul style="list-style-type: none"> <li>• Study design and data collection</li> <li>• Experimental vs. Non-experimental study designs</li> <li>• Confounder &amp; modifier effects</li> <li>• Descriptive statistics</li> <li>• Common statistical methods</li> </ul>
10	Gene expression analysis	Dr. Tom Belbin	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>• Understand the regulation of gene expression, including transcription, posttranslational control and translation</li> <li>• Understand different experimental approaches to study gene expression</li> <li>• Whole transcriptome analysis using RNA-seq</li> <li>• Analyzing RNA-seq data using Galaxy</li> <li>• Visualizing differentially expressed gene sets</li> </ul>
11	DNA sequencing technologies	Dr. Touati Benoukraf	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>• Describe the major sequencing methods currently used in research and clinical settings</li> <li>• Understand the assets and limits of current sequencing technologies</li> <li>• Understand the basic steps of sequencing data analysis</li> </ul>
12	Introduction to "R" and Bioconductor	Dr. Tom Belbin	lecture with assignment (10%)	<ul style="list-style-type: none"> <li>• Introduction to R</li> <li>• Basic R functions, graphics and packages, with applications</li> <li>• Reporting results using R markdown documents with the knitr package</li> <li>• The Bioconductor suite of packages for analysis of genomic data</li> <li>• Genomic ranges and summarized experiments</li> </ul>



## Request for Approval of a Graduate Course

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

**Course No.:** MED 6578

**Course Title:** Human Gross Anatomy I

**I. To be completed for all requests:**

**A. Course Type:**     Lecture course     Lecture course with laboratory  
                            Laboratory course     Undergraduate course<sup>1</sup>  
                            Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**     Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**     Yes     No

**E. Credit hours for this course:** 3

**F. Course description (please attach course outline and reading list):**  
 Please see attached course syllabus and assessment plan.

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests	44	
Assignments		28
Other (specify): Teaching preparations, lab professionalism	28	
Final examination:	N/A	

**Total 100**

<sup>1</sup> Must specify the additional work at the graduate level

**II. To be completed for special/selected topics course requests only**

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

- |  |                              |
|--|------------------------------|
|  | <b>Instructor's initials</b> |
| 1. duplication of thesis work              | JMA<br>_____                 |
| 2. double credit                           | JMA<br>_____                 |
| 3. work that is a faculty research product | JMA<br>_____                 |
| 4. overlap with existing courses           | JMA<br>_____                 |

Recommended for offering in the Fall Winter Spring 2023

Length of session if less than a semester: N/A

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

  
\_\_\_\_\_  
Course instructor

10/12/2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Approval of the head of the academic unit

8 November 2022  
\_\_\_\_\_  
Date

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

*Tracy Osmond*  
\_\_\_\_\_  
Secretary, Faculty/School/Council

December 20, 2022  
\_\_\_\_\_  
Date

# HUMAN GROSS ANATOMY I

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

**UGME Anatomy Content Lead/Head Instructor:** Janna M. Andronowski, Ph.D.

**Department:** Division of BioMedical Sciences

**Contact information:** E-mail: [jandronowski@mun.ca](mailto:jandronowski@mun.ca)

**Course Overview:** Anatomy is at the core of all medical practice and is an important component in biomedical research and applications. Human Gross Anatomy I will provide advanced graduate students with in-depth anatomical training and teaching preparation for future instruction in the anatomical sciences. Skeletal form and function, often subjects of analysis in biological anthropology and biomedical sciences, cannot be fully interpreted and understood without the context of the soft tissues – from muscles and ligaments to blood vessels and organs – that surround and interact with the bones. Using cadaver-based dissection, students experience the best method by which to learn about the structures of the human body, their integration, and variation among humans.

Anatomy will be taught *regionally* (not by systems) in this course. For example, when students learn the anatomy of the thorax, they will study all of the visceral (e.g., heart and lungs), vascular (arteries and veins), nervous (sensory, motor, and special function), lymphatic (thoracic duct), and muscular (e.g., intercostalis, serratus) structures in that region. They will be expected, however, to integrate knowledge of one compartment of the body with other regions; nerves originating in the brain, for example, affect structures in the neck, the thorax, and the abdomen.



## **Required Textbooks & Online Resources:**

**Principal Textbook:** Moore KL, Dalley AF, Agur AMR. 2014. Clinically Oriented Anatomy. Seventh edition. Baltimore: Lippincott Williams & Wilkins. ISBN: 978-1451119459.

**Virtual Dissector:** Complete Anatomy 2021. One-year student license can be purchased here: <https://3d4medical.com/student>

## **Recommended Atlas:**

**Anatomical Atlas:** Gilroy, Anne M. 2016. Atlas of Anatomy. Third edition. New York: Thieme Medical Publishers, Inc. ISBN: 9781626232525.

## **Course Objectives:**

- 1) Gain knowledge of human anatomical structures, their location in the body, and their spatial/functional relationships
- 2) Develop an appreciation for variation in anatomical structures among humans
- 3) Learn the fine dissection skills necessary to identify, isolate, and preserve the delicate structures encountered throughout the course
- 4) Learn how to integrate this anatomical knowledge with clinical and research applications
- 5) Gain experience preparing anatomy-related teaching materials including lectures and cadaver presentations

**Course Structure:** The content will be divided into two sequential courses – Human Gross Anatomy I (Fall offering) and Human Gross Anatomy II (Winter & Spring offering), with two primary components comprising the courses: lectures and dissection labs. The courses are geared towards graduate students in

the BioMedical Sciences stream. In Human Gross Anatomy I, students will attend each of the human anatomy lecture and lab sessions with the Undergraduate Medical Education (UGME) in Phase I. Topics of lectures will focus on the thorax and abdomen regions and include general anatomy, functional anatomy, aspects of human growth and development, and clinical applications.

Laboratories will provide students with the best opportunity to have practical experience with the anatomy by using prosected cadavers, wet and plastinated specimens, bones, diagrams, virtual resources (e.g., Anatomage table), and models to understand the physical arrangement of the structures that we discuss in lecture. Specific instructions regarding the lab and policy for dissecting can be viewed in the attached Laboratory and Dissection Safety Guidelines.

**Enrollment Cap:** The course is capped at the discretion of Dr. Andronowski.

**Assessment:** There are five proposed forms of evaluation during the courses: lecture written exams, laboratory practical exams, an oral laboratory presentation, and preparations for future anatomy teaching.

Lecture Written Exams: There will be two written lecture exams. These exams will be full-length tests that cover sections of the course divided thematically and regionally (e.g., Thorax and Abdomen). All lecture exams will cover material from the principal textbook (Moore et al.) and lectures supplementing the textbook. Question forms on these exams will be short answer, fill-in-the-blank, identification (using anatomical illustrations), true false, multiple choice, and some matching.

Laboratory Practical Exams: One laboratory practical exam will occur that corresponds to the two primary anatomical themes forming the core of this unit – the Thorax and Abdomen. The lab practical exam will be conducted as a series of timed stations at which models, bones, plastinated specimens, and cadavers will be pinned.

Laboratory Oral Presentations: Once during the term, students will be asked to provide a Laboratory Oral Presentation on a completed cadaver dissection. Example guidelines for the content that must be covered during these presentations can found in the attached Laboratory Safety and Human Cadaveric Dissection Guidelines (pp. 72-77) document along with prepared dissector annotations.

Lab Professionalism: A ‘Lab Professionalism’ grade will be assigned which includes respectful treatment of the human cadavers, responsibility/accountability of actions, punctuality, working with others (teamwork), and lecture/lab attendance.

Preparations for Future Anatomy Teaching: Students will be required to 1) show teaching acumen by preparing and presenting a formal anatomy lecture on a content area of their choice, and 2) prepare a detailed cadaveric dissection for presentation to learners in Phase I.

Below are the assessments for the course:

Assessment Name	Assessment Date	Assessment Type	Points Assigned	% of Grade
Thorax & Abdomen Lab Practical	TBD	Exam	24	18
Thorax & Abdomen Content Exam	TBD	Exam	120	26
Lab Presentation	TBD	Oral Presentation	60	18
Lab Professionalism	TBD	Other	25	8
Teaching Preparations	TBD	Other	190	30
		<b>Total</b>	<b>419</b>	<b>100</b>

There are a total of 419 points available in the course. You must take all of the assessments, and no curve will be applied to the grades. Exams are not cumulative in the strictest sense, though you will need to recall anatomy from other regions throughout the body in each subsequent exam to answer certain questions.

The grade scale is:

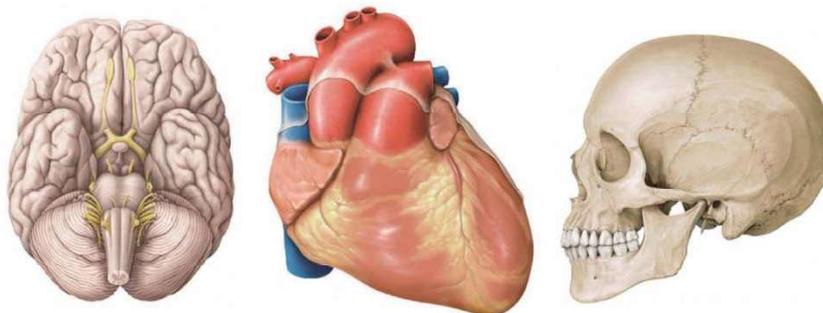
Letter Grade	Percent Grade	Points
A	92-100%	384-419
A <sup>-</sup>	88-91	365-383
B <sup>+</sup>	82-87	340-364
B	76-81	317-339
B <sup>-</sup>	70-75	293-316
C <sup>+</sup>	65-69	271-292
C	60-64	248-270
C <sup>-</sup>	55-59	231-247
D	50-54	211-230
F	<50	<210
<b>FINAL GRADES ARE NOT NEGOTIABLE</b>		

**Academic Honesty:** For this course, specific examples of academic dishonesty include (but are not limited to): Using notes/online resources for exams/quizzes and text messaging/talking on the phone with other students in the course during scheduled exams.

***Cheating of any form or improper treatment of the cadavers will absolutely not be tolerated.*** You may be removed from the course at Dr. Andronowski's discretion if any violation of the laboratory guidelines or academic honesty guidelines are violated. **If you cheat, you will be putting your entire degree in jeopardy. You are also guaranteed to lose all of Dr. Andronowski's trust and greatly disappoint her. Do not cheat.**

**Diversity and Inclusion:** It is my goal to create a learning environment for students that supports a diversity of thoughts, perspectives, and experiences, and honors your identities (e.g., race, gender, class, sexuality, ability, etc.). To help accomplish this: 1) Please let the instructors/class know your chosen name and pronouns, 2) If you feel your performance in the course is being impacted by experiences or circumstances outside of class, please do not hesitate to talk to me and the other instructors – I want to be a resource for you, 3) If something was said in class/lab (by anyone) that made you feel uncomfortable, please talk to us about it.

**Tips for getting the most out of this course:** Any course on human anatomy is challenging but rewarding. Many of you are taking this course in preparation for a professional career in which some anatomical knowledge will be essential. Even if you are not taking this for professional reasons, knowledge of your anatomy has long-term practical use. *So, remember that you are not learning this information for the exam, but for the rest of your life, professional or otherwise.*





## Request for Approval of a Graduate Course

*Adobe Reader, minimum version 8, is required to complete this form.* Download the latest version: <http://get.adobe.com/reader>. (1) Save the form by clicking on the diskette icon on the upper left side of the screen; (2) Ensure that you are saving the file in PDF format; (3) Specify where you would like to save the file, e.g. Desktop; (4) Review the [How to create and insert a digital signature](#) webpage for step by step instructions; (5) Fill in the required data and save the file; (6) Send the completed form by email to: [sgs@mun.ca](mailto:sgs@mun.ca).

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

**Course No.:** MED 6579

**Course Title:** Human Gross Anatomy II

### I. To be completed for all requests:

**A. Course Type:**     Lecture course     Lecture course with laboratory  
                                Laboratory course     Undergraduate course<sup>1</sup>  
                                Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**     Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**     Yes     No

**E. Credit hours for this course:** 3

**F. Course description (please attach course outline and reading list):**  
 Please see attached course syllabus and assessment plan.

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests	84	
Assignments		10
Other (specify): Lab professionalism	6	
Final examination:	N/A	
<b>Total</b>		<b>100</b>

<sup>1</sup> Must specify the additional work at the graduate level

**II. To be completed for special/selected topics course requests only**

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

- |  |                              |
|--|------------------------------|
|  | <b>Instructor's initials</b> |
| 1. duplication of thesis work              | JMA<br>_____                 |
| 2. double credit                           | JMA<br>_____                 |
| 3. work that is a faculty research product | JMA<br>_____                 |
| 4. overlap with existing courses           | JMA<br>_____                 |

Recommended for offering in the                      Fall                      **Winter**                      **Spring**                      20 24

Length of session if less than a semester: **N/A**

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

  
\_\_\_\_\_  
Course instructor

10/12/2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Approval of the head of the academic unit

8 November 2022  
\_\_\_\_\_  
Date

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

*Tracy Osmond*  
\_\_\_\_\_  
Secretary, Faculty/School/Council

December 20, 2022  
\_\_\_\_\_  
Date

# HUMAN GROSS ANATOMY II

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

**UGME Anatomy Content Lead/Head Instructor:** Janna M. Andronowski, Ph.D.

**Course Dates:** Winter – Spring (Special Time Frame)

**Department:** Division of BioMedical Sciences

**Contact information:** E-mail: [jandronowski@mun.ca](mailto:jandronowski@mun.ca)

**Course Overview:** Anatomy is at the core of all medical practice and is an important component in biomedical research and applications. Human Gross Anatomy II will provide advanced graduate students with in-depth anatomical training. Skeletal form and function, often subjects of analysis in biological anthropology and biomedical sciences, cannot be fully interpreted and understood without the context of the soft tissues – from muscles and ligaments to blood vessels and organs – that surround and interact with the bones. Using cadaver-based dissection, students experience the best method by which to learn about the structures of the human body, their integration, and variation among humans.

Anatomy will be taught *regionally* (not by systems) in this two-part course. For example, when students learn the anatomy of the thorax, they will study all of the visceral (e.g., heart and lungs), vascular (arteries and veins), nervous (sensory, motor, and special function), lymphatic (thoracic duct), and muscular (e.g., intercostalis, serratus) structures in that region. They will be expected, however, to integrate knowledge of one compartment of the body with other regions; nerves originating in the brain, for example, affect structures in the neck, the thorax, and the abdomen.



## **Required Textbooks & Online Resources:**

**Principal Textbook:** Moore KL, Dalley AF, Agur AMR. 2014. Clinically Oriented Anatomy. Seventh edition. Baltimore: Lippincott Williams & Wilkins. ISBN: 978-1451119459.

**Virtual Dissector:** Complete Anatomy 2021. One-year student license can be purchased here: <https://3d4medical.com/student>

## **Recommended Atlas:**

**Anatomical Atlas:** Gilroy, Anne M. 2016. Atlas of Anatomy. Third edition. New York: Thieme Medical Publishers, Inc. ISBN: 9781626232525.

## **Course Objectives:**

- 1) Gain knowledge of human anatomical structures, their location in the body, and their spatial/functional relationships
- 2) Develop an appreciation for variation in anatomical structures among humans
- 3) Learn the fine dissection skills necessary to identify, isolate, and preserve the delicate structures encountered throughout the course
- 4) Learn how to integrate this anatomical knowledge with clinical and research applications

**Course Structure:** The content will be divided into two sequential courses – Human Gross Anatomy I (Fall) and Human Gross Anatomy II (Winter & Spring), with two primary components comprising the courses: lectures and dissection labs. The courses are geared towards graduate students in the BioMedical Sciences stream. In Human Anatomy II, students will attend each of the human anatomy lecture and lab sessions with the Undergraduate Medical Education (UGME) in Phase II. Topics of lectures will focus on:

1) pelvis & perineum, 2) musculoskeletal system (MSK), and 3) head & neck. Topical foci will include general anatomy, functional anatomy, aspects of human growth and development, and clinical applications.

Laboratories will provide students with the best opportunity to have practical experience with the anatomy by using prosected cadavers, wet and plastinated specimens, bones, diagrams, virtual resources (e.g., Anatomage table), and models to understand the physical arrangement of the structures that we discuss in lecture. Specific instructions regarding the lab and policy for dissecting can be viewed in the attached Laboratory and Dissection Safety Guidelines. The lecture and laboratory content hours broken down by term are as follows:

Term	Lecture Hours	Lab Hours
Winter	12	18
Spring	6	18

**Enrollment Cap:** The course is capped at the discretion of Dr. Andronowski.

**Assessment:** There are four proposed forms of evaluation during the courses: lecture written exams, laboratory practical exams, and an oral laboratory presentation.

**Lecture Written Exams:** There will be three written lecture exams. These exams will be full-length tests that cover sections of the course divided thematically and regionally (e.g., pelvis & perineum, MSK, head & neck). All lecture exams will cover material from the principal textbook (Moore et al.) and lectures supplementing the textbook. Question forms on these exams will be short answer, fill-in-the-blank, identification (using anatomical illustrations), true false, multiple choice, and some matching.

**Laboratory Practical Exams:** Three laboratory practical exams will occur that correspond to the primary anatomical themes: 1) Pelvis and Perineum, 2) MSK, and 3) Head and Neck. Lab practical exams will be conducted as a series of timed stations at which models, bones, plastinated specimens, and cadavers will be pinned. Exams will not be cumulative in the strictest sense, though students will need to recall anatomy from other regions throughout the body in each subsequent exam in order to answer some questions.

**Laboratory Oral Presentations:** Once during the course, students will be asked to provide a Laboratory Oral Presentation on a completed cadaver dissection. Example guidelines for the content that must be covered during these presentations can be found in the attached Laboratory Safety and Human Cadaveric Dissection Guidelines (pp. 72-77) document along with prepared dissector annotations.

**Lab Professionalism:** A 'Lab Professionalism' grade will be assigned which includes respectful treatment of the human cadavers, responsibility/accountability of actions, punctuality, working with others (teamwork), and lecture/lab attendance. Below are the assessments for the course:

Assessment Name	Assessment Type	Points Assigned	% of Grade
Pelvis & Perineum Lab Practical	Exam	50	10
Pelvis & Perineum Lecture Exam	Exam	60	12
MSK Lab Practical	Exam	50	10
MSK Lecture Exam	Exam	100	21
Head & Neck Lab Practical	Exam	50	10
Head & Neck Lecture Exam	Exam	100	21
Lab Presentation	Oral Presentation	50	10
Lab Professionalism	Other	25	6
<b>Total</b>		485	100

November 3, 2022 – Calendar changes with mark up

### **38 Regulations Governing the Degree of Master of Science in Medicine**

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
- [www.med.mun.ca](http://www.med.mun.ca)
- [www.mun.ca/become/graduate/apply/app\\_deadlines.php](http://www.mun.ca/become/graduate/apply/app_deadlines.php)

The Faculty of Medicine offers the degree of Master of Science in Medicine in eight program areas: Applied Health Services Research, ~~Cancer and Development~~ Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics and Genomics, Immunology and Infectious Diseases, and Neurosciences. The Faculty of Medicine also offers the degrees of Master of Health Ethics and Master of Public Health. Each program area has a Co-ordinator/Principal who is responsible for communicating the interests of the programs to the Faculty of Medicine Graduate Studies Committee and participates in the admission of graduate students into the program in Medicine.

#### **38.1.3.2 ~~Cancer and Development~~ Bioscience of Health and Disease**

The graduate program in ~~Cancer and Development~~ Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including ~~viral oncogenesis, growth factors, and oncogenes in developmental models, programmed cell death and drug resistance.~~ cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.

##### **1. Qualifications for Admission**

The admission requirements are as given under the [General Regulations](#) governing Master's degrees. All courses in the program have as a prerequisite, successful completion of an undergraduate degree B.Sc.

##### **2. Program Requirements**

All M.Sc. students are required to attend, for credit, and participate in the ~~Cancer and Development Journal Club~~ Bioscience of Health and Disease Seminar Series (MED 6400, 6401, 6402, and 6403). One other graduate course (chosen from MED 6578, 6579, 6580, 6590, or 6591, 6340, 6341, or 6342) is required for M.Sc. Medicine students although other courses may also be required in individual cases.

November 3, 2022 – Calendar changes with mark up

### **38.1.3.6 Human Genetics & Genomics**

#### **1. Program Requirements**

1. Students will be required to complete a minimum of two graduate courses. Within the Human Genetics program the following courses are offered: Human Molecular Genetics (MED 6393), Human Population Genetics (MED 6390), Applied Human Genetics (MED 6392), Cancer Genetics (MED 6394), Genetic Epidemiology (MED 6395) and Selected Topics in Human Genetics (MED 6391). In addition, there are a number of courses in other graduate programs which could be suitable for some students in this program, including Epidemiology I (MED 6270), Molecular Biology of Cancer (MED 6580), ~~Molecular Biology I (MED 6590)~~ and ~~Molecular Biology II~~ Current Approaches to Biomedical Research (MED 6591). Course selection for each student is determined by the supervisory committee in consultation with the student and is based on the area of study and past course credits.

November 3, 2022 – Calendar changes with mark up

#### 43.29 Medicine

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
- [www.med.mun.ca](http://www.med.mun.ca)
- [www.mun.ca/become/graduate/apply/app\\_deadlines.php](http://www.mun.ca/become/graduate/apply/app_deadlines.php)

The Faculty of Medicine offers the degree of Doctor of Philosophy in seven program areas: ~~Cancer and Development~~, Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics, Immunology and Infectious Diseases and Neurosciences. Each program area has a Co-ordinator who is responsible for communicating the interests of the program to the Faculty of Medicine Graduate Studies Committee and participate in the admission of graduate students into the graduate program in Medicine. The Faculty of Medicine also offers the opportunity for students registered in the Doctor of Medicine (M.D.) program to obtain a Ph.D. in a combined and integrated M.D.-Ph.D. program.

##### 43.29.2.1 Program Areas

1. ~~Cancer and Development~~ Bioscience of Health and Disease
  - a) The graduate program in ~~Cancer and Development~~ Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including viral oncogenesis, growth factors, and oncogenes in developmental models, programmed cell death and drug resistance, cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.
  - b) Program Requirements: Students are required to participate in the ~~Cancer and Development~~ Bioscience of Health and Disease Ph.D. Seminar Series (MED 6410, 6411, 6412, and 6413). Other courses may be recommended for individual programs of study.

November 3, 2022 – Calendar changes with mark up

### 38.2.3 Graduate Courses

6030-6050 Special Topics  
 6070 Seminars in Physiological Instrumentation  
 6075 Human Physiology, Performance and Safety in Extreme Environments (HSPE)  
 6090-6101 Special Topics  
 6102 Critical Theory in Health and Society  
 6103-6119 Special Topics  
 6127 Immunology I  
 6128 Immunology II  
 613A/B Advanced Immunological Methods (*same as the former 6130*)  
 6131-6139 Special Topics  
 6140 Basic Cardiovascular and Renal Physiology  
 6141 Cardiovascular/Renal Techniques  
 6142 Selected Topics in Cardiovascular and Renal Physiology  
 6143 Cardiovascular Anatomy  
 6144 Current Concepts in Cardiovascular and Renal Pathophysiology  
 6150 Principles of Scholarly Writing for Rural Doctors (may be delivered outside the regular semester timeframe)  
 6151 Principles of Research for Rural Doctors (may be delivered outside the regular semester timeframe)  
 6180 Structure, Function and Pharmacology of Muscle  
 6190 General Pharmacology  
 6192 Pharmacology of Receptors and Receptor Effector Coupling Processes  
 6193 Advanced Topics in Neuroscience  
 6194 Advanced Topics in Physiology  
 6195 Neurobiology of Nervous System Diseases  
 6196 Systems Neuroscience  
 6197 Cellular Neuroscience  
 6198 Neuroanatomy for Graduate Students (accelerated format)  
 6199 Health Sciences Writing  
 6200 Biostatistics I (*credit may be obtained for only one of MED 6200 or MED 6262*)  
 6220 Introduction to Community Health  
 6225 Health Inequities and the Social Determinants of Health  
 6226 Postcolonial Theory: Considering the “Other” in Science, Medicine and Bioethics  
 6250 Basic Clinical Epidemiology  
 6255 Clinical Research Design  
 6260 Applied Data Analysis for Clinical Epidemiology  
 6262 Biostatistics in Clinical Medicine (*credit may be obtained for only one of MED 6200 or MED 6262*)  
 6263 Conducting and Publishing Systematic Review and Meta-analysis  
 6265 Genetics and Clinical Epidemiology  
 6268 Patient Engagement in Health Research  
 6270 Epidemiology I  
 6274 Chronic Disease Epidemiology  
 6275 Epidemiology II

## November 3, 2022 – Calendar changes with mark up

- 6276 Current Topics in Canada's Health Care System
- 6277 Issues in Northern, Rural and Remote Health in Canada
- 6278 Advanced Biostatistics for Health Research
- 6279 Quantitative Methods for Applied Health Research
- 6280 Community Health Research Methods
- 6281 Theory and Approaches to Medical Publication
- 6282 Canadian Health Care System
- 6284 Research and Evaluation Design and Methods
- 6285 Introduction to Applied Health Services Research
- 6286 Ethical Foundations of Applied Health Research
- 6288 Policy and Decision Making
- 6290 Determinants of Health: Healthy Public Policy
- 6292 Qualitative and Quantitative Methods for Health Services Research
- 6293 Knowledge Transfer and Research Uptake
- 6294 Advanced Qualitative Methods
- 6295 Advanced Quantitative Methods
- 6296 Residency
- 6297 Theories of Social Justice in Health
- ~~6340 Research Topics in Cancer I~~
- ~~6341 Research Topics in Cancer II~~
- ~~6342 Basic Principles of the Pathology of Cancer~~
- 6390 Human Population Genetics
- 6391 Selected Topics in Human Genetics
- 6392 Applied Human Genetics
- 6393 Human Molecular Genetics
- 6394 Cancer Genetics
- 6395 Genetic Epidemiology
- 6400 Research Seminars for M.Sc. Students I (one-credit hour)
- 6401 Research Seminars for M.Sc. Students II (one-credit hour)
- 6402 Research Seminars for M.Sc. Students III (one-credit hour)
- 6403 Research Seminars for M.Sc. Students IV (one-credit hour)
- 6410 Research Seminars for Ph.D. Students I (one-credit hour)
- 6411 Research Seminars for Ph.D. Students II (one-credit hour)
- 6412 Research Seminars for Ph.D. Students III (one-credit hour)
- 6413 Research Seminars for Ph.D. Students IV (one-credit hour)
- 6420 Medical Science/Social Responsibility in Health Care: Aspects of Medical History  
(*same as History 6125*)
- 6578 Gross Anatomy I
- 6579 Gross Anatomy II
- 6580 Molecular Biology of Cancer (*prerequisites: Biology 4241, Biochemistry 4100 [or equivalent]*)
- 6590 Imaging and Spectroscopy for Biomedical Science Molecular Biology I (*cross-listed as Biology 6590 and credit restricted with Biochemistry 6590) prerequisites: Biology 4241 (or equivalent)*)

November 3, 2022 – Calendar changes with mark up

6591 Current Approaches to Biomedical Research ~~Molecular Biology II~~ (*cross-listed as Biology 6591 and credit restricted with the former Biochemistry 6591*) prerequisites: *Biology 4241 (or equivalent)*

6592 Practicing and Teaching Professionalism

6900 Medical Geography I - Introduction to Geographic Information Science and Spatial Analysis in Health

6901 Medical Geography II - Geospatial Analysis and Modelling in Health *prerequisite: 6900*

6950 Simulation & Technology-based Learning in the Health Professions

6951 Assessment and Evaluation in Health Professions Education (*cross-listed as Pharmacy 6951*)

6953 Current Perspectives and Advances in Medical Education

November 3, 2022 – clean copy of calendar changes for the C&D program

### **38 Regulations Governing the Degree of Master of Science in Medicine**

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
- [www.med.mun.ca](http://www.med.mun.ca)
- [www.mun.ca/become/graduate/apply/app\\_deadlines.php](http://www.mun.ca/become/graduate/apply/app_deadlines.php)

The Faculty of Medicine offers the degree of Master of Science in Medicine in eight program areas: Applied Health Services Research, Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics and Genomics, Immunology and Infectious Diseases, and Neurosciences. The Faculty of Medicine also offers the degrees of Master of Health Ethics and Master of Public Health. Each program area has a Coordinator/Principal who is responsible for communicating the interests of the programs to the Faculty of Medicine Graduate Studies Committee and participates in the admission of graduate students into the program in Medicine.

#### **38.1.3.2 Bioscience of Health and Disease**

The graduate program in Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.

##### **1. Qualifications for Admission**

The admission requirements are as given under the [General Regulations](#) governing Master's degrees. All courses in the program have as a prerequisite, successful completion of an undergraduate degree.

##### **2. Program Requirements**

All M.Sc. students are required to attend, for credit, and participate in the Bioscience of Health and Disease Seminar Series (MED 6400, 6401, 6402, and 6403). One other graduate course chosen from MED 6578, 6579, 6580, 6590, or 6591 is required, although other courses may also be required for individual cases.

November 3, 2022 – clean copy of calendar changes for the C&D program

### **38.1.3.6 Human Genetics & Genomics**

The graduate program in Human Genetics & Genomics provides opportunities to pursue academic studies and research in a number of key areas including Mendelian and complex traits with a variety of approaches including molecular genetics, genomics and other omics applications, animal models, bioinformatics, genetic epidemiology, and population genetics. Our research is interdisciplinary with unique opportunities to apply skills to work with regional genetic isolates, as well as other populations, to explore the genetic and non-genetic determinants of health and diseases of global significance. Faculty members from all three divisions of the Faculty of Medicine (BioMedical Sciences, Community Health and Humanities, and the Clinical Disciplines) participate in the program.

#### **1. Qualifications for Admission**

The admission requirements are as given under the General Regulations governing Master's degrees. Applicants with backgrounds in the fields of genetics, biochemistry and biology are preferred.

#### **2. Program Requirements**

1. Students will be required to complete a minimum of two graduate courses. Within the Human Genetics program the following courses are offered: Human Molecular Genetics (MED 6393), Human Population Genetics (MED 6390), Applied Human Genetics (MED 6392), Cancer Genetics (MED 6394), Genetic Epidemiology (MED 6395) and Selected Topics in Human Genetics (MED 6391). In addition, there are a number of courses in other graduate programs which could be suitable for some students in this program, including Epidemiology I (MED 6270), Molecular Biology of Cancer (MED 6580), and Current Approaches to Biomedical Research (MED 6591). Course selection for each student is determined by the supervisory committee in consultation with the student and is based on the area of study and past course credits.

November 3, 2022 – clean copy of calendar changes for the C&D program

### **43.29 Medicine**

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
- [www.med.mun.ca](http://www.med.mun.ca)
- [www.mun.ca/become/graduate/apply/app\\_deadlines.php](http://www.mun.ca/become/graduate/apply/app_deadlines.php)

The Faculty of Medicine offers the degree of Doctor of Philosophy in seven program areas: Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics, Immunology and Infectious Diseases and Neurosciences. Each program area has a Co-ordinator who is responsible for communicating the interests of the program to the Faculty of Medicine Graduate Studies Committee and participate in the admission of graduate students into the graduate program in Medicine. The Faculty of Medicine also offers the opportunity for students registered in the Doctor of Medicine (M.D.) program to obtain a Ph.D. in a combined and integrated M.D.-Ph.D. program.

#### **43.29.2.1 Program Areas**

##### **1. Bioscience of Health and Disease**

1. The graduate program in Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.
2. Program Requirements: Students are required to participate in the Bioscience of Health and Disease Ph.D. Seminar Series (MED 6410, 6411, 6412, and 6413). Other courses may be recommended for individual programs of study.

November 3, 2022 – clean copy of calendar changes for the C&D program

### 38.2.3 Graduate Courses

- 6030-6050 Special Topics
- 6070 Seminars in Physiological Instrumentation
- 6075 Human Physiology, Performance and Safety in Extreme Environments (HSPE)
- 6090-6101 Special Topics
- 6102 Critical Theory in Health and Society
- 6103-6119 Special Topics
- 6127 Immunology I
- 6128 Immunology II
- 613A/B Advanced Immunological Methods (*same as the former 6130*)
- 6131-6139 Special Topics
- 6140 Basic Cardiovascular and Renal Physiology
- 6141 Cardiovascular/Renal Techniques
- 6142 Selected Topics in Cardiovascular and Renal Physiology
- 6143 Cardiovascular Anatomy
- 6144 Current Concepts in Cardiovascular and Renal Pathophysiology
- 6150 Principles of Scholarly Writing for Rural Doctors (may be delivered outside the regular semester timeframe)
- 6151 Principles of Research for Rural Doctors (may be delivered outside the regular semester timeframe)
- 6180 Structure, Function and Pharmacology of Muscle
- 6190 General Pharmacology
- 6192 Pharmacology of Receptors and Receptor Effector Coupling Processes
- 6193 Advanced Topics in Neuroscience
- 6194 Advanced Topics in Physiology
- 6195 Neurobiology of Nervous System Diseases
- 6196 Systems Neuroscience
- 6197 Cellular Neuroscience
- 6198 Neuroanatomy for Graduate Students (accelerated format)
- 6199 Health Sciences Writing
- 6200 Biostatistics I (*credit may be obtained for only one of MED 6200 or MED 6262*)
- 6220 Introduction to Community Health
- 6225 Health Inequities and the Social Determinants of Health
- 6226 Postcolonial Theory: Considering the “Other” in Science, Medicine and Bioethics
- 6250 Basic Clinical Epidemiology
- 6255 Clinical Research Design
- 6260 Applied Data Analysis for Clinical Epidemiology
- 6262 Biostatistics in Clinical Medicine (*credit may be obtained for only one of MED 6200 or MED 6262*)
- 6263 Conducting and Publishing Systematic Review and Meta-analysis
- 6265 Genetics and Clinical Epidemiology
- 6268 Patient Engagement in Health Research
- 6270 Epidemiology I
- 6274 Chronic Disease Epidemiology
- 6275 Epidemiology II

November 3, 2022 – clean copy of calendar changes for the C&D program

- 6276 Current Topics in Canada's Health Care System
- 6277 Issues in Northern, Rural and Remote Health in Canada
- 6278 Advanced Biostatistics for Health Research
- 6279 Quantitative Methods for Applied Health Research
- 6280 Community Health Research Methods
- 6281 Theory and Approaches to Medical Publication
- 6282 Canadian Health Care System
- 6284 Research and Evaluation Design and Methods
- 6285 Introduction to Applied Health Services Research
- 6286 Ethical Foundations of Applied Health Research
- 6288 Policy and Decision Making
- 6290 Determinants of Health: Healthy Public Policy
- 6292 Qualitative and Quantitative Methods for Health Services Research
- 6293 Knowledge Transfer and Research Uptake
- 6294 Advanced Qualitative Methods
- 6295 Advanced Quantitative Methods
- 6296 Residency
- 6297 Theories of Social Justice in Health
- 6390 Human Population Genetics
- 6391 Selected Topics in Human Genetics
- 6392 Applied Human Genetics
- 6393 Human Molecular Genetics
- 6394 Cancer Genetics
- 6395 Genetic Epidemiology
- 6400 Research Seminars for M.Sc. Students I (one-credit hour)
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- 6410 Research Seminars for Ph.D. Students I (one-credit hour)
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- 6412 Research Seminars for Ph.D. Students III (one-credit hour)
- 6413 Research Seminars for Ph.D. Students IV (one-credit hour)
- 6420 Medical Science/Social Responsibility in Health Care: Aspects of Medical History  
(*same as History 6125*)
- 6578 Gross Anatomy I
- 6579 Gross Anatomy II
- 6580 Molecular Biology of Cancer
- 6590 Imaging and Spectroscopy for Biomedical Science
- 6591 Current Approaches to Biomedical Research
- 6592 Practicing and Teaching Professionalism
- 6900 Medical Geography I - Introduction to Geographic Information Science and Spatial Analysis in Health
- 6901 Medical Geography II - Geospatial Analysis and Modelling in Health *prerequisite: 6900*
- 6950 Simulation & Technology-based Learning in the Health Professions

November 3, 2022 – clean copy of calendar changes for the C&D program

- 6951 Assessment and Evaluation in Health Professions Education (*cross-listed as Pharmacy 6951*)
- 6953 Current Perspectives and Advances in Medical Education

Jan 6 2023, Biology Graduate Course listing \_Mark up

[BIOLOGY]

Rational: These are Biology course listing calendar changes, which are secondary changes to reflect that MED6590 is no longer cross-listed or credit-restricted with Biology 6590. However, MED6591 is still cross-listed and credit-restricted with BIOL6591.

Biology were aware of these changes and are copied on this message.

Thank you,  
Rhonda Roebotham  
*on behalf of Dr. Ann Dorward, Associate Dean, Graduate Studies (Medicine)*  
RGS

#### 43.4.2 Courses

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

- 6000 Research Topics in Microbiology
- 6052 Plant Pathology (*credit cannot be obtained if already received for Biology 4052*)
- 6131 Models in Biology (*credit cannot be obtained if already received for Biology 4607*)
- 6351 Behavioural Ecology and Sociobiology (*cross-listed as Psychology 6351*) *credit cannot be obtained if already received for Biology 4701*
- ~~6590 Molecular Biology I (cross-listed as Medicine 6590 and credit-restricted with Biochemistry 6590) prerequisites: Biology 4241 (or equivalent)~~
- 6591 Molecular Biology II Current Approaches to Biomedical Research (*cross-listed as Medicine 6591 and credit-restricted with the former Biochemistry 6591*) *prerequisites: Biology 4241 (or equivalent)*
- 6592 Bacterial Genetics (*credit-restricted with the former Biochemistry 6592*) *prerequisite: Biology 4241 (or equivalent)*
- 6593 Selected Readings in Molecular Biology (*credit-restricted with the former Biochemistry 6593*) *prerequisites or co-requisites: one of Biology, Biochemistry or Medicine 6590, and one of Biology 6591, Medicine 6591, or the former Biochemistry 6591 (or equivalent)*
- 6710 Marine Benthic Biology
- 7000 Graduate Core Seminar (*cross-listed as Ocean Science 7000*)
- 7101 Topics in Marine Biology
- 7201 Topics in Cellular and Molecular Biology and Physiology
- 7220 Quantitative Methods in Biology (*credit cannot be obtained if already received for Biology 4605*)
- 7300 Ornithology (*credit cannot be obtained if already received for Biology 4620*)
- 7301 Topics in Ecology and Conservation Biology
- 7530 The Molecular Biology of Development
- 7535 Research Methods in Marine Science

Jan 6 2023, Biology Graduate Course listing \_Mark up

- 7920-7960 Special Topics in Biology (*excluding Biology 7931*)
- 7931 Research Methods in Genetic Biotechnology (Note: Biology 7931 may be delivered in an accelerated format outside of the regular semester time frame)

Jan 6 2023, Biology Graduate Course listing \_Clean version

[BIOLOGY]

43.4.2 Courses

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

- 6000 Research Topics in Microbiology
- 6052 Plant Pathology (*credit cannot be obtained if already received for Biology 4052*)
- 6131 Models in Biology (*credit cannot be obtained if already received for Biology 4607*)
- 6351 Behavioural Ecology and Sociobiology (*cross-listed as Psychology 6351*) *credit cannot be obtained if already received for Biology 4701*
- 6591 Current Approaches to Biomedical Research (*cross-listed as Medicine 6591*)
- 6592 Bacterial Genetics (*credit-restricted with the former Biochemistry 6592*)  
*prerequisite: Biology 4241 (or equivalent)*
- 6593 Selected Readings in Molecular Biology (*credit-restricted with the former Biochemistry 6593*) *prerequisites or co-requisites: one of Biology, Biochemistry or Medicine 6590, and one of Biology 6591, Medicine 6591, or the former Biochemistry 6591 (or equivalent)*
- 6710 Marine Benthic Biology
- 7000 Graduate Core Seminar (*cross-listed as Ocean Science 7000*)
- 7101 Topics in Marine Biology
- 7201 Topics in Cellular and Molecular Biology and Physiology
- 7220 Quantitative Methods in Biology (*credit cannot be obtained if already received for Biology 4605*)
- 7300 Ornithology (*credit cannot be obtained if already received for Biology 4620*)
- 7301 Topics in Ecology and Conservation Biology
- 7530 The Molecular Biology of Development
- 7535 Research Methods in Marine Science
- 7920-7960 Special Topics in Biology (*excluding Biology 7931*)
- 7931 Research Methods in Genetic Biotechnology (Note: Biology 7931 may be delivered in an accelerated format outside of the regular semester time frame)

## Calendar changes with mark up

### 38 Regulations Governing the Degree of Master of Science in Medicine

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
- [www.med.mun.ca](http://www.med.mun.ca)
- [www.mun.ca/become/graduate/apply/app\\_deadlines.php](http://www.mun.ca/become/graduate/apply/app_deadlines.php)

The Faculty of Medicine offers the degree of Master of Science in Medicine in eight program areas: Applied Health Services Research, ~~Cancer and Development~~ Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics and Genomics, Immunology and Infectious Diseases, and Neurosciences. The Faculty of Medicine also offers the degrees of Master of Health Ethics and Master of Public Health. Each program area has a Co-ordinator/Principal who is responsible for communicating the interests of the programs to the Faculty of Medicine Graduate Studies Committee and participates in the admission of graduate students into the program in Medicine.

#### 38.1.3.2 ~~Cancer and Development~~ Bioscience of Health and Disease

The graduate program in ~~Cancer and Development~~ Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including ~~viral oncogenesis, growth factors, and oncogenes in developmental models, programmed cell death and drug resistance.~~ cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.

##### 1. Qualifications for Admission

The admission requirements are as given under the [General Regulations](#) governing Master's degrees. All courses in the program have as a prerequisite, successful completion of an undergraduate degree B.Sc.

##### 2. Program Requirements

All M.Sc. students are required to attend, for credit, and participate in the ~~Cancer and Development Journal Club~~ Bioscience of Health and Disease Seminar Series (MED 6400, 6401, 6402, and 6403). One other graduate course (chosen from MED 6578, 6579, 6580, 6590, or 6591, 6340, 6341, or 6342) is required for M.Sc. Medicine students although other courses may also be required in individual cases.

### 38.1.3.6 Human Genetics & Genomics

#### 1. Program Requirements

1. Students will be required to complete a minimum of two graduate courses. Within the Human Genetics program the following courses are offered: Human Molecular Genetics (MED 6393), Human Population Genetics (MED 6390), Applied Human Genetics (MED 6392), Cancer Genetics (MED 6394), Genetic Epidemiology (MED 6395) and Selected Topics in Human Genetics (MED 6391). In addition, there are a number of courses in other graduate programs which could be suitable for some students in this program, including Epidemiology I (MED 6270), Molecular Biology of Cancer (MED 6580), ~~Molecular Biology I (MED6590)~~ and ~~Molecular Biology II~~ Current Approaches to Biomedical Research (MED 6591). Course selection for each student is determined by the supervisory committee in consultation with the student and is based on the area of study and past course credits.

## 43.29 Medicine

- [www.mun.ca/sgs/contacts/sgscontacts.php](http://www.mun.ca/sgs/contacts/sgscontacts.php)
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The Faculty of Medicine offers the degree of Doctor of Philosophy in seven program areas: ~~Cancer and Development~~, Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics, Immunology and Infectious Diseases and Neurosciences. Each program area has a Co-ordinator who is responsible for communicating the interests of the program to the Faculty of Medicine Graduate Studies Committee and participate in the admission of graduate students into the graduate program in Medicine. The Faculty of Medicine also offers the opportunity for students registered in the Doctor of Medicine (M.D.) program to obtain a Ph.D. in a combined and integrated M.D.-Ph.D. program.

## 43.29.2.1 Program Areas

1. ~~Cancer and Development~~ Bioscience of Health and Disease
  - a) The graduate program in ~~Cancer and Development~~ Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including viral oncogenesis, growth factors, and oncogenes in developmental models, programmed cell death and drug resistance, cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.
  - b) Program Requirements: Students are required to participate in the ~~Cancer and Development~~ Bioscience of Health and Disease Ph.D. Seminar Series (MED 6410, 6411, 6412, and 6413). Other courses may be recommended for individual programs of study.

### 38.2.3 Graduate Courses

6030-6050 Special Topics  
6070 Seminars in Physiological Instrumentation  
6075 Human Physiology, Performance and Safety in Extreme Environments (HSPE)  
6090-6101 Special Topics  
6102 Critical Theory in Health and Society  
6103-6119 Special Topics  
6127 Immunology I  
6128 Immunology II  
613A/B Advanced Immunological Methods (*same as the former 6130*)  
6131-6139 Special Topics  
6140 Basic Cardiovascular and Renal Physiology  
6141 Cardiovascular/Renal Techniques  
6142 Selected Topics in Cardiovascular and Renal Physiology  
6143 Cardiovascular Anatomy  
6144 Current Concepts in Cardiovascular and Renal Pathophysiology  
6150 Principles of Scholarly Writing for Rural Doctors (may be delivered outside the regular semester timeframe)  
6151 Principles of Research for Rural Doctors (may be delivered outside the regular semester timeframe)  
6180 Structure, Function and Pharmacology of Muscle  
6190 General Pharmacology  
6192 Pharmacology of Receptors and Receptor Effector Coupling Processes  
6193 Advanced Topics in Neuroscience  
6194 Advanced Topics in Physiology  
6195 Neurobiology of Nervous System Diseases  
6196 Systems Neuroscience  
6197 Cellular Neuroscience  
6198 Neuroanatomy for Graduate Students (accelerated format)  
6199 Health Sciences Writing  
6200 Biostatistics I (*credit may be obtained for only one of MED 6200 or MED 6262*)  
6220 Introduction to Community Health  
6225 Health Inequities and the Social Determinants of Health  
6226 Postcolonial Theory: Considering the “Other” in Science, Medicine and Bioethics  
6250 Basic Clinical Epidemiology  
6255 Clinical Research Design  
6260 Applied Data Analysis for Clinical Epidemiology  
6262 Biostatistics in Clinical Medicine (*credit may be obtained for only one of MED 6200 or MED 6262*)  
6263 Conducting and Publishing Systematic Review and Meta-analysis  
6265 Genetics and Clinical Epidemiology  
6268 Patient Engagement in Health Research  
6270 Epidemiology I  
6274 Chronic Disease Epidemiology  
6275 Epidemiology II

- 6276 Current Topics in Canada's Health Care System
- 6277 Issues in Northern, Rural and Remote Health in Canada
- 6278 Advanced Biostatistics for Health Research
- 6279 Quantitative Methods for Applied Health Research
- 6280 Community Health Research Methods
- 6281 Theory and Approaches to Medical Publication
- 6282 Canadian Health Care System
- 6284 Research and Evaluation Design and Methods
- 6285 Introduction to Applied Health Services Research
- 6286 Ethical Foundations of Applied Health Research
- 6288 Policy and Decision Making
- 6290 Determinants of Health: Healthy Public Policy
- 6292 Qualitative and Quantitative Methods for Health Services Research
- 6293 Knowledge Transfer and Research Uptake
- 6294 Advanced Qualitative Methods
- 6295 Advanced Quantitative Methods
- 6296 Residency
- 6297 Theories of Social Justice in Health
- ~~6340 Research Topics in Cancer I~~
- ~~6341 Research Topics in Cancer II~~
- ~~6342 Basic Principles of the Pathology of Cancer~~
- 6390 Human Population Genetics
- 6391 Selected Topics in Human Genetics
- 6392 Applied Human Genetics
- 6393 Human Molecular Genetics
- 6394 Cancer Genetics
- 6395 Genetic Epidemiology
- 6400 Research Seminars for M.Sc. Students I (one-credit hour)
- 6401 Research Seminars for M.Sc. Students II (one-credit hour)
- 6402 Research Seminars for M.Sc. Students III (one-credit hour)
- 6403 Research Seminars for M.Sc. Students IV (one-credit hour)
- 6410 Research Seminars for Ph.D. Students I (one-credit hour)
- 6411 Research Seminars for Ph.D. Students II (one-credit hour)
- 6412 Research Seminars for Ph.D. Students III (one-credit hour)
- 6413 Research Seminars for Ph.D. Students IV (one-credit hour)
- 6420 Medical Science/Social Responsibility in Health Care: Aspects of Medical History  
(*same as History 6125*)
- 6578 Gross Anatomy I
- 6579 Gross Anatomy II
- 6580 Molecular Biology of Cancer (~~*prerequisites: Biology 4241, Biochemistry 4100 [or equivalent]*~~)
- 6590 Imaging and Spectroscopy for Biomedical Science Molecular Biology I (~~*cross-listed as Biology 6590 and credit restricted with Biochemistry 6590*~~) ~~*prerequisites: Biology 4241 (or equivalent)*~~

6591 Current Approaches to Biomedical Research Molecular Biology II (~~cross-listed as Biology 6591 and credit restricted with the former Biochemistry 6591~~) prerequisites: ~~Biology 4241 (or equivalent)~~

6592 Practicing and Teaching Professionalism

6900 Medical Geography I - Introduction to Geographic Information Science and Spatial Analysis in Health

6901 Medical Geography II - Geospatial Analysis and Modelling in Health *prerequisite: 6900*

6950 Simulation & Technology-based Learning in the Health Professions

6951 Assessment and Evaluation in Health Professions Education (~~cross-listed as Pharmacy 6951~~)

6953 Current Perspectives and Advances in Medical Education

Biology:

#### 43.4.2 Courses

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

- 6000 Research Topics in Microbiology
- 6052 Plant Pathology (*credit cannot be obtained if already received for Biology 4052*)
- 6131 Models in Biology (*credit cannot be obtained if already received for Biology 4607*)
- 6351 Behavioural Ecology and Sociobiology (~~cross-listed as Psychology 6351~~) *credit cannot be obtained if already received for Biology 4701*
- ~~6590 Molecular Biology I (cross-listed as Medicine 6590 and credit restricted with Biochemistry 6590) prerequisites: Biology 4241 (or equivalent)~~
- 6591 Molecular Biology II Current Approaches to Biomedical Research (~~cross-listed as Medicine 6591 and credit restricted with the former Biochemistry 6591~~) prerequisites: ~~Biology 4241 (or equivalent)~~
- 6592 Bacterial Genetics (*credit-restricted with the former Biochemistry 6592*) *prerequisite: Biology 4241 (or equivalent)*
- 6593 Selected Readings in Molecular Biology (*credit-restricted with the former Biochemistry 6593*) *prerequisites or co-requisites: one of Biology, Biochemistry or Medicine 6590, and one of Biology 6591, Medicine 6591, or the former Biochemistry 6591 (or equivalent)*
- 6710 Marine Benthic Biology
- 7000 Graduate Core Seminar (~~cross-listed as Ocean Science 7000~~)
- 7101 Topics in Marine Biology
- 7201 Topics in Cellular and Molecular Biology and Physiology
- 7220 Quantitative Methods in Biology (*credit cannot be obtained if already received for Biology 4605*)
- 7300 Ornithology (*credit cannot be obtained if already received for Biology 4620*)
- 7301 Topics in Ecology and Conservation Biology
- 7530 The Molecular Biology of Development

- 7535 Research Methods in Marine Science
- 7920-7960 Special Topics in Biology (*excluding Biology 7931*)
- 7931 Research Methods in Genetic Biotechnology (Note: Biology 7931 may be delivered in an accelerated format outside of the regular semester time frame)

## clean copy of calendar changes for the C&D program

### 38 Regulations Governing the Degree of Master of Science in Medicine

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The Faculty of Medicine offers the degree of Master of Science in Medicine in eight program areas: Applied Health Services Research, Bioscience of Health and Disease, Cardiovascular and Renal Sciences, Clinical Epidemiology, Community Health, Human Genetics and Genomics, Immunology and Infectious Diseases, and Neurosciences. The Faculty of Medicine also offers the degrees of Master of Health Ethics and Master of Public Health. Each program area has a Co-ordinator/Principal who is responsible for communicating the interests of the programs to the Faculty of Medicine Graduate Studies Committee and participates in the admission of graduate students into the program in Medicine.

#### 38.1.3.2 Bioscience of Health and Disease

The graduate program in Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.

#### 3. Qualifications for Admission

The admission requirements are as given under the [General Regulations](#) governing Master's degrees. All courses in the program have as a prerequisite, successful completion of an undergraduate degree.

#### 4. Program Requirements

All M.Sc. students are required to attend, for credit, and participate in the Bioscience of Health and Disease Seminar Series (MED 6400, 6401, 6402, and 6403). One other graduate course chosen from MED 6578, 6579, 6580, 6590, or 6591 is required, although other courses may also be required for individual cases.

### **38.1.3.6 Human Genetics & Genomics**

The graduate program in Human Genetics & Genomics provides opportunities to pursue academic studies and research in a number of key areas including Mendelian and complex traits with a variety of approaches including molecular genetics, genomics and other omics applications, animal models, bioinformatics, genetic epidemiology, and population genetics. Our research is interdisciplinary with unique opportunities to apply skills to work with regional genetic isolates, as well as other populations, to explore the genetic and non-genetic determinants of health and diseases of global significance. Faculty members from all three divisions of the Faculty of Medicine (BioMedical Sciences, Community Health and Humanities, and the Clinical Disciplines) participate in the program.

#### **1. Qualifications for Admission**

The admission requirements are as given under the General Regulations governing Master's degrees. Applicants with backgrounds in the fields of genetics, biochemistry and biology are preferred.

#### **2. Program Requirements**

1. Students will be required to complete a minimum of two graduate courses. Within the Human Genetics program the following courses are offered: Human Molecular Genetics (MED 6393), Human Population Genetics (MED 6390), Applied Human Genetics (MED 6392), Cancer Genetics (MED 6394), Genetic Epidemiology (MED 6395) and Selected Topics in Human Genetics (MED 6391). In addition, there are a number of courses in other graduate programs which could be suitable for some students in this program, including Epidemiology I (MED 6270), Molecular Biology of Cancer (MED 6580), and Current Approaches to Biomedical Research (MED 6591). Course selection for each student is determined by the supervisory committee in consultation with the student and is based on the area of study and past course credits.

## 43.29 Medicine

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### 43.29.2.1 Program Areas

#### 2. Bioscience of Health and Disease

- a) The graduate program in Bioscience of Health and Disease offers study in fundamental cell and molecular biological areas including cancer biology and genomics, cellular growth and differentiation mechanisms, developmental biology, skeletal biology, stem cell biology, visual science and, biomedical imaging and spectroscopy.
- b) Program Requirements: Students are required to participate in the Bioscience of Health and Disease Ph.D. Seminar Series (MED 6410, 6411, 6412, and 6413). Other courses may be recommended for individual programs of study.

### 38.2.3 Graduate Courses

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- 6090-6101 Special Topics
- 6102 Critical Theory in Health and Society
- 6103-6119 Special Topics
- 6127 Immunology I
- 6128 Immunology II
- 613A/B Advanced Immunological Methods (*same as the former 6130*)
- 6131-6139 Special Topics
- 6140 Basic Cardiovascular and Renal Physiology
- 6141 Cardiovascular/Renal Techniques
- 6142 Selected Topics in Cardiovascular and Renal Physiology
- 6143 Cardiovascular Anatomy
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- 6190 General Pharmacology
- 6192 Pharmacology of Receptors and Receptor Effector Coupling Processes
- 6193 Advanced Topics in Neuroscience
- 6194 Advanced Topics in Physiology
- 6195 Neurobiology of Nervous System Diseases
- 6196 Systems Neuroscience
- 6197 Cellular Neuroscience
- 6198 Neuroanatomy for Graduate Students (accelerated format)
- 6199 Health Sciences Writing
- 6200 Biostatistics I (*credit may be obtained for only one of MED 6200 or MED 6262*)
- 6220 Introduction to Community Health
- 6225 Health Inequities and the Social Determinants of Health
- 6226 Postcolonial Theory: Considering the “Other” in Science, Medicine and Bioethics
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- 6260 Applied Data Analysis for Clinical Epidemiology
- 6262 Biostatistics in Clinical Medicine (*credit may be obtained for only one of MED 6200 or MED 6262*)
- 6263 Conducting and Publishing Systematic Review and Meta-analysis
- 6265 Genetics and Clinical Epidemiology
- 6268 Patient Engagement in Health Research
- 6270 Epidemiology I
- 6274 Chronic Disease Epidemiology
- 6275 Epidemiology II

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- 6279 Quantitative Methods for Applied Health Research
- 6280 Community Health Research Methods
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- 6288 Policy and Decision Making
- 6290 Determinants of Health: Healthy Public Policy
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- 6293 Knowledge Transfer and Research Uptake
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- 6295 Advanced Quantitative Methods
- 6296 Residency
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- 6390 Human Population Genetics
- 6391 Selected Topics in Human Genetics
- 6392 Applied Human Genetics
- 6393 Human Molecular Genetics
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- 6403 Research Seminars for M.Sc. Students IV (one-credit hour)
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- 6411 Research Seminars for Ph.D. Students II (one-credit hour)
- 6412 Research Seminars for Ph.D. Students III (one-credit hour)
- 6413 Research Seminars for Ph.D. Students IV (one-credit hour)
- 6420 Medical Science/Social Responsibility in Health Care: Aspects of Medical History  
(*same as History 6125*)
- 6578 Gross Anatomy I
- 6579 Gross Anatomy II
- 6580 Molecular Biology of Cancer
- 6590 Imaging and Spectroscopy for Biomedical Science
- 6591 Current Approaches to Biomedical Research
- 6592 Practicing and Teaching Professionalism
- 6900 Medical Geography I - Introduction to Geographic Information Science and Spatial Analysis in Health
- 6901 Medical Geography II - Geospatial Analysis and Modelling in Health *prerequisite: 6900*
- 6950 Simulation & Technology-based Learning in the Health Professions

- 6951 Assessment and Evaluation in Health Professions Education (*cross-listed as Pharmacy 6951*)
- 6953 Current Perspectives and Advances in Medical Education

### Biology Clean Copy:

#### 43.4.2 Courses

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

- 6000 Research Topics in Microbiology
- 6052 Plant Pathology (*credit cannot be obtained if already received for Biology 4052*)
- 6131 Models in Biology (*credit cannot be obtained if already received for Biology 4607*)
- 6351 Behavioural Ecology and Sociobiology (*cross-listed as Psychology 6351*) *credit cannot be obtained if already received for Biology 4701*
- 6591 Current Approaches to Biomedical Research (*cross-listed as Medicine 6591*)
- 6592 Bacterial Genetics (*credit-restricted with the former Biochemistry 6592*)  
*prerequisite: Biology 4241 (or equivalent)*
- 6593 Selected Readings in Molecular Biology (*credit-restricted with the former Biochemistry 6593*) *prerequisites or co-requisites: one of Biology, Biochemistry or Medicine 6590, and one of Biology 6591, Medicine 6591, or the former Biochemistry 6591 (or equivalent)*
- 6710 Marine Benthic Biology
- 7000 Graduate Core Seminar (*cross-listed as Ocean Science 7000*)
- 7101 Topics in Marine Biology
- 7201 Topics in Cellular and Molecular Biology and Physiology
- 7220 Quantitative Methods in Biology (*credit cannot be obtained if already received for Biology 4605*)
- 7300 Ornithology (*credit cannot be obtained if already received for Biology 4620*)
- 7301 Topics in Ecology and Conservation Biology
- 7530 The Molecular Biology of Development
- 7535 Research Methods in Marine Science
- 7920-7960 Special Topics in Biology (*excluding Biology 7931*)
- 7931 Research Methods in Genetic Biotechnology (Note: Biology 7931 may be delivered in an accelerated format outside of the regular semester time frame)



SCHOOL OF  
GRADUATE STUDIES

## Request for Approval of a Graduate Course

*Adobe Reader, minimum version 8, is required to complete this form.* Download the latest version: <http://get.adobe.com/reader>. (1) Save the form by clicking on the diskette icon on the upper left side of the screen; (2) Ensure that you are saving the file in PDF format; (3) Specify where you would like to save the file, e.g. Desktop; (4) Review the [How to create and insert a digital signature](#) webpage for step by step instructions; (5) Fill in the required data and save the file; (6) Send the completed form by email to: [sgs@mun.ca](mailto:sgs@mun.ca).

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

**Course No.:** DSCI 6659

**Course Title:** Statistical Exploration of Data

**I. To be completed for all requests:**

**A. Course Type:**     Lecture course     Lecture course with laboratory  
                                Laboratory course     Undergraduate course<sup>1</sup>  
                                Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**     Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**     Yes     No

**E. Credit hours for this course:** 3

**F. Course description (please attach course outline and reading list):**

The description and outline are the same as the existing course STAT 6559. These courses will be cross-listed and offered concurrently.

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests	25	
Assignments	15	
Other (specify):	20 (10)	
Final examination:	40	

**Total 100**

<sup>1</sup> Must specify the additional work at the graduate level

**II. To be completed for special/selected topics course requests only**

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

**Instructor's initials**

- 1. duplication of thesis work \_\_\_\_\_
- 2. double credit \_\_\_\_\_
- 3. work that is a faculty research product \_\_\_\_\_
- 4. overlap with existing courses \_\_\_\_\_

Recommended for offering in the                      Fall                      Winter                      Spring                      20 \_\_\_\_

Length of session if less than a semester:

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

\_\_\_\_\_  
Course instructor

12 Jan 2023  
\_\_\_\_\_  
Date

\_\_\_\_\_  
Approval of the head of the academic unit

12 Jan 2023  
\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Secretary, Faculty/School/Council

\_\_\_\_\_  
Date



SCHOOL OF  
GRADUATE STUDIES

# Request for Approval of a Graduate Course

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

**Course No.:** DSCI 6619

**Course Title:** Regression Models

**I. To be completed for all requests:**

**A. Course Type:**     Lecture course     Lecture course with laboratory  
                                Laboratory course     Undergraduate course<sup>1</sup>  
                                Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**     Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**     Yes     No

**E. Credit hours for this course:** 3

**F. Course description (please attach course outline and reading list):**

The description and outline are the same as the existing course STAT 6519. These courses will be cross-listed and offered concurrently.

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests	25	
Assignments	15	
Other (specify):	20 (10)	
Final examination:	40	

**Total 100**

<sup>1</sup> Must specify the additional work at the graduate level

**II. To be completed for special/selected topics course requests only**

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

**Instructor's initials**

- 1. duplication of thesis work \_\_\_\_\_
- 2. double credit \_\_\_\_\_
- 3. work that is a faculty research product \_\_\_\_\_
- 4. overlap with existing courses \_\_\_\_\_

Recommended for offering in the                      Fall                      Winter                      Spring                      20 \_\_\_\_

Length of session if less than a semester:

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

\_\_\_\_\_  
Course instructor

**12 Jan 2023**

\_\_\_\_\_  
Date

\_\_\_\_\_  
Approval of the head of the academic unit

**12 Jan 2023**

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Secretary, Faculty/School/Council

\_\_\_\_\_  
Date



SCHOOL OF  
GRADUATE STUDIES

# Request for Approval of a Graduate Course

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

**Course No.:** DSCI-6650

**Course Title:** Reinforcement learning

## I. To be completed for all requests:

**A. Course Type:**  Lecture course     Lecture course with laboratory  
 Laboratory course     Undergraduate course<sup>1</sup>  
 Directed readings     Other (please specify)

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

**C. Will this course require new funding (including payment of instructor, labs, equipment, etc.)?**  Yes     No  
 If yes, please specify:

**D. Will additional library resources be required (if yes, please contact [munul@mun.ca](mailto:munul@mun.ca) for a resource consultation)?**  Yes     No

**E. Credit hours for this course:** 3

## F. Course description (please attach course outline and reading list):

This course provides an introduction to reinforcement learning, an emerging field in data sciences in which an agent (e.g. human or robot) learns interactively which actions should be taken in a stochastically evolving environment to maximise a reward function. This course is intended to be an elective course for the Masters of Data Science Programme and will be offered concurrently with Math-4250.

G. Method of evaluation:	Percentage	
	Written	Oral
Class tests	20%	
Assignments	20%	
Other (specify): Course project	20%	(additional work for graduate credit)
Final examination:	40%	
<b>Total</b>	<b>100%</b>	

<sup>1</sup> Must specify the additional work at the graduate level

**II. To be completed for special/selected topics course requests only**

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

**Instructor's initials**

- 1. duplication of thesis work \_\_\_\_\_
- 2. double credit \_\_\_\_\_
- 3. work that is a faculty research product \_\_\_\_\_
- 4. overlap with existing courses \_\_\_\_\_

Recommended for offering in the                      Fall                      Winter                      Spring                      20 23

Length of session if less than a semester:

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

JC Loredano-Osti

October 31, 2022

\_\_\_\_\_  
Course instructor

\_\_\_\_\_  
Date

\_\_\_\_\_  
Approval of the head of the academic unit

\_\_\_\_\_  
Date

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

\_\_\_\_\_  
Secretary, Faculty/School/Council

\_\_\_\_\_  
Date

## DSCI 6650: Reinforcement learning

**Introduction:** Reinforcement learning is a learning paradigm that states that one learns by interacting with the environment in which one is in, rather than by being provided explicit rules to follow. Specifically, reinforcement learning states that an *agent* (e.g. a human or a robot) learns which actions to take in the *environment* so as to maximize a specific *reward* signal. That is, the agent initially has no information about the set of desirable actions to take and only learns them gradually by interacting with its environment.

**Rationale:** Reinforcement learning has seen a steady increase in application fields in virtually all areas of science and engineering. Applications of reinforcement learning today include self-driving cars, (video) games, health care, engineering and robotics.

Due to the importance of reinforcement learning for industry, it has become one of the main required skill sets a graduate from an applied mathematics program needs to possess. The purpose of this course is thus to equip our graduating students with an in-depth understanding (both theoretically and practically) of this emerging field of machine learning.

**Objectives:** This course will provide an introduction to classical and modern methods of reinforcement learning, including dynamic programming, Monte Carlo methods, Temporal-Difference learning, planning methods, approximate solution methods, policy gradient methods and deep reinforcement learning.

**Calendar description:** DSCI 6650 considers a mathematical framework in which an agent (such as a person or a robot) learns which actions to take in an environment in order to maximize a specific reward signal. The course provides an introduction to reinforcement learning, including tabular solution methods, dynamic programming, Monte Carlo methods, temporal-difference learning, planning methods and approximate solution methods.

**Prerequisites:** DSCI-6601 and STAT-6519/DSCI-6619 or permission from the chair of the Master of Data Science programme.

**Potential instructors:** Alex Shestopaloff, Alex Bihlo, JC Loredó-Osti

**Literature:** The following books are either publicly available or available through our library. The main textbook will be *Sutton and Barto, 2018*.

- R.S. Sutton and A.G. Barto. *Reinforcement learning*, MIT Press, 2018 (available online)
- C. Szepesvari. *Algorithms for Reinforcement Learning*, Morgan & Claypool, 2010 (available online)

**Tentative syllabus** (*in brackets are chapters from Sutton and Barto, 2018*):

1. *Multi-armed bandits*
  - (a) Action-value methods (*2.1–2.3*)
  - (b) The exploration–exploitation dilemma (*2.4–2.6*)
2. *Dynamic programming*
  - (a) An introduction to finite Markov decision processes (*3.1–3.3, 3.5–3.6*)
  - (b) Generalized policy iteration (*4.1–4.4, 4.6*)
  - (c) Asynchronous dynamic programming (*4.5*)
3. *Monte Carlo methods*
  - (a) On-policy Monte Carlo methods (*5.1–5.4*)

- (b) Off-policy Monte Carlo methods (5.5–5.7)
- 4. *Temporal-Difference learning*
  - (a) TD reinforcement learning (6.1–6.3)
  - (b) SARSA and Q-learning (6.4–6.5)
  - (c)  $n$ -step bootstrapping methods (7.1–7.3)
- 5. *Planning methods*
  - (a) Models and planning (8.1–8.3)
  - (b) Prioritized sweeping (8.4)
  - (c) Real-time dynamic programming (8.7–8.9)
  - (d) Monte Carlo tree search (8.11)
- 6. *Approximate solution methods and deep reinforcement learning*
  - (a) Linear methods and feature construction (9.1–9.4)
  - (b) A short introduction to deep neural networks (9.7)
  - (c) Deep Q-learning and applications to video and board games (16.5)
- 7. *Policy gradient methods*
  - (a) The policy gradient theorem (13.1–13.2)
  - (b) Monte Carlo policy gradient (13.3–13.4)
  - (c) Actor–Critic methods (13.5)

**Evaluation:** The suggested grading scheme will consist of:

- *Assignments:* 20%. Four assignments, which include both analytical and numerical components.
- *Midterm:* 20%. The midterm exam will be a one-hour written exam.
- *Course project:* 20%. Topic to be approved before the term exam and handled on the last day of class.
- *Final exam:* 40%. The final exam will be a three-hour exam, two hours of which will be a written exam and one hour will be a numerical lab component.