

**Faculty of Science Course Syllabus**  
**Department of Biochemistry & Molecular Biology**  
**BIOC 4403/5403 GENES AND GENOMES**  
**Winter Term, 2021**

**Instructor(s):** Dr. Claudio Slamovits (coordinator), Dept. of Biochemistry & Molecular Biology  
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leave)  
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**Lectures:** M W F POSTED ON BRIGHTSPACE (ASYNCHRONOUS DELIVERY)

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### **Course Description**

This course discusses the organization of genes into genomes. It deals with (i) compartmentalization of genetic material in nuclear and organellar genomes, (ii) the structure, behaviour and origins of components of both nuclear and organellar genomes which are not genes (transposable and other repetitive elements, introns), (iii) methods for sequencing and analyzing genomes, and (iv) the significance of genetic organization and higher order chromosomal structure and function. The methodologies and prospects of genomics are discussed at some length.

### **Course Prerequisites**

BIOC 3400.03 or BIOL 3046.03 or Instructor's consent

### **Crosslistings**

BIOC5403

### **Course Objectives/Learning Outcomes**

Appreciation of genomic diversity; understanding of the characteristics of, and differences between, nuclear, prokaryotic, organellar and viral genomes; understanding of the evolutionary processes that shape the coding capacity and architecture of genomes in different organisms and sub-cellular compartments; knowledge of current methods and technologies available to generate and analyze sequence data

### **Course Materials**

- Lectures, suggested and required reading and practice materials
- Course website: Brightspace

### Course Assessment

This course assumes intermediate level of molecular biology (BIOC 3400 or equivalent). The material is provided through lectures as well as original research and review articles and assignments. The final grade (for 4403) will be based on two mid-term exams (20% each) and the final exam (60%). For 5403, in addition to the three exams, each student is required to give an in-class presentation on special topic (arranged with the Coordinator) that accounts for 10% toward the final grade. A written essay based may be arranged in lieu of an in-class presentation due to the COVID-19 restrictions. The final presentation or assignment is graded on a 1to-10 scale. Since the marks of the three exams and the presentation can add up to 110, the final mark is multiplied by 0.91 to obtain the final grade for the course on a 100 scale (**Grad students only!**). Grad students need to achieve a grade of 65 or more (C+) to PASS.

<b>Midterm I</b>	<b>20 (% of final grade)</b>	<b>Feb. 12<sup>th</sup> 2021</b>
<b>Midterm II</b>	<b>20 %</b>	<b>Mar. 22<sup>nd</sup> 2021</b>
<b>Final exam</b>	<b>60 %</b>	<i>(Scheduled by Registrar)</i>

### Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

### Course Policies

#### Short-term Absence/Missed exams, midterms, or assignments, etc.

A student who misses an evaluation component of a course (midterm test, assignment, presentation, lab, etc.) due to illness should if possible, notify the instructor, course coordinator, or department office either prior to, or within 48 hrs of the scheduled time or due date for that component. The student must also submit a Student Declaration of Absence Form (through the course Brightspace page or to their instructor via e-mail) within three (3) calendar days following the last day of absence. Special 'make-up' tests (if offered) will normally be written within 7 calendar days after the missed test. Absence for non-medical reasons is not ordinarily acceptable unless prearranged with the instructor. A missed evaluation component for which no satisfactory arrangement has been made will be given a mark of zero. The Student Declaration of Absence form can only be submitted up to two (2) separate times per course during a term. Students who exceed this limit must inform their course instructor(s) and will be required to register with an Advisor at Student Academic Success (SAS). If students have recurring short-term absences and do not register with SAS, it is at the instructor(s)' discretion to disallow any further Student Declarations and deny alternate coursework arrangements.

#### Missed Final exam:

A student who misses the final examination due to illness must notify the course coordinator or department office within 48 hours to provide a medical certificate (see Dalhousie Calendar, section 16.8). Absence for non-medical reasons is not acceptable.

If necessary, a make-up final examination will be held shortly after the end of the official exam period, and typically before May 1. Students who need to write a makeup exam for medical or other reasons are expected to be available during this period.

**Please refer to the link below for further information on the University policy regarding Long-term absence.**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html](https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html)

## Course Content - 2021

### LECTURE LIST

DATE	DAY	TOPIC
Jan. 6	W	1. Introduction to the course — diversity of genes and genomes
8	F	2. DNA sequencing technologies
11	M	3. Origins of genes and genomes
13	W	4. Prokaryotic genomes I
15	F	5. Approaches to whole genome sequencing
18	M	6. Prokaryotic genomes II
20	W	7. Symbiosis and genomes
22	F	8. Transcriptomics
25	M	9. Organelles and their genomes I
27	W	10. Organelles and their genomes II
Feb 1	M	12. Viral genomes
3	W	13. Guest Lecture (TBD)
5	F	<i>Munro Day (No lecture)</i>
8	M	14. Metagenomics
10	W	<i>Review session</i>
12	F	<b>MID-TERM EXAM 1</b>
15-19	M,W,F	<i>Study break (No lectures)</i>
22	M	15. Origin of nuclear genomes I
24	W	16. Nuclear genomes Composition and structure I
26	F	17. Introduction to bioinformatics
Mar 1	M	18. Nuclear genomes Composition and structure II
3	W	19. Nuclear genomes Composition and structure III
5	F	20. Genome bioinformatics I
8	M	21. Genome evolution I
10	W	22. Genome evolution II
12	F	23. Genome bioinformatics II

	15	M	24. Genomes of model organisms
	17	W	25. The human genome
	19	F	26. Genome bioinformatics III
	22	M	--. <b>MID-TERM EXAM 2</b>
	24	W	27. Guest Lecture (TBD)
	26	F	28. Genome bioinformatics IV
	29	M	29. Proteomics - Guest Lecture (Dr. A. Cohen)
	31	W	30. Pathogenomics
Apr	2	F	31. Genome bioinformatics V
	5	M	32. Guest Lecture (TBD)
	7/8	--	Special topics presentations and review

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### Faculty of Science Course Syllabus (Section B) (revised Nov-2017)

*Genes and Genomes – BIOC4403/5403*

### University Policies and Statements

**This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate**

#### Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

**Information:** [https://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](https://www.dal.ca/dept/university_secretariat/academic-integrity.html)

#### Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

**Information:** [https://www.dal.ca/campus\\_life/academic-support/accessibility.html](https://www.dal.ca/campus_life/academic-support/accessibility.html)

#### Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

**Code:** [https://www.dal.ca/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)

#### Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

**Statement:** <http://www.dal.ca/cultureofrespect.html>

#### Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) ([elders@dal.ca](mailto:elders@dal.ca)).

**Information:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

**Important Dates** in the Academic Year (including add/drop dates)

[https://www.dal.ca/academics/important\\_dates.html](https://www.dal.ca/academics/important_dates.html)

**University Grading Practices**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

**Missed or Late Academic Requirements due to Student Absence (policy)**

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html](https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html)

## Student Resources and Support

### Advising

**General Advising** [https://www.dal.ca/campus\\_life/academic-support/advising.html](https://www.dal.ca/campus_life/academic-support/advising.html)

**Science Program Advisors:** <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

**Indigenous Student Centre:** [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

**Black Students Advising Centre:** [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

**International Centre:** [https://www.dal.ca/campus\\_life/international-centre/current-students.html](https://www.dal.ca/campus_life/international-centre/current-students.html)

### Academic supports

**Library:** <https://libraries.dal.ca/>

**Writing Centre:** [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html)

**Studying for Success:** [https://www.dal.ca/campus\\_life/academic-support/study-skills-and-tutoring.html](https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html)

**Copyright Office:** <https://libraries.dal.ca/services/copyright-office.html>

**Fair Dealing Guidelines** <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

### Other supports and services

**Student Health & Wellness Centre:** [https://www.dal.ca/campus\\_life/health-and-wellness/services-support/student-health-and-wellness.html](https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html)

**Student Advocacy:** <https://dsu.ca/dsas>

**Ombudsperson:** [https://www.dal.ca/campus\\_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

### Safety

**Biosafety:** <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

**Chemical Safety:** <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

**Radiation Safety:** <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>



**Scent-Free Program:** <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>