Physiology of the Prokaryotic Cell
MICI 3119
Syllabus
Department of **Microbiology and Immunology**
CRN 12091 Fall 2024

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.

Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

Course Instructor(s)

Name	Email	Office Hours
Nikhil Thomas	N.thomas@dal.ca	TBD
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Course Description

An introduction to the bacterial physiological processes required for interactions with other organisms and the environment. Topics include molecular architecture and assembly of bacterial cell components, metabolism and energy production, utilization of energy, adaptation responses to host and environmental challenges, and host-pathogen interactions.

Course Prerequisites

MICI 2100.03, BIOC 2300.03, BIOL 2020.03 and BIOL 2030.03, (a minimum of B- in each of these courses), or permission of the Course Coordinator.

Student Resources

Reserve reading materials, access to primary literature through Dal Library access, course lecture notes, Brightspace course page.

Course Structure

Course Delivery

in-person lectures and exams (assessments). In specific situations that prevent in-person sessions, asynchronous online delivery and exams may occur. In-person lecture sessions will be recorded and made available prior to midterm assessments or by special request.

Students should ensure that they have access and connectivity to online resources from inside or outside Canada.

Lectures

Tupper Building, Theatre D
10:35-11:25 am, Mondays, Wednesdays, and Fridays. All lectures will be delivered in-person unless there are unpredictable circumstances (weather, university closure, illness).
Lectures will be available on or before the scheduled dates on Brightspace as PowerPoint presentations or other formats.

Course Materials

Optional reference materials (not required)
1. Molecular Genetics of Bacteria. Larry Snyder and Wendy Champness. 2nd Edition 2003. ASM Press
2. Brock Biology of Microorganisms, Edition 15

Assessment

There are two mid-term examinations (27.5% each) and one final exam (40%). The format of the examinations will be a combination of multiple choice, true and false, and short answer questions. Attendance and participation at tutorials is awarded 5% (i.e. 2 x 2.5%).

Mid-terms: Friday Sept 27th and Wednesday Nov. 6 (10:35- 11:25 am)

Final exam: To be scheduled by the Registrar's office (3hr). The final exam is cumulative with respect to course content.

Conversion of numerical grades to final letter grades follows the Dalhousie Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (0-49)
A- (80-84)	B- (70-72)	C- (55-59)	

Policy of Missed Exams

MICI3119 will **NOT** be using **Student Declaration of Absence (SDA) Forms**. Students missing any scheduled test (or exam) will be given one opportunity to take an alternate test within 4-10 days. The alternate test can be similar or in a different format (e.g. all short answers or a long essay) and will be scheduled by the course coordinator taking into consideration student schedules. Failure to write the alternate test results in a grade of '0' for that course assessment. Students with known time/date conflicts OR extenuating circumstances are strongly encouraged to consult the course coordinator ahead of the scheduled exam to discuss any options that are available. In extremely challenging situations, the course coordinator has the discretion to make alternative arrangements to aid student completion of course requirements.

Policy on Accessibility for Students with Disabilities

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic under the Nova Scotia Human Rights Act. Students who require academic accommodation for either classroom participation or the writing of tests, quizzes and exams should make their request to the Advising and Access Services Center (AASC) prior to or at the outset of the regular academic year. Please visit www.dal.ca/access for more information and to obtain the Request for Accommodation Form.

Policy on plagiarism, cheating, and late assignments

All students should read and be familiar with the University position and policies on Academic Integrity: https://www.dal.ca/dept/university_secretariat/academic-integrity.html. Any late lab assignments will not be marked (note: each is worth ~1% of final grade).

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. 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. http://www.dal.ca/cultureofrespect.html

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

https://www.dal.ca/academics/important_dates.html

Expectancy of Attendance and Collaboration

Students are expected to attend all lectures and tutorials. Failure to regularly attend lectures will likely result in lower grade performance. Students are encouraged to collaborate and discuss course content, including tutorial material, however, each student is responsible for completing and submitting their own work for assessment.

Faculty Evaluation

The course will be evaluated by using the University's online Student Learning Experience Questionnaire (SLEQ) system, allowing for feedback on the course material, faculty and teaching assistant performance and course design.

Learning Objectives

- Describe the structures, functions, and synthesis of components of a bacterial cell envelope
- Know the kinetics and physiology of cell growth and cell division
- Describe the overall reactions and importance of the central metabolic pathways and fermentation
- Know the basic principles of membrane energetics and electron transport chains
- Understand how nutrients are transported into a bacterial cell and proteins are secreted
- Know the process of prokaryotic DNA replication, transcription, and translation
- Understand regulation of gene expression at the transcriptional and translational levels and the concept of global gene regulation
- Know the different mechanisms of genetic transfer, genetic mutations, and DNA repair in bacteria
- Demonstrate an understanding of the process of sporulation, chemotaxis, and biofilm
- Explain the mechanisms behind adaptive response to environmental changes and the concept of microbiome

SCHEDULE
MICI 3119 (Fall 2024)

Tupper Theatre D, 10:35-11:25
Monday (M), Wednesday (W), Friday (F)

Schedule of events

#	Date	Lecture/Tutorial/Assessment	Lecturer
1	W, Sept 4	Course introduction, Overview of the bacterial cell	Thomas
2	F, Sept 6	Bacterial cell envelope – 1 (Gram positive)	Thomas
3	M, Sept 9	Bacterial cell envelope – 2 (Gram positive)	Thomas
4	W, Sept 11	Bacterial cell envelope -3 (Gram negative)	Davidson
5	F, Sept 13	Bacterial cell envelope 4- (Gram negative)	Davidson
6	M, Sept 16	Extracellular polysaccharides/Biofilms	LeBlanc
7	W, Sept 18	Bacterial motility systems (flagella, twitching pili)	LeBlanc
8	F, Sept 20	Cell growth and kinetics, physiology, cell division	Thomas
9	M, Sept 23	Sporulation and cell differentiation systems	Thomas
10	W, Sept 25	**Tutorial / Honours and research course information**	Thomas
11	F, Sept 27	**Midterm 1, in lecture time slot**	Thomas
12	W, Oct 2	DNA replication, phages, anti-phage systems	Thomas
13	F, Oct 4	Gene expression - transcription (regulation)	Thomas
14	M, Oct 7	Protein translation -polypeptide biogenesis	Thomas
15	W, Oct 9	Plasmids, transformation, conjugation -horizontal transfer	Thomas
16	F, Oct 11	DNA recombination, transposition, transduction	Thomas
17	W, Oct 16	Enzymatic control in bacterial physiology I	Cheng
18	F, Oct 18	Enzymatic control in bacterial physiology II	Cheng
19	M, Oct 21	Protein secretion and translocation I	Cheng
20	W, Oct 23	Protein secretion and translocation II	Cheng
21	F, Oct 25	Bacterial protein modifications	Cheng
22	M, Oct 28	Two component regulatory systems	Thomas
23	W, Oct 30	Bacterial signal transduction	Thomas
24	F, Nov 1	Quorum sensing	Thomas
25	M, Nov 4	**Tutorial**	Thomas/Cheng
26	W, Nov 6	**Midterm 2, in lecture time slot**	Thomas
27	F, Nov 8	Mutagenesis	Thomas
28	M, Nov 18	Complementation and new advances in genetics, ‘omics’	Thomas
29	W, Nov 20	Synthetic Biology	Rohde
30	F, Nov 22	Genomics -I	Maguire
31	M, Nov 25	Genomics -II	Archibald
32	W, Nov 27	Virulence and Host Pathogen Interactions - I	Thomas
33	F, Nov 29	Virulence and Host Pathogen Interactions – II	Thomas
34	M, Dec 2	Virulence and Host Pathogen Interactions -III	Thomas
35	T, Dec 3	Term Review I - Preparation for exam	Thomas
36	W, Dec 4	Term Review II – Preparation for exam	Thomas