

Faculty of Science Course Syllabus
Department of Biochemistry & Molecular Biology
Medical Biotechnology
BIOC 4501/5501
Fall 2020

Instructor: Kathryn Vanya Ewart, Ph.D., vewart@dal.ca
Consultation hours: Mondays 9:00 a.m. - 12:00 p.m. ADT (then AST after Nov. 1st)
by phone, FaceTime or MS Teams and other times by appointment

Teaching assistant: Kelsey Williamson

Synchronous learning: Within regular class time (Mondays, Wednesdays 1:05 -2:25 p.m. ADT (then AST after Nov. 1st) on specific dates indicated below. This will include class introduction, updates, discussions, debates and presentations.

Asynchronous learning: Lecture material independent study and assignments on Brightspace and assigned videos

Course Description

This course covers fundamental principles of biotechnology from a medical perspective. Topics discussed include: recombinant DNA technology, polymerase-chain reaction-based applications, DNA microarrays, DNA sequencing, immunochemical techniques and applications, production of transgenic organisms, potential applications for embryonic stem cell and nuclear transfer cloning, business and legal aspects of biotechnology.

Course Prerequisites

BIOC 3400.03 or instructor's permission.

Course Objectives/Learning Outcomes

This course was originally developed by Dr. Melanie Dobson several decades ago and it has kept pace with discoveries and inventions in the biotechnology sphere. This is an area of rapid growth and innovation. Therefore, there are many interesting topics to consider. The course provides a combination of fundamental knowledge and cutting-edge developments along with consideration of ethical, business and legal aspects of biotechnology endeavors.

At the end of this course, students should be able to:

1. Explain the molecular basis of procedures such as gene cloning, gene knockdown and knock out, RNAi, cDNA and genomic DNA library screening, polymerase chain reaction (PCR) amplification beginning from DNA and RNA templates, DNA sequencing and manipulation, microarray and RNAseq technologies, CRISPR-Cas9 gene editing, expression and purification of recombinant proteins from prokaryotic and eukaryotic host cells, production of genetically modified organisms and gene therapy.
2. Design oligonucleotides probes and primers for molecular biology applications including manipulation of genes, PCR and other hybridization-based approaches.
3. Explain opportunities and challenges associated with expression of heterologous protein products in bacteria or other host cell systems.
4. Perform independent scholarly research on a medical biotechnology-related topic, resulting in a term paper and presentation.
5. Collaborate with team members to research and orally debate a medical biotechnology-related issue.
6. Describe the general considerations with respect to ethics, regulatory approval and patenting for medical biotechnology-based products and processes.

Course Materials

There is no textbook required for this course. Study materials (PDF lecture notes, recorded lecture videos, assigned readings and links to online videos) will be provided on Brightspace. Additional resources will be listed in a separate file on Brightspace.

Course Assessment

Evaluation will include the following components:

Component	Weight (% of final mark)	Date
Definition of biotechnology (assignment)	5%	Due at 11:59 p.m. on September 23rd, 2020
Overview of a Maritime Provinces Life Sciences company	15%	Due at 11:59 p.m. on October 19th, 2020
Midterm exam	20%	October 26th, 2020 (To be written in a 3-hour interval at a time between 9:00 a.m. and 11:59 p.m.)
Debate	15%	Debate team performance (October 28th, Nov. 2nd and Nov. 4th) and debate document (Nov. 4th)
Presentation	10%	Presentation on term paper topic (dates between November 16th and December 7th to be determined)
Peer feedback on presentations	5%	Due at 11:59 p.m. on December 8th, 2020
Term paper (essay)	30%	Due at 11:59 p.m. on December 8th, 2020

Conversion of numerical grades to Final Letter Grades follows the [Dalhousie Common Grade Scale](#)

A+ (90-100)

A (85-89)

A- (80-84)

B+ (77-79)

B (73-76)

B- (70-72)

C+ (65-69)

C (60-64)

C- (55-59)

D (50-54)

F (<50)

Specific course policies

- **Assignments** will be **docked a final mark per day** if submitted late (-1 mark after 23:59 on following day, -2 marks after 11:59 p.m. on the day after that and so on).
- Students will work in groups for the debates and will be given one mark per group; however, all other work will be done individually.
- **The midterm exams** is the only exam and it will cover the specific theory and technical information learned in this course. It will be a series of short answer questions.
- There will be a makeup midterm evaluation available in the event that a student is unable to write the exam at the expected time.
- If a student is unable to complete an exam or assignment at the scheduled time due to illness or for other valid reasons, the student must submit a **Student Declaration of Absence** form (available on Brightspace) either electronically or in printed form within 3 days of the event. A maximum of 2 declarations of absence will be accepted per student. **Travel for holidays will not be accommodated.**
- In the event that a synchronous debate, presentation or peer evaluation is missed (in which there are marked elements) for exceptional reasons, **the student must contact** me for alternate learning and evaluation arrangements.

Course content

This course material will include five sections and each will be covered in the video and reading portions of the course. **These include** history of biotechnology, traditional recombinant DNA methods, antibody-based technologies, recent and emerging nucleic acid methods and the development aspects (R&D, intellectual property, regulation and ethics).

In addition, a variety of topics will be introduced through the debates and shared presentations.

In all, the course will involve several components.

1. **Live (synchronous) sessions:** There will a synchronous MS Teams session on the first day of class and for classes on specific dates listed below. Involvement in these sessions will be required in order to participate fully, to learn optimally and to have the opportunity to earn full marks.
2. **Video (asynchronous) learning:** There will lecture videos and other files available on Brightspace as well as online videos.
3. **Student involvement:** In addition to synchronous participation, this course requires substantial independent study of the material in order to develop broadly based and in-depth knowledge of the methods and concepts covered. Independent and group project work will also be required.

Course schedule (Sept 9th – Dec 8th classes with Nov 9th-13th study break)

Sept. 9th:

Introduction – A Microsoft Teams Course Welcome meeting at 1:05 p.m.

Topics: Welcome, review of syllabus and introduction to course

To do: Begin reviewing learning material available online (see video 1)

To do: Begin work on Defining Biotechnology assignment

Sept. 14th

Update - Microsoft Teams meeting at 1:05 p.m.

To do: Continue online learning (see videos 2 and 3)

To do: Begin work on Overview of an Atlantic Canadian Life Sciences Company assignment

Sept. 16th

No class

Sept. 21st

Update - Microsoft Teams meeting at 1:05 p.m.

To do: Continue online learning (see videos 4 and 5)

To do: Continue work on Defining Biotechnology and Overview of an Atlantic Canadian Life Sciences Company assignment

Sept. 23rdth

No class

ALERT: Defining biotechnology assignment due today at 11:59 p.m.

Sept. 28th

Update - Microsoft Teams meeting at 1:05 p.m.

To do: Continue online learning (see videos 6 and 7)

To do: Continue work on Overview of an Atlantic Canadian Life Sciences Company assignment

Oct. 5th

Update - Microsoft Teams meeting at 1:05 p.m.

Topic: Confirmation of debate teams, topics and dates

To do: Continue online learning (see videos 8 and 9)

To do: Continue work on Overview of an Atlantic Canadian Life Sciences Company assignment

Oct. 7th

No class

To do: Continue work on Overview of an Atlantic Canadian Life Sciences Company assignment

To do: Continue preparing for debate

Oct. 12th

Thanksgiving – no class

Oct. 14th

No class

To do: Continue work on Overview of a Maritime Provinces Life Sciences Company assignment

Oct. 19th

Update - Microsoft Teams meeting at 1:05 p.m.

ALERT: Atlantic Canadian Life Sciences Company assignment due today at 11:59 p.m.

Topic: Midterm exam preparation

Topic: Confirmation of term paper and presentation topics and dates

To do: Continue online learning (see videos 10 and 11)

To do: Continue preparing for Debate

Oct. 21th

No class

To do: Continue preparing for midterm exam

To do: Continue preparing for debate

To do: Continue preparing for presentation and term paper

Oct. 26th

ALERT: Midterm exam (3 hours)

Oct. 28th

Update - Microsoft Teams meeting at 1:05 p.m.

ALERT: Debate 1 takes place today at 1:15 on Microsoft Teams

To do: Continue preparing for presentation and term paper

Nov. 2nd

Update - Microsoft Teams meeting at 1:05 p.m.

ALERT: Debate 2 takes place today at 1:15 on Microsoft Teams

To do: Continue preparing for presentation and term paper

Nov. 4th

Update - Microsoft Teams meeting at 1:05 p.m.

ALERT: Debate 3 takes place today at 1:15 on Microsoft Teams

ALERT: Debate reports due today at 11:59 p.m.

To do: Continue preparing for presentation and term paper

Nov. 9th and 11th

Study break – no class

Nov. 16th, 18th, 23rd, 25th, 30th, Dec. 2nd

ALERT: Student presentations

REMINDER: Prepare peer feedback on selected peer presentations

To do: Continue preparing term paper

Dec. 7th

ALERT: Student presentations (if numbers warrant)

REMINDER: Prepare peer feedback on selected peer presentations

To do: Continue preparing term paper

Dec. 8th (Tuesday, but it is a Monday in the term calendar)

ALERT: Student term papers (essays) due today

ALERT: Peer feedback document on selected peer presentations due today

End of course

Faculty of Science Course Syllabus (Section B)
Laboratory Research Techniques in Biomedical Sciences
BIOC 3610
Fall 2020

University Policies and Statements

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

Missed or Late Academic Requirements due to Student Absence

As per Senate decision instructors may not require medical notes of students who must miss an academic requirement, **including the final exam**, for courses offered during fall or winter 2020-21 (until April 30, 2021). Information on regular policy, including the use of the Student Declaration of Absence can be found here: https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.html.

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

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

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

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).

Information: 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

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

General Advising 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

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: 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

Studying for Success: 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

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

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>