



## CLASS SCHEDULE

Wednesday (lecture) 02:35 – 3:55 PM, SADB 1/12

Wednesday (tutorial) 4:05 – 4:55 PM, SADB 1/12

Friday (lecture) 02:35 – 3:55 PM, SADB 1/12 (updated on 2017-09-07)

## INSTRUCTOR

Professor Corinne A. Hoesli

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Office hours: Tuesday 2:30 - 3:30 PM or by appointment

## TEACHING ASSISTANTS (TAs)

Mohamed Elkhodiry ([mohamed.elkhodiry@mail.mcgill.ca](mailto:mohamed.elkhodiry@mail.mcgill.ca)). Office: Wong 7100. Lead contact for assignments.

Meghan Marshall ([meghan.marshall2@mail.mcgill.ca](mailto:meghan.marshall2@mail.mcgill.ca)). Office: Wong 7200. Lead contact for Lab 1.

Evelyne Kasperek ([evelyne.kasperek@mail.mcgill.ca](mailto:evelyne.kasperek@mail.mcgill.ca)). Office: Wong 5160. Lead contact for Lab 2.

## COMMUNICATION

myCourses (accessible via [www.mcgill.ca/lms](http://www.mcgill.ca/lms)) will be used to distribute all course materials.

To ask any questions, please come to my office hours, make an appointment with me, drop by my office, or contact the TAs. For questions that may interest the whole class, please post a discussion thread on myCourses.

## COURSE LEARNING OUTCOMES

- Comprehend the structure and function of basic biological compounds.
- Comprehend the reactions and processes involved in cell growth and gene expression.
- Comprehend genetic engineering strategies used to produce foreign proteins in cells.
- Develop enzyme kinetics models from first principles and apply the models obtained.
- Design, conduct and analyze molecular biotechnology experiments.
- Participate in teamwork during laboratories and presentations.
- Communicate experimental results and biotechnology concepts in written and oral reports.
- Understand the societal and economic impact of certain advances in biotechnology.
- Understand fundamental bioreactor design criteria for cell survival and growth.
- Locate external sources of information on biotechnology and engage in self-direction.



## COURSE ORGANIZATION

This course first introduces fundamental molecules involved in cell structure and function. The course then discusses methods to manipulate cells for applications in biotechnology. Finally, the course introduces fundamental notions in biochemical engineering, including enzyme kinetics, medium formulation and cell growth stoichiometry.

### Cellular biology

Module 2. Biomolecules and cell structure

Module 4. Metabolism and Bioenergetics

- Bioenergetics
- Glycolysis, fermentation, aerobic respiration

### Genetic engineering

Module 5. Molecular cell biology

- Central Dogma: replication, transcription, translation
- Control of gene expression

Module 6. Molecular biotechnology

- Manipulation of DNA
- DNA delivery vectors
- Analytical techniques
- Bioinformatics

### Industrial biotechnology

Module 1. What is biotechnology?

Module 3. Enzyme kinetics

- Michaelis-Menten kinetics
- Modulation of enzyme activity

Module 7. Introduction to biochemical engineering

- Medium formulation
- Cell growth stoichiometry
- Sterilisation

## COURSE MATERIALS

Required reading consists of an instructor-generated manual distributed via myCourses. ©Instructor generated course materials (e.g., handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission from the instructor. Note that infringements of copyright can be subject to follow up by McGill University under the Code of Student Conduct and Disciplinary Procedures.

## LABORATORY SAFETY

### WHMIS

Workplace Hazardous Materials Information System (WHMIS) training/exam is mandatory for all students registered in CHEE 370. If you haven't completed this training yet (i.e. in CHEE 291), you must inform me.

### Statement of Safe Laboratory Practice

The Department of Chemical Engineering is committed to providing a safe laboratory environment for its faculty, staff, students and visitors. We must wear appropriate attire and personal protective equipment when present in the lab. We must report accidents, dangerous incidents or suspected occupational illnesses to the immediate supervisor without delay. We must refrain from manipulating any hazardous materials prior to undergoing appropriate safety training and receiving safety instructions. Finally, the use of cell phones is prohibited in the laboratories. The laboratory technicians, teaching assistants and professors have the authority to expel from the lab anybody who does not abide by any of these rules. More information can be found on the Environmental Health and Safety (EHS) website: [www.mcgill.ca/ehs/](http://www.mcgill.ca/ehs/).



## COURSE CONTENT AND SCHEDULE (TENTATIVE)

**Please consult myCourses regularly for an updated detailed schedule and exact due dates.**

Week	Dates	Lecture Topic	Tutorial and/or lab	Due dates and notes
1	Sept 6 & 8	Module 1. Introduction to Biotechnology Module 2. Biomacromolecules and Cell Structure	No tutorial	
2	Sept 13 & 15	Module 2. Biomacromolecules and Cell Structure	Assignment 1	Assignment 1 due
3	Sept 20 & 22	Module 2. Biomacromolecules and Cell Structure	Assignment 2	Assignment 2 due Poster topic due
4	Sept 27 & 29	Module 3. Enzyme kinetics	Questions – lab protocol	<i>Bring your laptop to class!</i> Lab 1 draft protocol due
5	Oct 4 & 6	Module 3. Enzyme kinetics Module 4. Metabolism & Bioenergetics	Feedback: enzyme kinetics protocol	Lab 1 final protocol due
6	Oct 11 & 13	Module 4. Metabolism & Bioenergetics	(no tutorial)	<b>Lab 1 (all week)</b>
7	Oct 18 & 20	<b><u>October 18: Midterm Exam</u></b> Module 5. Molecular Biology of the Cell	<b>Midterm exam during tutorial</b>	<b>Lab 1 (all week)</b>
8	Oct 25 & 27	Module 5. Molecular Biology of the Cell	Assignment 3	Assignment 3 due
9	Nov 1 & Nov 3	Module 5. Molecular Biology of the Cell Module 6. Molecular Biotechnology	Midterm review	Lab 1 report due
10	Nov 8 & 10	Module 6. Molecular Biotechnology	(no tutorial)	<b>Lab 2 (all week)</b> Draft poster due (optional)
11	Nov 15 & 17	Module 6. Molecular Biotechnology Module 7. Introduction to Biochemical Engineering	Assignment 4	Lab 2 report due Assignment 4 due
12	Nov 22 & 24	Module 7. Introduction to Biochemical Engineering	Assignment 5	Assignment 5 due
13	Nov 29 & Dec 1	<b><u>Nov 29: Poster Presentations</u></b> Module 7. Introduction to Biochemical Engineering	<b>Poster session</b>	
14	Dec 6	Review	Review	



**EVALUATION AND ASSESSMENT\***

Assessment	Weight
<p><b>Assignments</b></p> <ul style="list-style-type: none"> <li>There will be 5 assignments submitted by groups of ~4 students. Assignment 1 is formative (commented, not graded). Assignments 2 to 5 each count 2.5% towards the final grade.</li> </ul>	10%
<p><b>Laboratories (2)</b></p> <ul style="list-style-type: none"> <li>The labs will take place Monday through Friday in Wong 1180. A sign-up sheet will be available to choose lab times.</li> <li>Laboratory 1 will require the submission of a draft lab protocol that will be graded.</li> <li>Labs will be performed in groups of ~4 students.</li> <li>Each lab evaluation will include both individually-graded and group-graded elements.</li> <li>Each final laboratory report must consist of the following sections: objective, background information, methods, results, discussion, conclusions.</li> </ul>	15% (10% for lab 1, 5% for lab 2)
<p><b>Poster presentation</b></p> <ul style="list-style-type: none"> <li>There will be one poster presentation by groups of ~4 students worth 10% of the final mark.</li> <li>The poster presentation will take place November 29<sup>th</sup>, from 14h35 – 16h55.</li> <li>10% of the mark will be for the quality of feedback given to other students.</li> </ul>	10%
<p><b>Individual and team work</b></p> <ul style="list-style-type: none"> <li>Contribution to team work will be evaluated by self and peer assessment. 20% of this mark is for participation (team contract and peer evaluation).</li> </ul>	5%
<p><b>Midterm exam</b></p> <ul style="list-style-type: none"> <li>The midterm exam will take place October 18<sup>th</sup> in SABD 1/12., from 2h35 – 4h55 PM.</li> <li>The midterm exam will cover material up to the lecture before the exam.</li> <li>The exam will consist of short-answer and/or long-answer questions.</li> <li>The exam is closed-book and closed-notes. Please bring a Faculty Standard Calculator.</li> </ul>	25%
<p><b>Final exam</b></p> <ul style="list-style-type: none"> <li>The final exam will be cumulative (i.e. will cover all units).</li> <li>The exam will consist of short and/or long-answer questions.</li> <li>The exam is closed-book and closed-notes. Please bring a Faculty Standard Calculator.</li> </ul>	35%
<p><b>Formative assessment</b></p> <p>Polling will be used in this course to enhance engagement. During a class with polling questions, you will respond to questions from the instructor from a personal device (smartphone, tablet, or laptop) connected to the Internet. Polling will be available through <a href="http://www.mcgill.ca/polling">www.mcgill.ca/polling</a>. For your responses to be connected to your username, you MUST first register for an account by clicking on “Register Your Account” at <a href="http://www.mcgill.ca/polling">www.mcgill.ca/polling</a> and logging in with your McGill username and password. If you do not have a phone, tablet, or laptop to use to respond to polling questions, please contact the instructor immediately in order for appropriate arrangements to be made.</p> <p>To maintain a safe and respectful classroom environment, please ensure that any polling responses you submit are appropriate and relevant to the question asked. Please note that unless the poll is labelled as anonymous, your responses are identifiable to the instructor.</p>	

\* Updated instructions, reading assignments, course materials and due dates will be posted on myCourses.



**Policy for Missed Exams/Lab/Poster presentation:** For students who miss an exam/lab/poster presentation for a valid reason (e.g. medical, accompanied by a valid medical note): the weight of the missed exam/lab/presentation will be added to the weight of the final examination.

## ACADEMIC INTEGRITY

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures” (see [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/) for more information).

Potential cases of plagiarisms will be automatically reported to the Disciplinary Officer.

## LANGUAGE OF SUBMISSION

In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

## SUGGESTED READING/REFERENCES

The course content is based on the 3 textbooks listed below, in particular *Biochemistry* by Judith and Donald Voet. To complete the material covered in handouts posted on myCourses, students are strongly advised to consult these textbooks. Two to three copies of each textbook have been placed on reserve at the Schulich Library.

Alberts, B., A. Johnson, et al. (2008). Molecular Biology of the Cell, Garland Science, Taylor & Francis Group. ISBN: 978-0-8153-4105-5

Madigan, M. T., J. M. Martinko, et al. (2012). Brock Biology of Microorganisms. San Francisco, Pearson Education, Inc. ISBN: 978-0-321-64963-8

Voet, D. and J. G. Voet (2011). Biochemistry, John Wiley & Sons, Inc. ISBN: 978-0470-57095-1