University of Manitoba

Price Faculty of Engineering
Department of Biosystems Engineering

Course Outline

Instructor
David B. Levin
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Student Hours
Individual assistance is always available by appointment. Please e-mail Dr. Levin to arrange a day and time to meet.

Lecture Days, Time, & Location
MWF 10:30-11:20 am
Human Ecology, Rm 108

Tutorial/Lab
Tuesdays, 2:30-3:45 pm
E2-150 EITC

Contact Hours
Lectures:
3 hrs x 12 weeks = 36 hrs

Tutorial/Lab:
3 hrs x 10 weeks = 30 hrs

Prerequisites
CHEM 1300
University 1 Chemistry.

Course Website
http://umanitoba.ca/umlearn

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate and Dene, and on the National Homeland of the Red River Métis.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

BIOE 2590 Biology for Engineers A01 Fall 2025 (CRN 18593)

Credit Hours: 4

Calendar Description

BIOE 2590 provides theories and principles of Biology to engineering students and presents applications of biological principles to engineering problems. Fundamental theories involved in cell structure and function, metabolism, genetics and heredity, the roles of DNA, RNA, and Proteins in cells, as well as animal structure, function, and evolution are covered. Tutorial sessions and term assignments focus on the engineering applications of these basic theories and principles to provide a good understanding of the role of Biology in Engineering.

Course Objectives

The intent of this course is to:

1. Introduce students to basic biological principles of cell structure and function, metabolism, genetics and heredity, bacteria and virus structure and function, and animal structure, function, and evolution; and
2. Provide students with an opportunity to collaborate in the learning process and develop critical thinking skills

Texts, Readings, Materials

Textbook:

Campbell Biology, Fourth Canadian Edition. by Urry, L.C., Wasserman, M., Minorsky, S., Orr, P., Hull, R., Rawle, L., Durnford, F., Moyes, D., and Kevin, CS.
Publisher, Benjamin Cummings Science. ISBN: 9780138091774
$119.95 before tax.

You can purchase the textbook with the Mastering Biology code at the Campus Bookstore or on-line at:

https://campusebookstore.com/link/?id=3c752037-13f0-4948-8483-b7f7b76e4a1f

The Mastering Biology code and the Textbook are sold together. You cannot purchase them separately.

Course Delivery

The lectures are divided into four modules: Module 1, Thermodynamics & Chemistry; Module 2, Cell Biology; Module 3, Genetics & Molecular Biology; and Module 4: Animal Diversity & Evolution.

Evaluation Method

The grading system for this course is based on a combination of four In-class Module Tests, four On-line assignments, and attendance of the Guest Lectures

Evaluation Summary:

1) In Class Module Tests:	60% (4 x 15% each)
2) On-line assignments:	32% (4 x 8% each)
3) Guest Lecture Attendance:	8% (1% per Guest Lecture)
Total:	100%

Important Dates

First day of class: Course Syllabus
Tuesday, September 2, 2025

Early Withdrawal Deadline
Tuesday, September 16, 2025

National Day for Truth and Reconciliation (Orange Shirt Day)
Tuesday, September 30, 2025
No classes or examinations

Thanksgiving
Monday, October 13, 2025
No classes or examinations

Remembrance Day (observed)
Tuesday, November 11, 2025
No classes or examinations

Fall Term Break
November 10-14, 2025
No classes or examinations

Voluntary Withdrawal Deadline
Tuesday, November 18, 2025

Last Day of Class
Monday. December 08, 2025

Lecture schedule

Lecture #	Date	Lecture Topic/Title
0	September 3	Hand-out course Syllabus
1	September 5	Matter, Elements, Atoms, & Water
2	September 8	Carbon & the Molecular Diversity of life
3	September 10	Macromolecules
4	September 12	Metabolism & Energy
5	September 15	Enzymes & Metabolism
Review	September 17	Review to Lectures 1 to 5
In-class Test	September 19	Module 1 Test
6	September 22	The Cell
7	September 24	Membrane Structure & Function
8	September 26	Cellular Respiration I
9	September 29	Cellular Respiration II
10	October 1	Photosynthesis I
11	October 3	Photosynthesis II
12	October 6	Cell Communication
13	October 8	The Cell Cycle: Mitosis
14	October 10	Meiosis
No Class	October 13	Thanksgiving
Review	October 15	Review to Lectures 6 to 14
In-class Test	October 17	Module 2 Test
15	October 20	Mendelian Genetics I
16	October 22	Mendelian Genetics II
17	October 24	Chromosomes
18	October 27	The Molecular Basis of Inheritance
19	October 29	From Gene to Protein I
20	October 31	From Gene to Protein II
21	November 3	Genetics of Bacteria
22	November 5	Genetics of Viruses
Review	November 7	Review to Lectures 15 to 22
No Class	November 10	Remembrance Day
No Class	November 11-14	Reading Week
In-class Test	November 17	Module 3 Test
23	November 19	Intro to Animal Diversity
24	November 21	Invertebrate Evolution I
25	November 24	Invertebrate Evolution II
26	November 26	Invertebrate Evolution III
27	November 28	Vertebrate Evolution I
28	December 1	Vertebrate Evolution II
29	December 3	Vertebrate Evolution III
Review	December 5	Review to Lectures 23 to 29
In-class Test	December 8	Module 4 Test

Grading Scale

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure year-to-year grading consistency.

Letter	Mark
A+	92–100
A	85–91
B+	78–84
B	72–77
C+	66–71
C	60–65
D	51-59
F	< 50

Class tutorials/Module Reviews

On specified Tuesday afternoons, from 2:30 to 4:20 pm, we will have class tutorials in which we will review the course material leading up to the Module test.

Module Review Dates:

Date	Module Review	Topic
Wednesday, September 17th	1	Review of Lectures 1 - 5
Wednesday, October 15th	2	Review of Lectures 6 - 14
Friday, November 7th	3	Review of Lectures 15 - 22
Friday, December 5th	4	Review of Lectures 23 - 29

In-class Test Dates:

Date	Module Test	Topic
Friday, September 19th	1	Lectures 1 - 5
Friday, October 17th	2	Lectures 6 - 14
Monday, November 17th	3	Lectures 15 - 22
Monday, December 8th	4	Lectures 23 - 29

On-line Assignments

You will have access to the on-line Mastering Biology website that supports the Campbell text Book. Throughout the semester, for each Module, you will be given an on-line assignment that you must complete, and submit on-line for grading. The assignments will be available to you at mid-night Thursday evening before the Friday class on the dates indicated in the On-line Assignment Due Dates table, above. Access to the assignments closes at noon on the day of the in-class Module Test (see the Important Dates table, above). There are four on-line assignments, worth 32% of your final grade.

To access the on-line Assignments, you must purchase the Mastering Biology Code. This can be purchase with the hardcopy of the Campbell Biology textbook, or the Campbell Biology eBook, or you can purchase just the Mastering Biology Code. Prices for these are listed above, on page 1 of this syllabus.

To access the on-line Assignments, you have to register at the BIOE 2590 Mastering Biology site, BIOE 2590 Fall 2024, using the following code: **levin99586**. Instructions on how to register for Mastering Biology have been uploaded to the BIOE 2590 website on UM Learn.

On-line Assignment Due Dates:

On-Line Assignment #	Accessible on	Due on
1	Friday, September 12th	Friday, September 26th
2	Friday, October 3rd	Friday, October 17th
3	Friday, October 24th	Friday, November 7th
4	Friday, November 21st	Friday, December 5th

Late Assignments: Assignments submitted after the due date will be docked 10% per school day. Missed Assignments will receive a zero grade.

Tutorial Guest Lectures

There will be a series of guest lectures on various aspects of biology and biosystems engineering. These lectures will be presented by Professors and graduate students and will highlight the interface between microbiology, biochemistry. biotechnology, and genome sciences with biosystems and bioprocess engineering. Attendance of the Guest Lectures is compulsory. Attendance in the Guest Lecture classes is work 8% (1% per Guest Lecture) of your total marks and your presence at the lecture will be recorded. The dates, presenter names, and topics are as follows:

Guest Lecture	Lecture Date	Presenter	Topic
1	Tuesday, Sept. 9th	Dr. Levin	Polymers and Plastics
2	Tuesday, Sept. 23th	Quintin Litke	Biodegradable Food Packaging Materials
3	Tuesday, Oct. 7th	Marshall Timmermans	Enzymes and Chemical Reactions
4	Tuesday, Oct.21st	Dr. Budisa	Engineering Life
5	Tuesday, Nov. 4th	Trinh Nguyen	Microbial & Enzymatic Degradation of LDPE
6	Tuesday, Nov. 18th	Sarita Shrestha	Microbial & Enzymatic Degradation of PLA
7	Tuesday, Nov. 25th	Katherine Romero	From Soda Bottles to Simple Molecules: How Enzymes Do the Work
8	Tuesday, Dec. 2nd	Kenton McCorquordale-Bauer	Antimicrobial Resistance in Waste waters

Learning Outcomes

By the end of this course, you will be able to:

Learning Outcomes	
1	Understand the basic principles of biological systems;
2	Describe the basic structures of cells and the differences between prokaryotic and eukaryotic cells;
3	Explain the differences between aerobic and anaerobic metabolism;
4	Explain the basic structures, functions, and evolution of animals;
5	Distinguish correct statements from incorrect statements through critical assessment of the information presented.

Evaluation

Evaluation Method	Value (%)	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Module 1 Test	15	S	1 to 5	I
Module 1 On-line assignment	10	S	1 to 5	I
Module 2 Test	15	S	1 to 5	I
Module 2 On-line assignment	10	S	1 to 5	I
Module 3 Test	15	S	1 to 5	I
Module 3 On-line assignment	10	S	1 to 5	I
Module 4 Test	15	S	1 to 5	I

Evaluation Method	Value (%)	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Module 4 On-line assignment	10	S	1 to 5	I

* Method of Feedback: **F** - Formative (written comments and/or oral discussion), **S** - Summative (numerical grade) ** I/T: **I** – Individual effort, **T** – Team effort

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 100%
- Complementary Studies: 0%
- Engineering Science: 0%
- Engineering Design: 0%

Graduate Attributes

KB: A knowledge base for engineering
PA: Problem analysis
IN: Investigation
DE: Design
ET: Use of engineering tools
IT: Individual and team-work
CS: Communication skills
PR: Professionalism
IE: Impact of engineering on society/environment
EE: Ethics and equity
EP: Economics and project management
LL: Life-long learning

Competency Levels

I - Introduced
D – Intermediate (Developing)
A - Advanced

CEAB Graduate Attributes Assessed

This course will assess the following CEAB graduate attribute indicators shown below:

Indicator (Level)	Indicator Description	Assessment Point
KB.2 (I)	Recalls and defines, and/or comprehends and applies information, first principles and concepts in the natural sciences	Module tests & On-line assignments

Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations on Academic Integrity, students are reminded that plagiarism, use of Artificial Intelligence (AI), or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Requirements/Regulations

- Please copy the Instruction Team in all emails (Instructors and Teaching Assistants). All email communication must conform to the Communicating with Students university policy.

Communicating with Students

- As the Instruction Team, we will do our best to respond to all emails **within 48 hours during working hours** (8:30 AM – 5:30 PM Monday thru Friday). Ex. A Friday night email may not be responded to until the following Tuesday.

- Self-declaration forms may be completed for missed tests, exams, or assignments during short-term absences (≤72 hours) for extenuating circumstances. This form cannot be used for planned absences like vacations. It is also not to be used for longer-term absences, or ongoing circumstances (e.g., Authorized Withdrawals, Leaves of Absence, or other accommodations), which will still require additional documentation.

Self-Declaration Form for Brief or Temporary Absence

Self-Declaration Policy for Brief or Temporary Absences

- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should familiarize themselves with the University's *General Academic Regulations*.

General Academic Regulations

Engineering Academic Regulations

- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g., Academic Integrity, Respectful Behaviour, Examinations, and related matters.
- *Supplemental Resources*

Deferred Final Examinations

Students who miss the regularly scheduled writing of a final examination for valid medical or compassionate reasons will only be allowed to write a deferred exam if the Associate Dean (Undergraduate) approves the request. All requests for a deferred examination *must* be made within 48 hours of the missed exam and follow the procedure described on the Faculty website without exception. Course Instructors *do not have the discretion* to grant deferred final examinations.

Deferred Exam Policy (student experience website)

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e., assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the Instructor and the Department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

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