

Course Details

Course Title & Number:	BIOE 2590 Biology for Engineers
CRN:	18593
Days of Week; Class times; Locations	Lectures: MWF; 10:30 - 11:20 am; E2-160 EITC Tutorials: Tuesdays; 2:30 - 3:45 pm; E2-165 EITC

Course 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 structure and function of bacteria and viruses, 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

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he intent of this course is to:

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

Why this course is useful: This course is the “Bio” in Biosystems Engineering. As biosystems engineers, you will need a basic understanding of the structure, function, and energy transformations of biological systems at the cellular and organismal levels, and how these processes are affected by both internal and external environmental parameters.

Who should take this course?: This is a required course in the Biosystems Engineering program.

How this course fits into the curriculum: It is intended that students take this course during the first year after being accepted into the Department of Biosystems Engineering. As mentioned above, this course introduces students to the basic principles of biology.

Pre-Requisites: CHEM 1300 or University 1 Chemistry (Chem 1310)

Instructor Information

Instructor(s) Name: Dr. David Levin, Professor
Office Location: E1-354 EITC
Availability: By appointment: Send me an e-mail message any time (24/7).
I will respond within 24 hours with a day and time that we can meet on-line.
Office Phone No. 204-474-7429
Email: david.levin@umanitoba.ca

Textbook, Readings, Materials

Required Text Book and Additional Material

Campbell, N.A., J.B. Reece and L.G. Mitchell. 2020. *Biology*, eText with Mastering Biology: On-line resources provided by the textbook publisher, Benjamin Cummings Science.

There are two options:

- 1) Purchase an eText copy of Campbell Biology, with Mastering Biology Code: \$123.50
- 2) Purchase Mastering Biology Code only (without the Campbell Biology eText): \$ 49.50

Note: If you have, or can purchase, a used hardcopy of Campbell, Reese, & Mitchell, *Biology*, 3rd Canadian Edition of you can purchase the Mastering Biology Code only.

How to Purchase the Campbell Biology eBook and/or Mastering Biology on-line:

The Campbell Biology eBook and Mastering Biology code digital products can be purchased by directly from The University of Manitoba bookstore online store: <http://www.umanitoba.ca/bookstore/>

Once you at the UManitoba Bookstore website, click on “Shop Textbooks”. Under “Search by Course”, click on Department click on “Course-Section-Instructor” and then selected BIOE 2590-A01 Levin, David

After these selections are made, you click “View Your Materials” which will take you to the course materials page.

Both the eText with Modified Mastering & the Modified Mastering component by itself are listed there.

If you have questions, you can contact the UofM Bookstore:

UofM Bookstore phone: 204-474-7961

UofM Bookstore email: bookstore_webmaster@umanitoba.ca

General Course Information

Instructional Methods

Learning is most effective when both the teacher and the student are engaged in the subject material. The role of the teacher, therefore, is to create an environment that facilitates student engagement (and therefore learning). Due to the COVID-19 pandemic, this course will be presented entirely on-line. All of the lectures will be presented on-line in the scheduled class times (MWF 10:30 to 11:20 am) via WebEx. The lectures presented on-line will be recorded and then posted to the BIOE 2590 website on UM Learn. The tutorial classes (on Tuesdays from 2:30 to 3:45) will also be presented on-line and will be used for clarification of specific topics, special guest lectures, and reviews of lecture materials in advance of class tests.

A complete set of the lectures is already posted to the UM Learn website, but these do not have voice-over recordings. The lectures recorded during scheduled class periods via the WebEx will be uploaded to the UM Learn website after each class. The files with the voice-over recording are very large (60 to 100 Mb), and not all students have the computer capacity to download files of this size. The files without the voice-over recording are smaller (3 to 5 Mb).

A substantial portion of the course content is contained within the assigned textbook and supplementary materials accessible on-line through the Mastering Biology website, provided by the textbook publisher. Students are expected to prepare for class by reviewing the lecture PowerPoint files, reading the assigned materials in the textbook, and completing on-line assignments.

The Department of Biosystems Engineering has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and is unable to continue lectures in-person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

How does this course fit into the curriculum?

This is a required course in the Biosystems Engineering program; the prerequisite for BIOE 2900 is ENG 1430. The Biosystems Engineering program has four design courses that build upon basics that were introduced in ENG 1430 (i.e., introduction to the engineering design process and the dynamics of working as a team to solve an engineering problem). BIOE 2900 is the first of these four courses and is to be taken during the 2nd year of the program.

Intended Learning Outcomes

The Accreditation Detail for this course is 100% Natural Science

The Graduate Attribute for this is KB: A knowledge base for engineering

At the conclusion of the course, the student should be able to:

No.	Learning Outcome	Transferable Skill
1	Understand the basic principles of biological systems	Scientific knowledge
2	Describe the basic structures of cells and the differences between prokaryotic and eukaryotic cells	Scientific knowledge
3	Explain the differences between aerobic and anaerobic metabolism	Scientific knowledge
4	Explain the basic structures and functions of viruses and bacteria	Scientific knowledge
5	Explain the basic structures, functions, and evolution of animals	Scientific knowledge
6	Distinguish correct statements from incorrect statements through critical assessment of the information presented	Scientific knowledge

Expected Competency Levels

Learning Outcome	Attribute*											
	KB-2**	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1	I											
2	I											
3	I											
4	I											
5	I											
6	I											

***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

Expected Level of Development:

- I – Introductory
- D – Developed
- A – Advanced

** KB-2: Recalls and defines and/or comprehends and applies information and concepts in the natural sciences.

 Course Evaluation Methods

The grading system for this course is based on a combination of four In-class Module Tests and four On-line assignments.

Evaluation Summary:

1) In Class Module Tests:	60% (4 x 15% each)
2) On-line assignments:	40% (4 x 10% each)
Total:	100%

 Grading

The grading scale used for this course is shown below:

Letter Grade	Percentage out of 100	Grade Point Range
A+	92.00 – 100.0	4.14-4.50
A	85.00 – 91.99	3.82-4.14
B+	78.00 – 84.99	3.51-3.82
B	72.00 – 77.99	3.24-3.51
C+	66.00 – 71.99	2.97-3.24
C	60.00 – 65.99	2.70-2.2.97
D	50.00 – 59.99	2.25-2.70
F	< 49.99	< 2.25

All courses in the Biosystems Engineering program are expected to contribute, in some way, to the development of one or more of the 12 graduate attributes that have been identified by the Canadian Engineering Accreditation Board. The table below shows the graduate attributes covered in BIOE 2590 in relation to the assessment element that contributes to your overall grade in the course. The final column indicates the approximate level of development in graduate attributes that is anticipated in this course.

Assessment Element	Value	Attributes Covered	Indicators being assessed	Level*
Class Module Tests	60%	Knowledge base for engineering	KB.2 Recalls and defines and/or comprehends and applies information and concepts in the natural sciences	I
On-line Assignments	40%	Knowledge base for engineering	KB.2 Recalls and defines and/or comprehends and applies information and concepts in the natural sciences	I

*Level of Development Grade Attributes (I – Introductory; D = Intermediate; A = Advanced)

Important Dates

Event	Date
Last day to drop fall term courses without penalty	Tuesday, September 20 th
Voluntary withdrawal date	Tuesday, November 22 ^{cd}
1 st In-class Test: Module 1 - Thermodynamics & Chemistry	Friday, September 23 rd
2 ^{cd} In-class Test: Module 2 - Cell Biology	Wednesday, October 21 st
3 rd In-class Test: Module 3 - Genetics & Molecular Biology	Monday, November 21 st
4 th In-class Test: Module 4: Animal Diversity & Evolution	Monday, December 12 th

Class Tutorials & Module Reviews

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 21 st	1	Review of Lectures 1 - 5
Wednesday, October 19 th	2	Review of Lectures 6 - 14
Friday, November 18 th	3	Review of Lectures 15 - 22
Friday, December 9 th	4	Review of Lectures 23 - 29

Assignment Descriptions

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 40% 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 2022, using the following code: **levin22015**.

On-line Assignment Due Dates:

On-Line Assignment #	Accessible on	Due on
1	Friday, September 16 th	Friday, September 30 th
2	Friday, October 7 th	Friday, October 21 st
3	Friday, October 28 th	Friday, November 18 th
4	Friday, November 25 th	Monday, December 12 th

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

Guest Lectures

There will be a series of guest lectures on various aspects of biology and biosystems engineering. These lectures will be presented by graduate students and will highlight the interface between microbiology, biotechnology, and genome sciences with biosystems and bioprocess engineering. Attendance of these lectures is obligatory, and there will be questions on the Module tests on the lectures. The dates, presenter names, and topics are as follows:

Guest Lecture	Lecture Date	Presenter	Topic
1	Tuesday, Sept. 27 th	Joe Ackerman	The Problem with Recycling
2	Tuesday, Oct. 11 th	Quin Litke	Biodegradable Food Packaging Materials
3	Tuesday, Oct. 25 th	Daniel Flores-Orozco	Anaerobic Digestion of Manure
4	Tuesday, Nov. 2 nd	Ryan Sestric	Microbial production of carotenoids
5	Tuesday, Nov. 16 th	Peter Owoade	Carbon capture and ethanol production
6	Tuesday, Dec. 6 th	Madeline Stanley	Engineered Floating Wetlands and bioremediation

University & Course Policies

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 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

- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, smart watches, wireless communication, or data storage devices) are allowed in examinations unless approved by the course instructor.
- All email communication must conform to the Communicating with Students university policy. [Communicating with Students](#)
- Attending lectures and laboratories is essential for the successful completion of this course.
- Self-declaration forms may be completed for missed tests, exams, or assignments during short-term absences (≤ 72 hours) for extenuating circumstances. Students don't need to share personal information about their situation beyond declaring the nature of the extenuating circumstance on the self-declaration form.

[Self-Declaration Form for Brief or Temporary Absence](#)

- 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 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*, as well as Section 3 of the Faculty of Engineering *Academic Regulations* dealing with incomplete term work, deferred examinations, attendance, and withdrawal.

 [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](#)

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/or 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.

Copyright Notice

- All materials provided in this course are copyright and are provided under the fair dealing provision of the Canadian Copyright Act. This material may not be redistributed in any manner without the express written permission of the relevant copyright holder.

 [Copyright Office](#)

Recording Class Lectures

- Dr. Levin and the University of Manitoba hold copyright over the course materials, presentations and lectures that form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from Dr. Levin. Course materials (both paper and digital) are for the participant's private study and research.

Use of Cell Phones

- As a courtesy to both the instructors and your classmates, use of cell phones is not permitted during class time. Please remember to switch your cell phone to vibrate mode to avoid interruptions. Laptops may be used during lectures only for the purpose of taking notes. Some course materials will be available through UM Learn.

Class Communication

- The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:
http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf
- Please note that all communication between you as a student and your instructors/TAs must comply with the electronic communication with student policy:

http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html).

You are required to obtain and use your UManitoba email account for all communication between yourself and the university.

Expectations: What you can expect from me:

- Learning is most effective when both the teacher and the student are engaged in the subject material. The role of the teacher, therefore, is to create an environment that facilitates student engagement and learning. In this course, some dissemination of information will occur using the traditional lecture format. However, a substantial portion of the content will be distributed as reading materials, which will be covered using classroom discussion or other learning activities. You can expect us to endeavour to create an active learning environment.

Expectations: What I expect from you:

- I expect you to attend the lectures, and be on time, for all scheduled lectures and tutorials. If you must be absent, please show us the courtesy of sending an e-mail notifying us of your absence. To benefit the most from this class, you must be willing to participate in class discussions. Therefore, you will be expected to prepare for class by reading the assigned materials.

Student Accessibility Services

- If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services

<http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

Student_accessibility@umanitoba.ca
