

Department of Medical Biophysics
MEDBIO 4455A – Biological Control Systems

Course Syllabus for Fall 2022



Western University is committed to a **thriving campus**; therefore, your health and wellness matter to us. The following link provides information about resources available on and off campus to support students: <https://www.uwo.ca/health/>. Your course coordinator can also **guide you** to resources and/or services should you need them.

1. Technical Requirements:



Laptop with MATLAB installed



Working microphone (to attend remote office hours)



Working webcam (to attend remote office hours)

2. Important Dates:



Classes Begin	Reading Week	Classes End	Study day(s)	Exam Period
September 8	November 1-7	December 8	December 9	December 10–21

* November 12, 2021: Last day to drop a first-term half course or a first-term full course without penalty

3. Contact Information



Course Coordinator James Lacefield	Contact Information jlacefie@uwo.ca
Teaching Assistant Samir Abdel Rahman	Contact Information sabdel3@uwo.ca

4. Course Description and Design

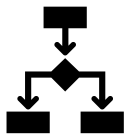
Delivery Mode: In person

An introduction to linear systems and control theory as applied to organ system regulation and adaptation. Emphasis is placed on biophysical models of the cardiovascular and respiratory systems and interactions of those systems with medical devices.

Antirequisite: ECE 4455A/B.

Prerequisite(s): MEDBIO 3501F and MEDBIO 3505F, or permission of the department.

Timetabled Sessions



Component	Date(s)	Location and Time
Lecture	Mondays	ACEB 1420, 10:30-11:30 am
	Tuesdays	ACEB 1420, 5:30-6:30 pm
	Wednesdays	ACEB 1415, 4:30-5:30 pm

Attendance at class sessions is expected.

All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, they can seek support on the [OWL Help page](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be contacted by phone at 519-661-3800 or ext. 83800.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

5. Learning Outcomes

Upon successful completion of this course, students will be able to:

- Explain the physiological and biophysical basis of biomedical systems models and analyze those models using concepts from systems analysis and control theory.
- Demonstrate the use of biomedical systems models to inform the design of medical devices.
- Employ software tools to investigate the dynamic behaviour of biomedical systems.
- Investigate and critique hypotheses, modeling approaches, and conclusions presented in primary-source biomedical engineering and medical physiology literature.
- Identify and analyze ethical issues arising from allocation of scarce medical resources and from use of biomedical models to make decisions about public health or safety concerns.



6. Course Content and Schedule



Week	Dates	Topic
1	Sept. 8–9	No scheduled class meetings
2	Sept. 12–16	Introduction to Biomedical Modeling
3	Sept. 19–23	Cardiac Electrophysiology and Implantable Cardioverter Defibrillators
4	Sept. 26–30	
5	Oct. 3–7	
6	Oct. 11–14	Cardiovascular Mechanics and Left Ventricular Assist Devices
7	Oct. 17–21	
8	Oct. 24–28	
9	Oct. 31 – Nov. 4	Reading Week
10	Nov. 7–11	Respiratory Mechanics and Mechanical Ventilation
11	Nov. 14–18	
12	Nov. 21–22	
12, cont.	Nov. 23–25	Respiratory Regulation and Pathophysiology of Unstable Periodic Breathing
13	Nov. 28 – Dec. 2	
14	Dec. 5–8	

7. Participation and Engagement



- Students are expected to engage with the course content as much as possible, including reading assigned case studies and journal articles before the deadlines recommended on the course OWL site and completing advance preparation for in-class MATLAB investigations and ethics discussions as directed on the OWL site.
- Students can participate by contributing to ethics discussions on Oct. 5 and Nov. 22.
- Students can participate by working collaboratively with their classmates during MATLAB investigation sessions. A schedule of these sessions will be posted on OWL.

8. Evaluation

Below is the evaluation breakdown for the course. Any deviations will be communicated.

Assessment	Format	Weighting	Due Date
Homework (3)	Written responses submitted via OWL Assignments tool	35%	Oct. 12, Nov. 9, Nov. 29
Quizzes (4)	OWL Quiz tool	20%	Oct. 3, Oct. 28, Nov. 21, Dec. 6
Minute Papers (2)	Written responses submitted in person	5%	Oct. 7, Nov. 22
Final Project	Written responses submitted via OWL Assignments tool	40%	Dec. 16

- All homework assignments and quizzes are due at 11:55 pm Eastern (London, Ontario) time unless otherwise specified.
- Students are responsible for ensuring that the correct file version is uploaded. Incorrect submissions, including corrupt files, could be subject to late penalties (see below) or a 0.
- Quizzes will be available to students for at least 72 hours. Each quiz may be submitted twice; the higher mark will be recorded.
- After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator. To ensure a timely response, reach out within 7 days.
- Any grade appeals on assignments or quizzes must be received within 3 weeks of the grade being posted.



Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table below outlines the University-wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

Information about late or missed evaluations:

- Homework assignments will be accepted without penalty until the end of a grace period lasting 24 hours after the posted due date.
- Homework assignments submitted more than 24 hours late without illness self-reports will not be accepted unless alternate arrangements are agreed to *in advance* by the instructor.
- Late homework assignments with illness self-reports should be submitted within 48 hours of submission of the last illness self-report.
- The OWL quiz tool will not permit late submission of quizzes.
- Minute papers will be completed during class sessions and must be submitted at the end of that class period. Late submissions of minute papers will not be accepted.
- If a student submits an illness self-report or receives an accommodation for a missed quiz or minute paper, the weight of that assessment will be transferred to the final project.

INC (Incomplete Standing): If a student has been approved by the Academic Counselling Office (in consultation with the instructor/department) to complete term work at a later date, an INC will be assigned. Students with INC will have their course load in subsequent terms reduced to allow them to

complete outstanding course work. Students may request permission from Academic Counselling to carry a full course load for the term the incomplete course work is scheduled.

9. Communication:



- Students should check the OWL site every 24 – 48 hours.
- Students should e-mail their instructor at his uwo.ca e-mail addresses.
- E-mails will be monitored daily; students will receive a response in 24 – 48 hours.

10. Office Hours:



- Office hours will be held in hybrid format (*i.e.*, in person and remotely using Zoom).
- Office hours will be held Thursdays, 3:00-4:00 pm, beginning September 22.
- Office hours will be drop-in format.
- Office hours may be used for individual or small-group consultations.

11. Resources



- All resources, including required and recommended reading and MATLAB scripts for systems models, will be posted in OWL.
- There is no required textbook.

12. Professionalism & Privacy:

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:



- All course materials created by the instructor(s) are copyrighted and cannot be sold or shared.
- Recordings (audio or video) are not permitted without explicit permission from the instructor.
- Permitted recordings are for the student's personal use and are not to be distributed.
- Students may be expected to take an academic integrity pledge before some assessments.

Western is committed to providing a learning and working environment that is free of harassment and discrimination. All students, staff, and faculty have a role in this commitment and have a responsibility to ensure and promote a safe and respectful learning and working environment. Relevant policies include Western's [Non-Discrimination/Harassment Policy](#) and [Non-Discrimination/Harassment Policy – Administrative Procedures](#).

Any student, staff, or faculty member who experiences or witnesses behaviour that may be harassment or discrimination **must report the behaviour** to the Western's Human Rights Office. Harassment and discrimination can be human rights-based, which is also known as EDI-based (sexism, racism, transphobia, homophobia, Islamophobia, xenophobia, antisemitism, and ableism), or non-human rights-based (personal harassment or workplace harassment).

13. How to Be Successful in this Class:

Students enrolled in this class should understand the level of autonomy and self-discipline required to be successful.



1. Invest in a planner or application to keep track of your courses. Populate all your deadlines at the start of the term and schedule time at the start of each week to get organized and manage your time.
2. Make it a daily habit to log onto OWL to ensure you have seen everything posted to help you succeed in this class.
3. Follow weekly checklists created on OWL or create your own to help you stay on track.
4. Take notes during class lectures and discussion sessions. Keeping handwritten notes or notes in a Word document or other electronic format will help you learn more effectively.
5. Connect with others. Try forming an in-person or online study group and try meeting on a weekly basis for study and peer support.
6. Do not be afraid to ask questions. If you are struggling with a topic, check the online discussion boards or contact your instructor(s) and or teaching assistant(s).

14. Western Academic Policies and Statements

A. Absence for Medical Illness:

Students must familiarize themselves with the [Accommodation for Illness Policy](#).

A student seeking academic accommodation for any **work worth less than 10%** must contact the instructor or follow the appropriate Department or course specific instructions provided on the course outline. Instructors will use good judgment and ensure fair treatment for all students when considering these requests. You are not required to disclose details about your situation to your instructor; documentation is not required in this situation, and you should not send any pictures to your instructor.

If you are unable to meet a course requirement for any **work worth 10% or greater** due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Academic Counseling as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. Please note that the format of a make-up test, exam, or assignment is at the discretion of the course coordinator.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

B. Absence for Non-Medical Reasons:

Student absences might also be approved for non-medical reasons such as religious holidays and compassionate situations. Please review the policy on [Accommodation for Religious Holidays](#). All non-medical requests must be processed by Academic Counselling. Not all absences will be approved; pay attention to the academic calendar and final exam period when booking any trips.

C. Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has

implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found [here](#).

Academic Offenses

Scholastic offences are taken seriously, and students are directed [here](#) to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review [The policy on Accommodation for Students with Disabilities](#).

Correspondence Statement

The centrally administered **e-mail account** provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner. You can read about the privacy and security of the UWO email accounts [here](#).

Discovery Credit Statement

Students are permitted to designate up to 1.0 Discovery Credit course (or equivalent) for pass/fail grading that can be counted toward the overall course credits required for their degree program. The details of this policy and the deadlines can be found [here](#).

15. BMSUE Academic Policies and Statements

Copyright and Audio/Video Recording Statement

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws. You must always ask permission to record another individual and you should never share or distribute recordings.

Rounding of Marks Statement

Across the Basic Medical Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g., a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

16. Support Services

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

The following links provide information about support services at Western University.

[Academic Counselling \(Science and Basic Medical Sciences\)](#)

[Appeal Procedures](#)

[Registrarial Services](#)

[Student Development Services](#)

[Student Health Services](#)