

MEDICAL BIOPHYSICS
MEDBIO 3501A

Circulatory and Respiratory Sciences 1

Short form - Course outline for Fall 2026

Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, and Lūnaapéewak peoples, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish With One Spoon Covenant Wampum.

1. Technical Requirements



Stable internet connection



Laptop or computer

2. Course Overview and Important Dates

Classes Begin	Reading Week	Classes End	Study day(s)	Exam Period
September 9	October 10-18	December 9	December 10	December 11–22

September 30, 2026: National Day for Truth and Reconciliation; non-instructional day

September 17, 2026: Last day to add or drop a Fall 12-week course

November 30, 2026: Last day to withdraw from a Fall 12-week course without academic penalty

3. Contact Information

This information is limited to persons having Western University credentials with permission to access Western University' academic service portals.

4. Course Description and Design

Delivery Mode: in-person

Course summary

The study of the biophysics and physiology of the cardiovascular and respiratory systems in health and disease, including cellular biophysics, cardiac function, physics of blood flow, vascular mechanics in the microcirculation and large vessels, lung function, physics of air flow, breathing mechanics, diffusive and convective transport and exchange.

Prerequisites

One of [Calculus 1000A/B](#), [Calculus 1500A/B](#), [Mathematics 1225A/B](#), [Numerical and Mathematical Methods 1412A/B](#), the former Applied Mathematics 1412A/B, the former Applied Mathematics 1413; one of [Physics 1201A/B](#), [Physics 1401A/B](#), [Physics 1501A/B](#), the former Physics 1028A/B, the former Physics 1301A/B. Typically taken in third year, this course is also open to second-year students with an overall average of at least 70% in first year.

Prerequisite checking – the student's responsibility

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Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Course Weight: 0.5

Breadth: Category C

Subject code: MEDBIO

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 Student Accessibility Services at 519-661-2147 for any specific question regarding an accommodation.

Timetabled Sessions

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2 h classroom lessons per week. 1 h Tutorial per week. Online lessons.

- Asynchronous pre-work lessons must be completed prior to in-person sessions.
- Attendance at in-person sessions is required.
- Students have access to all course materials, assignments, exams, and tutorials through OWL: <https://westernu.brightspace.com/d2l/login>. 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 Brightspace Help](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be contacted by phone at 519-661-3800 or ext. 83800.
- Current versions of Safari, Chrome, Edge, and Firefox are supported with OWL Brightspace; what is most important is that you update your browser frequently to ensure it is current. All JavaScript and cookies should be enabled.

5. Course Syllabus

Teaching Rationale

This course uses primarily the flipped classroom approach to learning.

Online asynchronous lessons with pre-recorded videos introduce fundamental background for physiology and biophysics concepts related to the organization, structure, and function of selected components of the human cardiovascular and respiratory system. The course highlights with examples from medicine and scientific literature, various applications of biophysics and measurements of cardiovascular and respiratory functions, structures and behaviors. Organized into modules, the online lessons, which may be a review for some and new for other students, are necessary for establishing a common baseline to allow discussions later in the course.

The principal instructor facilitates discussion of course related topics during the In-person lecture periods. Students prepare themselves for class by reviewing the asynchronous lessons and materials posted on Brightspace OWL and attending Tutorials. Students participate in class discussions and group work on material covered in lessons from prior and current week. The

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instructor assigns work for completion prior to class, group work in class, and individual, and group work to be followed up in subsequent classes, or tutorials.

Teaching Assistants lead tutorials. Students are expected to complete work prior to class and or in Tutorials. Some of this work may be followed up in subsequent Lecture and Tutorial periods. Tutorials are opportunities for students to discuss the current Assignment with instructors and work on problem solving skills and writing as individuals or in groups. Instructors encourage students to ask questions about any course material covered in lectures throughout the term.

Students must become familiar with all required course readings and course materials posted on OWL Brightspace, review all lessons, attend all tutorials, complete all assignments, and examinations. Students are encouraged to become familiar with recommended reading lists.

Course Learning Outcomes

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

- Explain the functions and structures of organs, tissues, and cells found in the human cardiovascular and respiratory systems.
- Predict and calculate biophysics concepts and formulas, including those related to blood flow, blood pressure, cardiac function, diffusion, partial pressures.
- Critically appraise scientific literature.
- Generate hypotheses to test solutions for problems encountered in the cardiovascular and respiratory systems.
- Express evidence-based opinions in disciplinary discussions, reports, and presentations.

6. Course Content and Schedule

Week	Module / Topics
1	001 Introduction to the circulatory system
2	002 Biophysics Principles: a focus on transport of fluids
3	003 The heart, the vasculature, and the blood.
4	004 Cellular biophysics of cardiac cells
5	005 The heart as a pump
6	Reading Week
7	005 The heart as a pump
8	006 Midterm Review and Exam Week
9	007 Peripheral vascular system and vascular control; blood and the microcirculation
10	007 Peripheral vascular system and vascular control; blood and the microcirculation
11	008 Respiratory system and biophysics
	009 Lung function, blood flow, and ventilation-perfusion
12	010 Oxygen transport and diffusion
	011 Technology & Applications
13	011 Technology & Applications
14	012 Course Wrap up
Dec 10	University study day

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Set by Registrar Dec 11 – 22	<i>Final Exam Cumulative; on campus; date and time and location to be determined</i>
The themes and dates reflect the expected timelines to cover these topics. We may spend longer or shorter time on topics as the semester unfolds.	

7. Evaluation

Assessment	Deadlines	Methods	Grade Weight (%)	Flexibility
Assignment #1	Week 3	Mixed. Primarily problem solving by making calculations.	10	72-hour no late penalty
Assignment #2	Week 5	Mixed. Primarily writing structured critical appraisal of article/topic area related to cardiovascular sciences.	25	72-hour no late penalty
Assignment #3	Week 11	Group Project. Written.	25	72-hour no late penalty
	Weeks 12, 13	Group Project. Oral.		Grade weighting.
Midterm	Week 8	In person on campus. Mixed. Short answer. Problem solving questions that require calculations. Covers first half of course.	20	Not applicable.
Final Exam	University Scheduled	In person on campus. Mixed. Short answer. Problem solving questions that require calculations. Cumulative. Covers all of course.	20	Not applicable

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Designated Assessment: Instructors are permitted to designate one assessment per course per term as requiring supporting documentation to receive academic consideration. See below for information on academic consideration policy and missed course work. For 3501A, the following assessment is designated as requiring supporting documentation:

Midterm	Week 8	In person on campus. Mixed. Short answer. Problem solving questions that require calculations. Covers first half of course.	20%
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Access to full copy of the official Course syllabus is limited to people having Western University credentials with permission to access Western University's academic service portals.