



HK*4550 Human Cardio-respiratory Physiology

Fall 2018
Section(s): C01

Department of Human Health and Nutritional Sciences
Credit Weight: 0.50
Version 1.00 - September 07, 2018

1 Course Details

1.1 Calendar Description

The central focus of this course is a comprehensive examination of the effects of a variety of work parameters on normal cardio-respiratory adjustments required to meet metabolic demands. Immediate adjustments to increase metabolic rate as well as long term cardio-respiratory adaptability will be discussed.

Pre-Requisite(s): HK*3810 or HK*3940

1.2 Course Description

The goal of the course is to understand how these systems of energy and substrate delivery – the respiratory and cardiovascular systems – maintain or meet energy demands that occurs while engaging in exercise or physical activity.

1.3 Timetable

Day and Time: Monday, Wednesday and Friday, 11:30-12:30

Location: ROZ 103

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructor(s)

Dr. Jeremy Simpson

Email: jeremys@uoguelph.ca

Telephone: 5198244120 x56629

Office: ANNU 349

Office Hours:

- Any time after lecture

- In class time
- By appointment
- Wednesday 4:30–5:30PM (Tentative)

2.2 Teaching Assistant(s)

Teaching Assistant: Jade Marrow
Email: jmarrow@uoguelph.ca
Office Hours: By appointment only

3 Learning Resources

This course will consist of 12 weeks of lectures (3 lectures per week, each lasting 50 minutes). The course is taught in lecture format with handouts of diagrams available online.

3.1 Additional Resource(s)

Respiratory Physiology: The Essentials. (Textbook)

West, JB. and Luks **Respiratory Physiology: The Essentials**. 10th Ed, Lippincott, Williams, Wilkins (LWW), Baltimore, 2012. \$60.00 for used and \$80.00 for new

9th edition was published in 2011

Cardiovascular Physiology (Textbook)

Mohrman, DE, & LJ Heller. **Cardiovascular Physiology**. 9th Ed. Lange Physiology Series, McGraw-Hill, Toronto. 2010. ~\$40.00 for used and \$52.00 for new

7th edition was published in 2010 and 8th edition was published in 2014

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Identify and explain the different hemoglobin isoforms and be able to demonstrate knowledge of how changes in their ratio impact exercise performance.
2. Demonstrate an understanding of how hemoglobin is acutely and chronically regulated to optimize Oxygen delivery to a working muscle.
3. Analyze the oxygen content of blood in response to various physiological situations.
4. Demonstrate knowledge of how carbon dioxide is transported from a contracting muscle

to the lung.

5. Diagram or illustrate the control of ventilation
6. Summarize the structural components of the lung at the cellular level.
7. Demonstrate an ability to analyze oxygen diffusion across the alveolar surface.
8. Understand how blood flow (and resistance) is controlled within the pulmonary circulation. Explain both circulatory and non-circulatory functions of the lung.
9. Describe the limitation of current models and serum markers for studying respiratory function. Define central vs peripheral vs neuromuscular fatigue/failure. Explain direct and indirect measures of muscle function, including what limitations each have in an experimental and clinical setting.
10. Evaluate pulmonary system response to various stresses.
11. Summarize the structural components of the Cardio-vascular system
12. Analyze the cardiac cycle through the use of electrocardiogram, echocardiographs and pressure-volume loops.
13. Understand contractile reserve and how it is modulated.
14. Summarize the major cell types of the heart and demonstrate an understanding of their physiological significance.
15. Evaluate cardiac compliance in response to various stresses.
16. Analyze the hypertrophic response of the heart to various stresses.
17. Explain how respiratory physiology affects cardiac physiology and vice versa.
18. Develop basic critical thinking skills that correlate the abnormal functions of body systems with the disease process.

5 Teaching and Learning Activities

The lecture material will introduce the physiological concepts using resting and exercise situations to examine how the respiratory and cardiovascular (CV) systems respond to the stress of increasing substrate demand and by-product production while moving about during daily living. The primary goals of the respiratory and CV systems are to maintain the blood gas status and blood pressure in the vascular system within a “normal” or homeostatic range.

5.1 Lecture

Topic(s): Introduction to Respiratory and Cardiovascular Physiology
Interaction with the Environment – Homeostasis, Systems Design, Blood Volume, Factors Limiting Exercise Performance, Control Principles

Carriage of Oxygen and Carbon Dioxide in the Blood

Topic(s): Respiratory Physiology
Control of ventilation

Structure and function of the lungs

Ventilation – how gas gets to the lungs

Diffusion – how gas gets across the blood/gas barrier

Lung blood flow – systemic and local

Ventilation/perfusion relationships

Mechanics of breathing

Acid base regulation and the lung (not in text)

Response of the pulmonary system to exercise and exercise training (not in text)

Diseases of the pulmonary system (not in text)

Topic(s): Cardiovascular Physiology
Anatomical design and terminology of the CV system

Cardiovascular regulation – maintaining blood pressure

Structure and function of the heart

Cardiac cycle and the electrocardiogram

Control of cardiac output.

Control of peripheral resistance and flow

Longer term regulation of blood pressure – interaction with fluid volume (not in text)

Diseases of the cardiovascular system (not in text)

Response of the CV system to exercise and exercise training (not in text)

6 Assessments

6.1 Assessment Details

Midterm 1 (20%)

Date: Wed, Oct 3, 5:30 PM - 7:00 PM, tba

Lectures 1 to 10 (Sept 7th – Sept 28th)

Oct 3rd -Review class for those who are interested at 11:30 AM

Midterm 2 (30%)

Date: Mon, Oct 29, 5:30 PM - Wed, Oct 31, 7:00 PM, tba

Lectures 11 to 20 (Oct 1st – Oct 24th)

Oct 29th - review class at 11:30 AM.

Note: Friday November 2nd is the 40th class day

Final Exam (50%)

Date: tba

Cumulative - Lectures 1 to 36

6.2 Method of Assessment

	Weight (%)	Learning Objectives	Lectures on exam	Info
Midterm I	20%	1-4	1-10	The mid-term is not cumulative (directly). The midterm will be short answer questions. Any students not writing the midterm (without prior consent from the course instructor) will receive zero on the midterm.
Midterm II	30%	4-10 & 17	11-19	The mid-term is not cumulative (directly). The midterm will be short answer questions. Any students not writing the midterm (without prior consent from the course instructor) will receive zero on the midterm.

Weight Learning Lectures
(%) Objectives on exam

Info

Final Exam 50% 1-18 1-36

The final exam is cumulative. The final exam will be a combination of short and long answer questions and will also have integrative questions. The final exam will assess the students understanding of all course content and their ability to integrate and apply the various concepts presented during the semester.

7 Course Statements

7.1 Attendance Expectations

Since lecture content will be assessed in the midterm and final exam, it is strongly encouraged that students attend all lectures. The structural overview of lectures will be made available on the website and students who have missed classes will need to interact with their fellow students to obtain the material. While appointments can be made to discuss course content with the instructor or TA, do not contact us requesting lecture notes for missed lectures. There will be a section online where you can post request for any missed lecture notes.

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for [Academic Consideration](#) are detailed in the Undergraduate Calendar.

8.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](#) are available in the Undergraduate Calendar.

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

8.6 Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The [Academic Misconduct Policy](#) is detailed in the Undergraduate Calendar.

8.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.
