



# HK\*4550 Human Cardio-respiratory Physiology

Fall 2022

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.50

Version 1.00 - October 04, 2022

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## 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-Requisites:** 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, 11:30-12:20

Location: MCLN 102.

Check Courselink for updates.

Questions are encouraged during course lecture. An additional Q&A session will be held the week before the midterm and final. You are free to ask questions anytime after class - I always have the hour after lecture free. You can schedule an appointment by email, for either face to face or zoom.

### 1.4 Final Exam

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

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## 2 Instructional Support

### 2.1 Instructional Support Team

**Instructor:** Dr. Jeremy Simpson  
**Email:** jeremys@uoguelph.ca  
**Telephone:** 5198244120 x56629  
**Office:** ANNU 349

**Office Hours:**

- Q&A sessions will be posted after the semester starts.
- By email appointment for either in person or remote (zoom)

### 2.2 Teaching Assistants

**Teaching Assistant (GTA):** Jade Marrow  
**Email:** jmarrow@uoguelph.ca

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## 3 Learning Resources

This course will consist of 12 weeks of lectures (3 lectures per week). The course is taught in lecture format with corresponding course lecture notes online.

### 3.1 Additional Resources

**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 and contains much of the same information that we will be using in this course; copies are also available at the library reserve)

**Cardiovascular Physiology (Textbook)**

Mohrman, DE, & LJ Heller. **Cardiovascular Physiology**. 9th Ed. Lange Physiology Series,  
 McGraw-Hill, Toronto. 2018. ~\$40.00 for used and \$52.00 for new

7th edition was published in 2010 and 8th edition was published in 2014 (copies are also available at library reserve)

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## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

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

1. Teaching format: a mix of asynchronous online and synchronous face to face (in accordance to public health guidelines),
  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; Analyze the hypertrophic response of the heart to various stresses.
  16. Explain how respiratory physiology affects cardiac physiology and vice versa.
  17. Explain how cardiac and respiratory physiology differs from a sex and gender perspective.
  18. Develop basic critical thinking skills that correlate the abnormal functions of body systems with the disease process.
  19. Develop critical thinking skills for addressing issues around the sex and gender gap in cardiovascular physiology.
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## 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

**Topics:** 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.

**Topics:** 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

Response of the pulmonary system to exercise and exercise training

Diseases of the pulmonary system

**Topics:** 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

Diseases of the cardiovascular system

Response of the CV system to exercise and exercise training

## 5.2 Delivery Format

Is there a face-to-face component that is required to be successful in the course?: Yes.

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# 6 Assessments

## 6.1 Assessment Details

### Midterm (30%)

**Date:** Wed, Oct 26, online

Midterm will cover all the material up until, and including, lecture 17 (October 16th). Online assessments for this midterm will be administered using Respondus Lockdown software with the microphone and web cam enabled (closed book)

### Assignment (30%)

**Date:** Fri, Nov 11

Two major problems facing research is the incorporation of sex/gender issues and knowledge translation (i.e., communicating complex issues to the public so they can benefit from the research). To address this, students will be required, guided by CIHR sex and gender modules, prepare an illustration with a written report on a topic within the cardiovascular field. Details of assignment will be handed out on Friday, October 7th and students will have 5 weeks to complete it.

### Final Exam (40%)

**Date:** tba

Cumulative - covering all lectures. Online assessments for this final exam will be administered using Respondus Lockdown software with the microphone and web cam enable (closed book)

## 6.2 Method of Assessment

	<b>Weight (%)</b>	<b>Learning Objectives</b>	<b>Lectures on exam</b>	<b>Info</b>
Midterm	30%	1-10	1-17	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.
Assignment	30%	1-19		Individual assignment to understand sex and gender issues in research and develop illustrations directed at understanding a specific topic in cardiorespiratory physiology.
Final Exam	40%	1-19	1-36	<b><u>The final exam is cumulative.</u></b> The final exam will be a combination of short and long answer

<b>Weight (%)</b>	<b>Learning Objectives</b>	<b>Lectures on exam</b>	<b>Info</b>
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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.

### 6.3 REspondus LockDown Browser and Monitoring

This course currently plans to use Respondus Lockdown software for some assessments. Your instructors are aware that some students have expressed concerns about the use of this exam invigilation software. The University Administration has approved the use of Respondus Lockdown software and other online monitoring platforms that use artificial intelligence for remote invigilation. Your instructors are committed to an equitable and accessible assessment experience, please contact your instructor if you have concerns.

Online assessments in this course will be administered using Respondus Lockdown software with the microphone and web cam enabled.

This course requires the use of Respondus LockDown Browser and Monitor (webcam) for proctoring within CourseLink. You must download and install LockDown Browser and Monitor to complete the practice test (if provided) and course exam(s). The purpose of the practice test is to ensure that Respondus LockDown Browser and Monitor is set up properly and that you are comfortable using the software.

- Respondus LockDown Browser is a locked browser connected to the Quizzes tool in CourseLink. It prevents you from printing and copying, using other operating software, using search engines (e.g., going to another URL), communicating via instant messaging, and it blocks non-web-related software (e.g., Adobe PDF, Microsoft Word).
- Respondus Monitor is a companion application for LockDown Browser that uses webcam and video technology to ensure academic integrity during online exams. The software captures video during the exam and allows the instructor to review the video once the exam is completed.
- In order to use Respondus LockDown Browser and Monitor, you must meet the technical requirements. Visit the Remote Learning website for guidance on preparing your online exam environment. · If you have any concerns about meeting system requirements, contact CourseLink Support. They will work with you to find alternative solutions or make alternative arrangements.

## 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/download all lectures. The structural overview of lectures will be made available on the website and students who have missed Q&A sessions will need to interact with their fellow students to obtain the material.

## 8 Department of Human Health and Nutritional Sciences Statements

### 8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

### 8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

### 8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>



- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations.  
<http://www.selfregulationskills.ca/>

## 8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar.  
(<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

## 8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

# 9 University Statements

## 9.1 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.

## 9.2 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 grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals  
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration  
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions  
<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

### 9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

### 9.4 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.

### 9.5 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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

## 9.6 Academic Integrity

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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

## 9.7 Recording of Materials

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

## 9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

## 9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website

(<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

## 9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

## 9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

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