HK*3810 Human Physiology II - Integrated Systems

Fall 2021
Section(s): C01

Department of Human Health and Nutritional Sciences
Credit Weight: 0.75
Version 1.00 - September 07, 2021

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1 Course Details

1.1 Calendar Description

This course will build on the fundamental concepts and principles of communication systems developed in Human Physiology I and examine more complex physiological phenomena such as the control of blood volume and blood pressure, which integrates tissue of the cardiovascular system, the heart, vasculature and kidney, and acid-based physiology, which integrates the respiratory system and the kidney. Finally, all systems will be integrated to determine how the body responds to challenges such as altitude, exercise and shock (blood loss).

Pre-Requisites: HK*2810

1.2 Course Description

Physiology is characterized by the integration of biological systems in the body. Each system is built upon a foundation of concepts and principles that are repeatedly used to explain a variety of observations. This course will build upon the concepts and principles explored in Human Physiology I and will move forward to explore more complex physiological phenomena such as the control of blood volume and blood pressure (integrating tissues of the cardiovascular system, the heart, vasculature and kidney) and acid-base physiology (integrating the respiratory system and the kidney). The course will then explore how these integrated systems adapt in response to physiological challenges such as exercise, altitude and shock (blood loss). The course uses factual material and theories to explain the function of the organs or systems, and enables you to predict how these systems shift in life situations

1.3 Timetable

i). Tuesdays and Thursdays, 8:30-9:50am, Remote Delivery

Asynchronous lectures will be presented as recorded videos prepared by Dr. Castellani. Lectures and accompanying materials will be posted to courselink at the beginning of the week. Students may view these videos on their own schedule within a given week.

ii). Fridays, 4:30pm-5:20pm, Remote Delivery

The Friday session will be delivered as an asynchronous lecture posted to courselink at the beginning of the week **OR** a live lecture hosted on zoom from 4:30-5:20pm ET* (see schedule below for dates and topics).

*All live lectures will be recorded and posted to courselink for students to view when their schedule permits if they are not able to attend the in-person session.

1.4 Final Exam

The final exam will be administered online during the exam period. The final exam is currently scheduled for **Monday December 13 2021** from **8:30am EST to 10:30am EST**. Note that the date and time are subject to change. Please see WebAdvisor for the latest information.

The final exam will be administered using Respondus Lockdown software with the microphone and webcam enabled.

NOTE: 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.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Laura Castellani
Email: castelll@uoguelph.ca

Office Hours: Dr. Castellani will host weekly open Q&A sessions on **Tuesdays** from **8:30am-9:50am EST**. A link to the recurring session will be posted on courselink. Students are encouraged to attend these sessions if they have questions regarding course content or structure.

Office Hours:

Office Hours: Dr. Castellani will host weekly open Q&A sessions on **Tuesdays** from **8:30am-9:50am EST**. A link to the recurring session will be posted on courselink. Students are encouraged to attend these sessions if they have questions regarding course content or structure.

Office Hours:

Students interested in scheduling a 1:1 meeting can email Dr. Castellani directly to request an appointment.

2.2 Teaching Assistants

Teaching assistants will be available weekly to share their expertise on course material and support students throughout the semester. TAs will monitor the discussion boards, lead question and answer sessions, and can be available for meetings by email request.

TA	Email Address
Leslie Ogilvie	ogilviel@uoguelph.ca

Erin Seto	eseto@uoguelph.ca

3 Learning Resources

3.1 Required Resources

Courselink (Website)
https://www.courselink.uoguelph.ca

The course outline, a tentative lecture schedule, readings, and handouts for specific lectures can be found at the Courselink D2L site for the course. Students are encouraged to use discussion boards to share ideas and clarify questions. The discussion boards will be monitored from Sept. 9 to Dec. 13 (or TBA based on final exam scheduling).

3.2 Recommended Resources

Physiology text (Textbook)

Textbook of Medical Physiology (Textbook)

The recommended textbook for the course is Textbook of Medical Physiology, 13th edition by Hall and is available at the University bookstore. The 11th, 12th and 14th editions are also acceptable textbooks for the course. Copies of the textbook are on reserve at the library.

3.3 Campus Resources

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

- Make an appointment with a program counsellor in your degree program. https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically:

- There are numerous academic resources offered by the Learning Commons for a variety of courses, workshops related to online learning, time management, taking multiple choice exams, and general study skills.
- You can also set up individualized appointments with a learning specialist. https://learningcommons.lib.uoguelph.ca/

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

- Wellness Education and Performance Centre has many interactive recourses and offers peer to peer support related to multi-dimensional wellness

  https://wellness.uoguelph.ca/wec

If you have a documented disability or think you may have a disability:

- The Centre for Students with Disabilities (CSD) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see visit the

accessibility website.

https://wellness.uoguelph.ca/accessibility

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4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Learn the fundamentals of heart, vasculature, kidney, and lung tissue function.
2. Apply the principles and concepts learned in HK*2810 to understand tissue function.
3. Integrate individual tissues to enable systems to work, i.e. integrate the heart, and vasculature to understand the cardiovascular system, integrate the lung and the kidney to understand the acid/base system.
4. Integrate the systems within the body to understand physiological regulation of regulated variables i.e. integrate the central nervous system with the cardiovascular system and kidney to determine how mean arterial pressure is regulated (which includes integrating principles and systems learned in HK*2810 with systems learned in HK*3810).
5. Integrate multiple systems to determine how whole body will respond to physiological challenges such as exercise and hemorrhage (which includes integrating all systems learned in HK*2810 with systems learned in HK*3810).
6. Demonstrate knowledge of the mechanistic explanations for physiological events at the cellular and tissue level and systems level.
7. Developed advanced problem solving and critical thinking skills by applying and integrating physiological principles, tissues and systems to solve physiological challenges such as left heart failure, right heart failure, systemic vasoconstriction, altitude, snorkeling, exercise, shock, etc.
8. Effectively communicate ideas and arguments in graphic and written form in assignments and tests for assessment.
9. Interpret data in tabular and graphic form in homework assignments and tests, in order to assess how the body responds to challenges.

10. Identify gaps in knowledge in the area of physiology.

5 Teaching and Learning Activities

Course Philosophy

The philosophy of this course will be to show students that physiology is built on fundamental principles that are used to build the foundations of communication, which are in turn used and integrated to build systems within the body with higher order functions. This course will take an integrated approach to building physiological systems. The course will also take a problem-solving, critical thinking approach to understanding the material and building physiological systems. Following this pedagogical style, the testing style will be short and long answer where students must work through problems and show their work. Weekly tutorial assignments will be completed in groups and used to help students with the short and long answer testing style.

5.1 Lecture

Topics: List of Topics Included:

1. Heart and Vasculature

2. Kidney

3. Blood Gas Concentrations

4. Integration- Acid-Base Physiology

5. Integration- Response to Physiological Challenges

i. Exercise

ii. Altitude/Hypoxia

iii. Cardiovascular Shock (Blood Loss)

Date	Section	Lecture	11th Edition	12th Edition	13th Edition

			Readings	**Readings**	**Readings**
Sept 9	1. Heart and Vasculature	The Cardiovascular System			
Sept 10		Heart Bioelectricity (Nodal Cells)	116-124	115-124	123-133
Sept 14		Heart Bioelectricity (Cardiac Myocytes)			
Sept 16		The Cardiac Cycle	106-111	104-110	113-119
Sept 17		Live Lecture 1: Class discussion + Recap			
Sept 21		Cardiac Output	111-114, 232-236, 237-243	110-112, 229-232, 233-240	119-121, 245-256
Sept		Vasculature and	161-170,	157-166,	169-178,

23		Flow	204-208, 750-755	201-205, 731-735	215-219, 775-779
Sept 24		Live Lecture 2: Class discussion + Recap			
Sept 28		Arterioles, Radius and TPR	195-203,	191-200	203-213
Sept 30		Capillaries	181-194, 302-306	177-189, 296-300	189-201, 316-320
Oct 1		Live Lecture 3: Class discussion + Recap			
Oct 5		Cardiovascular Fluid Flux	204-213	201-209	215-223
Oct 7		Cardiovascular Mechanics I	204-213	201-209	215-223
Oct 8		Cardiovascular Mechanics II			

Oct 12		Fall Study Break- No Class			
Oct 14		Cardiovascular Mechanisms III			
Oct 15		Live Lecture 4: Class discussion + Recap			
Oct 19		**Term Test 1**			
Oct 21	2. Kidney	Structure and Blood Flow Tubular Function (Fluid Flux)	308-325	303-321	323-345
Oct 22		The Nephron	327-342	323-337	347-362
Oct 26		Renal Function and Regulation	348-357 358-363	345-353 355-360	371-380 381-386
Oct 28		Regulation	342-343, 362-363,	337-339, 358-359,	362-365, 384,385,

			365-381, 927-929	361-377, 904-925	389-406, 948-972
Oct 29		Live Lecture 5: Class discussion + Recap			
Nov 2		Cardiovascular Integration	216-231	213-228	227-243
Nov 4	3. Blood Gas Concentrations	Respiration and Air Flow	471-481	465-483	509-516
Nov 5		Alveolar Ventilation			
Nov 9		VA/Q and Exchange	499-501, 491-499, 502-512	492-494, 485-492, 495-504	524-526, 517-524, 527-536
Nov 11		PO_2 and PCO_2			
Nov 12		Live Lecture 6: Class discussion + Recap			

Nov 16		O_2 and CO_2 Sensors			
Nov 18		**Term Test II**			
Nov 19		Regulation of Respiration	514-523	505-513	539-548
Nov 23	4. Integration	Acid/Base Physiology I (Regulation of H^+)	383-400	379-395	409-426
Nov 25		Acid/Base Physiology I (Davenport Diagrams)			
Nov 26		Acid/Base Physiology I (Metabolic Acidosis)			
Nov 30		Exercise Altitude	537-541 1055-	527-531 1031-	561-565 1085-

			1066	1039	1093
Dec 2		Cardiovascular Shock			

6 Assessments

6.1 Marking Schemes & Distributions

Problem solving sets allow students to prepare for the term test exams in a low pressure/low stakes environment. If a student does not complete the problem set the weight of the assignment will be redistributed to the subsequent term test. See all possible schemes below.

Assessment	Scheme A (%)	Scheme B (%)	Scheme C (%)	Scheme D (%)	Scheme E (%)	Scheme F (%)	Scheme G (%)	Scheme H (%)
Problem Solving Set 1	5	0	5	5	0	0	5	0
Term Test I	25	30	25	25	30	30	25	30
Problem Solving Set 2	5	5	0	5	0	5	0	0

Term Test II	25	25	30	25	30	25	25	30
Problem Solving Set 3	5	5	5	0	5	0	0	0
Final Exam	35	35	35	40	35	40	40	40

6.2 Assessment

Assessment	Weight	Date of Assessment	Content	Learning Outcome Addressed
Problem Solving Set 1	5%	Submit: Oct. 1 2021 Review Due: Oct. 5 2021	Problem Solving and Critical Thinking- Cardiovascular System	1-10
Term Test I	25%	Oct. 19 2021	Heart and Vasculature	1-10
Problem Solving Set 2	5%	Submit: Oct. 29 Review: Nov. 2 2021	Problem Solving and Critical Thinking- Kidney	1-10

Term Test II	25%	Nov. 18 2021	Kidney and Blood Gasses	1-10
Problem Solving Set 3	5%	Submit: Nov. 26 2021 Review: Nov. 30 2021	Problem Solving and Critical Thinking- Blood Gases and Integration	1-10
Final Exam	35%	Dec. 13 2021 (tentative- see Webadvisor to confirm)	Integration (cardiovascular system, kidney and blood gases)	1-10

Problem Solving Sets:

Problem solving sets will allow students to think critically to identify and solve problems related to the systems explored in the course.

Problem Set Submission: Each problem solving set will become available at 12:00am and remain active until 11:59pm on the problem solving set assessment days (see table above for specific dates). Answers must be submitted electronically using the PEAR system by 11:59pm EST when the set becomes inactive. (More details will be discussed on the submission process in class). Time will be allotted during live lectures for peer-to-peer

discussions regarding the active problem sets. Students are encouraged to share ideas using these sessions and the courselink discussion boards. However, each student must submit their own independent problem set that contains their own unique thoughts and words.

Problem Set Review: The day after the problem sets are completed Dr. Castellani will post an answer key that will allow students to review their own submission plus the submission of two of their peers. Students will have two days (not including Saturday/Sunday) to complete their review process.

Each problem set is worth a total of 5%. Students will receive 2.5% for completing the reviews and 2.5% will be based on the graded score of the submission. Late submissions will not be accepted.

If a problem solving set is not completed the weight of the set will be added to the subsequent term test.

Tests:

Term tests will be administered online during the scheduled class time (8:30am-9:50am EST Tuesday or Thursday) using Respondus lockdown browser software with the microphone and web cam enabled.

The final exam will be administered during the final exam period. It will be delivered online using Respondus lockdown browser software with the microphone and web cam enabled.

Term tests will allow students to integrate key concepts and think critically to predict the function of systems explored in the course. The tests will consist of short and long answer written questions. Tests are to be completed and submitted individually.

If students cannot complete the assessment on the scheduled date, they must email the instructor as soon as possible. If students are unable to write term test 1 or 2 due to illness or compassionate reasons the weighting (%) of these tests may be added to the weighting (%) of the final exam at the discretion of the instructor.

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7 Course Statements

7.1 Technology in the Classroom

All instruction and assessment for the course will be completed using Courselink, Zoom, and PEAR.

Respondus

Respondus LockDown Browser is a locked browser for taking quizzes in CourseLink. It will be required to take the term tests and final exam. 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 following technical requirements so that you can take the term tests and final exam:

1. Operating Systems: Windows 10, 8, 7; Mac OS X 10.10 or higher.

2. Memory: Windows 2 GB RAM; Mac 512 MB RAM.

3. For Mac users: Safari must function properly on the computer.

4. Mac users must have Adobe Flash Player installed to Safari, even if a different browser is normally used.

5. Functioning webcam and microphone. The webcam and microphone can be built into your computer or can be the type that plugs in with a USB cable. (You will be required to do an environment scan of your room, so please ensure you can move your computer, laptop or webcam for this scan.)

6. A broadband Internet connection. It is recommended that you access the Internet via a wired connection.

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.

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 book their exams at least 7 days in advance and not later than the 40th Class Day.

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

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