HK*3810 Human Physiology II - Integrated Systems

Fall 2020
Section(s): C01

Department of Human Health and Nutritional Sciences
Credit Weight: 0.75
Version 1.00 - September 09, 2020

---

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- Asynchronous lectures posted to courselink at 8:30am ET

ii). Fridays-Asynchronous lecture posted to courselink at 8:30am ET **OR** live lecture 3:30-4:20pm ET* (see schedule below for dates and topics)

*All live lectures will be recorded and posted to courselink

1.4 Final Exam

The final exam will be administered online during the exam period. The final exam is currently scheduled for Wednesday December 8 2020 from 14:30 to 16:30. Date and time are subject to change. Please see WebAdvisor for the latest information.

---

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Laura Castellani
Email:	castelll@uoguelph.ca
Office Hours:	Office Hours: Tuesdays 2:00-5:00pm (Zoom meeting room) or by appointment as requested Students are encouraged to ask questions in person during online lectures . If students are unable to attend the live sessions they are welcome to submit questions by email or on the appropriate discussion boards in courselink.

2.2 Teaching Assistants

There are 2 teaching assistants (TAs) as resources for this course. TA's will be monitoring the D2L discussion board and are available to e-mail directly with questions or to set up appointments to answer questions.

TA	Email Address
Nicole Fletcher	fletchen@uoguelph.ca

Eamon Fitzpatrick	fitzpate@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. In D2L you can submit questions on the course discussion boards where TAs will be monitoring daily. The discussion boards will be monitored from Sept 8 to Dec 3.

Assessments will also be completed and submitted via courselink throughout the semester.

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 and 12th 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

---

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 Readings	12th Edition Readings	13th Edition Readings

Sept 10 (Thurs)	1. Heart and Vasculature	The Cardiovascular System			
Sept 11 (Fri)		Heart Bioelectricity (Nodal Cells)	116-124	115-124	123-133
Sept 15 (Tues)		Heart Bioelectricity (Cardiac Myocytes)			
Sept 17 (Thurs)		The Cardiac Cycle	106-111	104-110	113-119
Sept 18 (Fri)		Live Lecture: Practice Problem Solving + Recap			
Sept 22 (Tues)		Cardiac Output	111-114, 232-236, 237-243	110-112, 229-232, 233-240	119-121, 245-256
Sept 24		Vasculature and Flow	161-170,	157-166,	169-178,

(Thurs)			204-208, 750-755	201-205, 731-735	215-219, 775-779
Sept 25 (Fri)		Guest Lectures- TA Introduction and Research Presentations			
Sept 29 (Tues)		Arterioles, Radius and TPR	195-203,	191-200	203-213
Oct 1 (Thurs)		Capillaries	181-194, 302-306	177-189, 296-300	189-201, 316-320
Oct 2 (Fri)		Live Lecture: Practice Problem Solving and Recap			
Oct 6 (Tues)		Cardiovascular Fluid Flux	204-213	201-209	215-223
Oct 8 (Thurs)		Cardiovascular Mechanics I	204-213	201-209	215-223

Oct 9 (Fri)		Cardiovascular Mechanics II			
Oct 13 (Tues)		Fall Study Break- No Class			
Oct 15 (Thurs)		Cardiovascular Mechanisms III			
Oct 16 (Fri)	2. Kidney	Structure and Blood Flow	308-325	303-321	323-345
Oct 20 (Tues)		Term Test 1			
Oct 22 (Thurs)		Tubular Function (Fluid Flux)	327-342	323-337	347-362
Oct 23		The Nephron			

(Fri)					
Oct 27 (Tues)		Renal Function and Regulation	348-357 358-363	345-353 355-360	371-380 381-386
Oct 29 (Thurs)		Regulation	342-343, 362-363, 365-381, 927-929	337-339, 358-359, 361-377, 904-925	362-365, 384,385, 389-406, 948-972
Oct 30 (Fri)		Live Lecture: Practice Problem Solving and Recap			
Nov 3 (Tues)		Cardiovascular Integration	216-231	213-228	227-243
Nov 5 (Thurs)	3. Blood Gas Concentrations	Respiration and Air Flow	471-481	465-483	509-516
Nov 6 (Fri)		Alveolar Ventilation			

Nov 10 (Tues)		VA/Q and Exchange	499-501, 491-499, 502-512	492-494, 485-492, 495-504	524-526, 517-524, 527-536
Nov 12 (Thurs)		PO_2 and PCO_2			
Nov 13 (Fri)		Live Lecture: Practice Problem Solving/Recap			
Nov 17 (Tues)		O_2 and CO_2 Sensors			
Nov 19 (Thurs)		Term Test II			
Nov 18 (Fri)		Regulation of Respiration	514-523	505-513	539-548

Nov 24 (Tues)	4. Integration	Acid/Base Physiology I (Regulation of H^+)	383-400	379-395	409-426
Nov 26 (Thurs)		Acid/Base Physiology I (Davenport Diagrams)			
Nov 27 (Fri)		Acid/Base Physiology I (Metabolic Acidosis)			
Dec 1 (Tues)		Exercise Altitude	537-541 1055-1066	527-531 1031-1039	561-565 1085-1093
Dec 3 (Thurs)		Cardiovascular Shock			

6 Assessments

6.1 Marking Schemes & Distributions

All assessments will be completed and submitted in courselink.

Quizzes (5, 2% each):

Quizzes will allow students to identify key concepts related to the course topics. Quizzes will consist of multiple choice, fill in the blank and true and false questions. Students will have approximately 20 minutes to complete the quiz once it is opened by the student on courselink. Quizzes will become available at 12:00am and remain available until 11:59pm on quiz dates (see table above for specific dates). If a quiz is not completed the weight of the quiz will be added to the subsequent term test (e.g. if quiz 4 is not completed Term Test II will be re-weighted to be worth 22% of the final grade). If the quiz grade is lower than the grade of the subsequent term test the quiz grade will be dropped and the weighting of the dropped assignment will be added to the subsequent term test.

Problem Solving Sets (4, 5% each):

Problem solving sets will allow students to think critically to identify and solve problems related to the systems explored in the course. The problem solving sets consist of short and long answer problems. The problem solving sets will be posted to Courselink at 12:00am on test days. Answers to problem sets must be submitted to the appropriate dropbox by 11:59pm on the problem solving set assessment days (see table above for specific test dates). 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.

If a problem solving set is not completed the weight of the set will be added to the subsequent term test. If the problem solving set grade is lower than the grade of the subsequent term test the set grade will be dropped and the weighting of the dropped assignment will be added to the subsequent term test.

Term Tests (2, 20% each):

Term tests will allow students to integrate identification of key concepts and critical thinking to predict the function of systems explored in the course. The term tests will be composed of short and long answer questions. Students will have 2 hours to complete the term test once it is posted on Courselink. Term tests questions will be available on Courselink at 8:30am ET on the scheduled test days (see table above). Students must submit completed term tests to the appropriate dropbox by 10:30am ET, at which time the dropbox will close. If students cannot complete the assessment at this time, they must email the instructor as soon as possible. Students may submit a request to write an alternate term test at a different time within 3 hours of the stated term test time, which will be granted at the discretion of the instructor. Requests to complete the term test at an alternate time must be scheduled at least 72 hours prior to the scheduled term test date. If students are unable to write test 1 or 2 due to illness or compassionate reasons the weighting (%) of these tests will be added to the weighting (%) of the final exam.

6.2 Assessment

Type of Assessment	Weight of Assessment	Date of Assessment	Course Content	Learning Outcome Addressed
Quiz 1	2%	Sept 18	Key Concepts- Heart	1, 2, 6-10
Problem Solving Set 1	5%	Sept 18	Problem Solving and Critical Thinking- Heart	1-10
Quiz 2	2%	Oct 2	Key Concepts- Vasculature	1, 2, 6-10
Problem Solving Set 2	5%	Oct 2	Problem Solving and Critical Thinking- Vasculature	1-10

Term Test I	20%	Oct 20	1. Heart and Vasculature	1-10
Quiz 3	2%	Oct 30	Key Concepts- Kidney	1, 2, 6-10
Problem Solving Set 3	5%	Oct 30	Problem Solving and Critical Thinking- Kidney	1-10
Quiz 4	2%	Nov 13	Key Concepts- Respiration	1, 2, 6-10
Problem Solving Set 4	5%	Nov 13	Problem Solving and Critical Thinking- Respiration	1-10
Term Test II	20%	Nov 19	2. Kidney and 3. Blood Gasses	1-10
Quiz 5	2%	Nov 27	Key Concepts- Integration	1, 2, 6-10
Final Exam	30%	Dec 8 2020	Focus on 4. Integration (involves concepts from 1. Heart and Vasculature 2. Kidney and 3. Blood	1- 10

			Gases)	

7 Course Statements

7.1 Turnitin

Students will be required to submit their course essays to Turnitin.com for review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website.

Online submissions uploaded through Courselink will automatically be submitted to Turnitin. To complete this process students must agree first agree to the Turnitin license agreement. For students encounter issues with Turnitin alternate submission processes can be arranged by contacting the instructor. For students who do not submit via Turnitin a short oral test will accompany the written submission (i.e. the instructor will meet with the student to ask a series of questions and evaluate the student's knowledge of the submitted material). The grade will reflect the written material and the student's performance on the oral test.

Turnitin results will be reviewed by the instructor who will contact students in the event of concerns regarding their submitted written content. Marks may be deducted for improper citations or unacknowledged use of material. Marks concerning plagiarism will be deducted if students do not respond to the email from the instructor requesting to discuss the concern.

If major concerns of plagiarism are suspected, the Office of Academic Integrity will be contacted to review the assignment and advise on possible sanctions.

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)

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 and academic schedules. Any such changes will be announced via CourseLink and/or class email. 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

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.
