



# HK\*3600 Applied Human Kinetics I

Fall 2019

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.75

Version 1.00 - August 28, 2019

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## 1 Course Details

### 1.1 Calendar Description

This course covers laboratory techniques which are central to human biology, together with their underlying concepts. Human performance and function are evaluated through cellular, organic, systemic and whole person studies. The student's technical competence and conceptual understanding are emphasized.

**Pre-Requisites:** HK\*2270  
**Co-Requisites:** HK\*3810  
**Restrictions:** Registration in the Human Kinetics major.

### 1.2 Course Description

The objective of this course is to introduce the student to laboratory measures that examine the functioning of a human body at rest and in motion. The students will be introduced to the underlying concepts of various physiological and neuromechanical measures in lecture. The principles from lecture will then be used to make direct respiratory, cardiovascular, metabolic, thermoregulatory, neuromuscular, sensorimotor, kinetic and kinematic measures in the laboratory. Students will be asked to describe the laboratory measures and findings, and to integrate the lecture and laboratory material in formalized laboratory reports. The information and technical expertise gained in this course will provide the foundation for future and more advanced courses (i.e. HK 4600 Applied Human Kinetics II and others) that explore human biology in the Human Kinetics Major.

### 1.3 Timetable

Classes: RICH 2520 M, W, F - 1:30-2:20 PM

Laboratories: JT Powell Building - rooms 2236 and 2237 (Previously known as JTP 208 A & B)

Section 0101: Tuesday – 10:00 PM – 12:50 PM

Section 0102: Tuesday - 2:30 PM - 5:20 PM

Section 0103: Wednesday - 2:30 PM - 5:20 PM

Section 0104: Thursday – 10:00 AM – 12:50 PM

Section 0105: Thursday – 2:30 PM – 5:20 PM

## 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:** Jamie Burr  
**Email:** burrj@uoguelph.ca  
**Telephone:** +1-519-824-4120 x52591  
**Office:** HHNS Annex 263  
**Office Hours:** Office hours by appointment (please email or see instructor after class)

**Instructor:** John Zettel  
**Email:** jzettel@uoguelph.ca  
**Telephone:** +1-519-824-4120 x53638  
**Office:** ANNU 330A  
**Office Hours:** Office hours by appointment (please email or see instructor after class)

### 2.2 Teaching Assistants

To arrange an appointment with your TA, please email or speak with him/her in laboratory

#### Physiology:

Alexandra Coates, PhD Student, acoate01@uoguelph.ca - Head TA

Chris Pignanelli, MSc student; cpignane@uoguelph.ca

Heather Petrick, MSc Student, hpetrick@uoguelph.ca

Jeremy Cohen, MSc Student, jcohen04@uoguelph.ca

Christopher Norman, Lab Technician, cnorm@uoguelph.ca

**Biomechanics:**

Dennis Larson, PhD student, larsond@uoguelph.ca, Head TA

Emma Plater, PhD student, plater@uoguelph.ca

Kyle Poland, MSc student, kpoland@uoguelph.ca

Matthew Boston, MSc student, mboston@uoguelph.ca

Christopher Norman, Lab Technician, cnorm@uoguelph.ca

## 3 Learning Resources

### 3.1 Recommended Resources

**Exercise Physiology: Theory and application to fitness and performance (Textbook)**

Physiology portion of the course (First 6 weeks): Powers SK, and ET Howley. Exercise Physiology: Theory and application to fitness and performance. 7 th , 8 th, or 9th Edition. McGraw-Hill, Toronto, 2009, 2012, 2015.

**Neuromechanics of Human Movement (Textbook)**

Biomechanics portion of the course (Last 6 weeks) Enoke R. Neuromechanics of Human Movement. 4th or 5th Edition, Human Kinetics, 2008, 2015.

**CoursePack (Other)**

**FOR BIOMECHANICS HALF:** There is a coursepack for the course which are combined readings from two different text books. This is available in the bookstore

### 3.2 Reference Texts - Physiology

1. Hale T. Exercise Physiology: A Thematic Approach. Wiley, 2003.
2. McArdle, FI Katch, and VL Katch. Exercise Physiology: Energy, Nutr, & Human Perf. LWW, 2010.
3. Guyton AC. Textbook of Medical Physiology. 10th Ed. WB Saunders Co. 2001.
4. Vander AJ, JH Sherman and DS Luciano. Human Physiology: The Mechanisms of Body Function. 7th Edition, McGraw-Hill, 1998.

### 3.2 Reference Texts - Biomechanics

1. Hamill J, Knutzen KM. Biomechanical Basis of Human Movement. 4th Edition. LWW, 2015.
2. Kandel ER, JH Schwartz, and TM Jessell. Principals of Neural Science. 4th Edition, McGraw-Hill, 2000.
3. Roberston DGE et al. Research Methods in Biomechanics. Human Kinetics, 2004.
4. Winter DA. Biomechanics & Motor Control of Human Movement. Wiley, 2005. 5. Kaman G, Gabriel DA. Essentials of Electromyography. Human Kinetics, 2010

### 3.2 Campus Resources

If you are concerned about any aspect of your academic program: make an appointment with a Program Counsellor in your degree program.

If you are struggling to succeed academically: 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.

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. Student Health Services is located on campus and is available to provide medical attention. 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.

If you have a documented disability or think you may have a disability: Student Accessibility Services (SAS) formerly Centre for Students with Disabilities 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.

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## 4 Learning Outcomes

Course Learning Objectives

1. Develop your understanding and working knowledge of key techniques used in human physiology and biomechanics testing and evaluation
2. Develop and enhance your ability to work effectively as part of a group
3. Enhance learning and problem solving through group work and group discussion of course material

4. Be able to integrate lecture and lab material within lab reports and exams
5. Learn how to analyze data sets and to critically evaluate lab-generated data
6. Develop scientific writing skills
7. This course will prepare you for the following courses: HK\* 4600 [0.75] Applied Human Kinetics II; HK\*4070 [0.50] Clinical Biomechanics; HK\*4240 [0.75] Occupational Biomechanics and Ergonomics; HK\*4460 [0.50] Regulation of Human Metabolism; HK\*4550 [0.75] Human Cardio-respiratory Physiology; HK\*4610 [0.50] Health and Injury Biomechanics.

## 5 Teaching and Learning Activities

### 5.1 Lecture

Fri, Sep 6 - Fri, Oct 18

Topics:

Lecture and Lab Schedule 1st HALF including DUE DATES

<u>Month</u>	<u>Date</u>	<u>Lecture Topic</u>	<u>Lab</u>	<u>Chapters</u>
	September 6th	Introduction		-
Week 9	1	Intro to exercise physiology and energy metabolism—producing energy to move and stay alive	LAB 1- Introduction to physiological measures in human kinetics	Chapters 1, 12, 24
	11			
	13			
Week 16	2	Respiratory and cardiovascular responses to exercise	LAB 2 – Respiratory and cardiovascular responses to exercise	Chapters 9, 10
	18			
	20		LAB REPORT REQUIRED	
Week 23	3	Measuring oxygen uptake ( $VO_2$ ) and energy expenditure in human	LAB 3 – Measurement of submaximal $VO_2$	Chapters 1, 4, 15

		kinetics		
	25		(LAB 2 REPORT DUE AT BEGINNING OF LAB TIME)	
	27			
Week 4	September 30	Oxygen uptake continued and maximal aerobic exercise	LAB 4 – Maximal oxygen uptake testing (VO <sub>2</sub> max)	Chapter 13, 20
	2			
	4		LAB REPORT REQUIRED	
Week 5	7		LAB 5– Estimation of anaerobic energy contribution, power and capacity during exercise	
	9	Importance of anaerobic energy contribution during varying forms of exercise	(LAB 4 REPORT DUE AT BEGINNING OF LAB TIME)	Chapter 11, 19
	11			
Week 6	14	NO CLASS OCTOBER 14		Chapter 25
	16	Finish material/ return Lab 4		
	18	Midterm Exam		

**Mon, Oct 21 - Fri, Nov 29**

**Topics:**

Lecture and Lab Schedule 2nd HALF including DUE DATES

**Month Date**

**Lecture Topic**

**Lab**

**Enoka**

**Chapters**

**5<sup>th</sup> edition**

Week 21 7	Introduction to electromyography (EMG). Learn how to measure muscle activity and understand		<b>Chapters 5 and 6</b>
23	EMG-force and fatigue relationship		
25			
Week 28 8	The nervous system. What is the H-reflex? Learn how the H-reflex can help us understand the spinal cord and how sensory information alters movement?	LAB 6 - EMG lab	<b>Chapter 7</b>
30		<b>LAB REPORT REQUIRED</b>	
November 1			
Week 4 9	Kinetics, What is force? Learn force measurement, force plate techniques	LAB 7- H-reflex lab	<b>Chapter 2</b>
6		(LAB 6 REPORT DUE AT BEGINNING OF LAB TIME)	
8			
Week 11 10	Kinematics – understanding 2D data collection, velocity and acceleration calculations	LAB -8 Kinetics, Force measurement	<b>Chapter 1 and TBD</b>
13		<b>REPORT REQUIRED</b>	
15			
Week 18 11	Human movement & balance	LAB -9 Kinematics- video based analysis –velocity and acceleration	
20			
22		(LAB 8 DUE AT BEGINNING OF LAB TIME)	

Week 25	Review of class material
12	–clarification of concepts
27	
29	Review

## 5.2 Physiology Labs - explanation for lab splitting

LAB # 3 - EACH LAB GROUP IS SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

Tuesday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Tuesday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

Wednesday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

Thursday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Thursday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

There will be 3 stations (A, B & C) in Room 208 A where oxygen uptake (VO<sub>2</sub>) will be measured.

There will be ~12-16 students in each of the above groups and you will be further divided into 3 sub-groups; A, B, and C. We will need a volunteer who is willing to do exercise at each of the stations – so we need 3 subjects in total at each of the 10 time slots.



LAB # 4 - EACH LAB GROUP IS SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

Tuesday 10:00 AM – Lab groups 5-8: 11:30 AM – Lab groups 1-4

Tuesday 2:30 PM - Lab groups 5-8: 4:00 PM - Lab groups 1-4

Wednesday 2:30 PM - Lab groups 5-8: 4:00 PM - Lab groups 1-4

Thursday 10:00 AM – Lab groups 5-8: 11:30 AM – Lab groups 1-4

Thursday 2:30 PM - Lab groups 5-8: 4:00 PM - Lab groups 1-4

There will be 3 stations (A, B & C) in Room 208A where oxygen uptake and body composition will be measured.

There will be ~12-16 students in each of the above groups and you will work in the same 3 sub-groups (A, B, and C) as in lab # 3. We will need a volunteer who is willing to do exercise all the way up to VO<sub>2</sub>max and voluntary exhaustion at each of the stations – the subject will also have their body composition measured – so we need 3 subjects in total at each of the 10 time slots.

LAB # 5 EACH LAB GROUP SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

Tuesday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Tuesday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

Wednesday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

Thursday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Thursday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

There will be 3 stations (A, B & C) in Room 208A where oxygen uptake will be measured. There will be one station (Wingate) where the sprint tests are done for all three groups.

There will be ~12-16 students in each of the above groups and you will work in the same 3 sub-groups (A, B, and C) as in labs 3 & 4. We will need a volunteer who is willing to do the two sub-maximal exercise rides and one additional volunteer to do the all-out sprint or Wingate test. So we need 2 volunteers in each of lab group A, B & C in each of the 10 time slots.

### **5.3 Biomechanics Labs - explanation for lab splitting**

LAB # 6 (OCT 28 - Nov 1) EMG

Tuesday 10:00 AM -1:00 All Lab groups

Tuesday 2:30 PM -5:30 All Lab groups

Wednesday 2:30 PM -5:30 All Lab groups

Thursday 10:00 AM – 1:00 All Lab groups

Thursday 2:30 PM – 5:30 All Lab groups

LAB # 7 (Nov 4 - Nov 8) - H REFLEX

Tuesday 10:00 AM -1:00 All Lab groups

Tuesday 2:30 PM -5:30 All Lab groups

Wednesday 2:30 PM -5:30 All Lab groups

Thursday 10:00 AM – 1:00 All Lab groups

Thursday 2:30 PM – 5:30 All Lab groups

LAB # 8 (Nov 11 - Nov 15) - KINETICS

EACH LAB GROUP IS SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE .

Tuesday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Tuesday 2:30 PM – Lab groups 1-4: 4:00 PM – Lab groups 5-8

Wednesday 2:30 PM - Lab groups 1-4: 4:00 PM - Lab groups 5-8

Thursday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8

Thursday 2:30 PM – Lab groups 1-4: 4:00 PM – Lab groups 5-8

There will be 2 stations in room 208B set up for force plate measurements (Kinetics lab). The group will split in half and work at one of the two stations.

We will need one or two volunteers for the Galvanic Vestibular Stimulation (GVS) demo in class during week 11.

LAB # 9 (NOV 18 - NOV 22) KINEMATICS

Tuesday 10:00 AM -1:00 All Lab groups

Tuesday 2:30 PM -5:30 All Lab groups

Wednesday 2:30 PM -5:30 All Lab groups

Thursday 10:00 AM – 1:00 All Lab groups

Thursday 2:30 PM – 5:30 All Lab groups

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## 6 Assessments

## 6.1 Marking Schemes & Distributions

Lab reports - Learning outcomes 1-6

Exams - Learning outcomes 1,4,5,

Name	Scheme A (%)
Lab Reports	60
Midterm #1	20
Midterm #2	20
Total	100

## 6.2 Assessment Details

### Lab Reports (60%)

4 lab reports X 15% - Lab reports are due the following week at the beginning of your lab section. Late lab reports without a valid documented reason are penalized 10% per day up to 5 days, after which the lab is marked as zero.

**LABs #2, #4, #6 an #8 are mandatory to hand in. These are handed in at the beginning of lab time, ONE WEEK following the lab.**

### Midterm #1 (20%)

50 Minutes

### Midterm #2 (20%)

1.5 Hours

## 7 Course Statements

### 7.1 Human Ethics

Ethical approval has been obtained from the Research Ethics Board at the University of Guelph for subject participation in the course laboratories. Please refer to the University of Guelph ethics website for further information

<http://www.uoguelph.ca/research/humanParticipants/PDF/policies/1%20-%20Review%20Policies/1-G-008.pdf>

If you have any concerns about the ethics of this course program, please contact the University of Guelph ethics officer, Telephone: (519) 824-4120, ext. 56606, E-mail: reb@uoguelph.ca, Fax: (519) 821-5236.

## 7.2 Course Teaching/Learning Approach

The course comprises a combination of lectures, applied labs and tutorials. You will perform a series of 10 labs. The emphasis of the course is on applied techniques that are relevant to those of you considering applied or research careers in human biomechanics, performance and clinical exercise testing, ergonomics, occupational therapy, exercise physiology, physiotherapy, kinesiologists, sports injury rehabilitation, paramedics, medicine, chiropractics, etc. The general skills you obtain will also provide you with the ability to work in groups and successfully troubleshoot challenges in other work environments.

The key concepts and theory underlying each lab will be presented in a series of lectures, such that this material is presented to you in the week preceding the lab. The lecture and lab material will be posted on D2L.

**The lectures start on Friday, Sept 6th, 2016.**

**The labs begin during the week of Sept 9-13th, 2016 (Tuesday - Thursday Sept. 9-13th)**

# 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/>

## 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>

### 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.

More information can be found on the SAS website

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

## 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>

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