HK*3600 Applied Human Kinetics I - (3-3) [0.75] Fall 2016

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.

Prerequisite(s): HK*2270 or permission of instructor, *Co-requisite(s):* HK*3940 or permission of instructor
Restriction(s): Registration in the Human Kinetics major.

Instructors:

Dr. Jamie Burr - Office: GFTC 263, x52591; burrj@uoguelph.ca

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Teaching Assistants:

Physiology: Sebastian Jannas, PhD student; sjannas@uoguelph.ca
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Classes: MACN 113 M, W, F - 1:30 - 2:20 PM

Laboratories: JT Powell Building - rooms 208 A & B

Lab 1: Tuesday – 10:00 PM – 12:50 PM
Lab 2: Tuesday - 2:30 PM - 5:20 PM
No lab 3 listed on web advisor
Lab 4: Wednesday - 2:30 PM - 5:20 PM
Lab 5: Thursday – 10:00 AM – 12:50 PM
Lab 6: Thursday – 2:30 PM – 5:20 PM

Evaluation:

Lab Reports (4 lab reports x 15%)	60%
First Midterm Exam (50 minutes)	20% - Friday October 21, 2016
Second Midterm Exam (1.5 hours)	20% - Monday, Dec 13, 2016

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**.

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 9th, 2016.

The labs begin during the week of Sept 12-16th, 2016 (Tuesday - Thursday Sept. 13-15th).

Lab Report Submission: 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.

Recommended Text: Physiology portion of the course (First 6 weeks)

Powers SK, and ET Howley. Exercise Physiology: Theory and application to fitness and performance. 7th, 8th, or 9th Edition. McGraw-Hill, Toronto, 2009, 2012, 2015.

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.

Lecture and Laboratory Outline

PHYSIOLOGY

You must hand in two labs (#2 and #4) in the first half of the course.

Month	Date	Lecture Topic	Lab	Chapters
	September 9th	Introduction		Powers text
Week 1	12	Intro to exercise physiology and energy metabolism–producing energy to move and stay alive	Introduction to physiological measures in human kinetics	**Chapters 1, 24**
	14			
	16			
Week 2	19	Respiratory and cardiovascular responses to exercise	LAB 2 – Respiratory and cardiovascular responses to exercise **LAB REPORT REQUIRED**	**Chapters 9, 10**
	21			
	23			
Week 3	26	Measuring oxygen uptake (VO_2) and energy expenditure in human kinetics	LAB 3 – Measurement of submaximal VO2 *(LAB 2 REPORT DUE AT BEGINNING OF LAB TIME)*	**Chapters 1, 4, 15**
	28			
	30			
Week 4	October 3rd	Oxygen uptake continued and maximal aerobic exercise	LAB 4 – Maximal oxygen uptake testing (VO2 max) **LAB REPORT REQUIRED**	**Chapter 13, 20**
	5			
	7			
Week 5	10	No Class	LAB 5– Estimation of anaerobic energy contribution, power and capacity during exercise *(LAB 4 REPORT DUE AT BEGINNING OF LAB TIME)*	
	12	Importance of anaerobic energy contribution during varying forms of exercise		**Chapter 11, 19**
	14	No Class		
Week 6	17	Finish material/ return Lab 4	LAB 5 - make up dates - See lab 5 instructions regarding Tues/Thursday re-scheduling	**Chapter 25**
	19			
	21	Midterm Exam		

Physiology labs- explanation for lab splitting:

LAB # 3 (SEPT. 27 – SEPT 29) - EACH LAB GROUP IS SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

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Tuesday 10:00 AM – Lab groups 1-4: 11:30 AM – Lab groups 5-8
Wednesday 10:30 AM – Lab groups 1-4: Noon – 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_2) 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 (OCT. 4-6) - 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
Wednesday 10:30 AM – Lab groups 5-8: noon – 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_2max 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 (OCT. 11-13) EACH LAB GROUP SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

Tuesday 10:00 AM – Lab groups 1-4: 11:30 PM – Lab groups 5-8
Tuesday 2:30 PM – Lab groups 1-4: 4:00 PM – Lab groups 5-8

Note: Tuesday rescheduled one week later (Holiday) same time – see top of lab 5

Wednesday 10:30 AM - Lab Groups 1-4: Noon - Lab Groups 5-8
Wednesday 2:30 PM – Lab groups 1-4: 4:00 PM – Lab groups 5-8
Thursday Group (normally 10am) – rescheduled to Monday 17th
7:00 PM – Lab groups 1-4: 8:30 PM – Lab groups 5-8
Thursday Group (normally 2:30) – rescheduled to Tuesday 18th
7:00PM – Lab groups 1-4: 8:30 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. S**o we need 2 volunteers in each of lab group A, B & C in each of the 10 time slots.

Friday, OCT. 21st– MID-TERM – IN CLASS 1:30 PM

BIOMECHANICS

Recommended Text: Biomechanics portion of the course (Last 6 weeks)

Enoka R. Neuromechanics of Human Movement. 4th or 5th Edition, Human Kinetics, 2008, 2015.

Reference Texts:

Biomechanics

1. Hamill J, Knutzen KM. Biomechanical Basis of Human Movement. 3rd Edition. LWW, 2009.
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.

You must hand in two labs (# 6 EMG and #8 Kinetics) in the second half of the course

Month	Date	Lecture Topic	Lab
Week 7	24 26 28	Introduction to electromyography (EMG). Learn how to measure muscle activity and understand EMG-force and fatigue relationship	Excel tutorial to assist with EMG assignment (location TBA)
Week 8	31 November 2nd 4	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?	EMG lab (this lab will be written up)
Week 9	7 9 11	Kinetics, What is force? Learn force measurement, Forceplate techniques	H-reflex lab (**EMG Lab 6 report due at beginning of lab time)
Week 10	14 16 18	Kinematics – understanding 2D data collection, velocity and acceleration calculations	Kinetics, Force measurement (this lab will be written up)
Week 11	21 23 25	The vestibular system and the motor cortex. Learn about our inner ear and balance. Understand the role our brain plays in the generation of movement	Kinematics- video based kinematic analysis –velocity and acceleration calculations. (***Kinetics Lab 8 report due at beginning of lab time)
Week 12	28 30	Review of class material – clarification of concepts	Transcranial Magnetic Stimulation (TMS) and Galvanic Vestibular Stimulation (GVS) Demo in class

Biomechanics labs- explanation for lab splitting

LAB # 8 (NOV 15-17) - EACH LAB GROUP IS SPLIT INTO 2 TIME SLOTS FOR ATTENDANCE

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

FINAL EXAM – December 13th 7-9pm, Location TBD

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, Sandy Auld, Telephone: (519) 824-4120, ext. 56606, E-mail: sauld@uoguelph.ca, Fax: (519) 821-5236.

Course and University Policies **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. See the undergraduate calendar for information on regulations and procedures for **Academic Consideration**.

Accessibility
The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services (formerly the Centre for Students with Disabilities) as soon as possible.
For more information, contact Student Accessibility Services at 519-824-4120 ext. 56208 or email csd@uoguelph.ca.

Academic Misconduct
The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of

supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.
Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

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

Drop Date
The last date to drop one-semester courses, without academic penalty, is the 40th class day. To confirm the actual date please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar.

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.

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

Grading
Indicate all course policies regarding in-semester tests and assignment submissions, including time and place for submission of assignments and explicit penalties for late submissions.

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.