

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

COURSE GOAL

This course presents an overview of tissue function from a biomechanics perspective, within the framework of health and injury. Particular emphasis is placed on the influence of biomechanical signals on the regulation of soft tissue, bone and joint structure and function. Individual diseases, such as osteoarthritis and osteoporosis, will be considered as they impact the various tissues of the joint (cartilage, ligament and bone) and the function of the neuromuscular system. Clinical applications of these biomechanical principles will be emphasized in the second half of the course including diagnosis, assessment, treatment and clinical management of injury. The laboratory will provide supplementary material illustrating particular aspects of musculoskeletal function and clinical applications of human biomechanics in health and disease.

Page | 1

TEACHING TEAM

Professor	Dr John Srbely, Office GFTC 281, jsrbely@uoguelph.ca , ext. 52058 Office Hours, by appointment
Teaching Assistant	Lukas Linde llinde@uoguelph.ca Felipe Coutinho coutinhf@uoguelph.ca Office Hours, by appointment
Course Schedule:	10:30-11:20 Monday, Wednesday, Friday, ROZH 102
Labs:	Monday, Wednesday and Friday 11:30-1:20, Friday 1:30-3:20, JTP208/215

LEARNING OUTCOMES

- Describe tissue injury in bone, tendon, ligament, cartilage and muscle using principles of tissue mechanics
- Understand how to perform a clinical history and orthopedic/neurologic physical examination/assessment
- Interpret the findings of a clinical history and physical examination to confer a clinical opinion/impression and/or clinical diagnosis
- Understand how to communicate findings with other health professionals
- Understand the key diagnostic features of musculoskeletal injuries and disease
- Understand mechanisms of acute and chronic pain and how to clinically assess
- Understand and apply principles of rehabilitation and injury management to the spectrum of musculoskeletal injury and disease
- Understand and apply principles of prevention to common clinical conditions
- Appreciate the role and contribution of the Certified Kinesiologist in the Canadian health delivery system

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

COURSE RESOURCES

There is no formal textbook. Material will be covered in class and supplementary material will be provided from the scientific literature (see CourseLink for assigned readings).

Page | 2

Undergraduate Calendar: is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. It can be found at:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

COURSE TOPICS

- Clinical Biomechanics review
- Tissue mechanics, structure and function of:
 - bone
 - tendon
 - ligament
 - cartilage
 - muscle
 - joints
- injury and healing
- clinical epidemiology
- acute and chronic pain
- injury prevention
- clinical applications of biomechanics
 - diagnosis and assessment of injury
 - management of musculoskeletal injury and disease

COURSE EVALUATION

Online Lecture Quizzes	20% (5, best 4 @ 5% each)
Online Laboratory Quizzes	20% (3 quizzes @ 5, 5 and 10%)
Midterm Exam	25%
Final Exam	35%

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

LECTURES

Lectures will comprise presentations by the instructor and guest speakers. Integrated class discussion and small group activities will facilitate

LABORATORIES

Page | 3

The laboratory section has been designed to reinforce the material covered in lectures. Emphasis will be placed on both experimental and clinical evaluation of selected aspects of the musculoskeletal system. The lab quizzes will be comprised of short-answer/multiple choice questions based on material within the laboratory, and will be completed at the end of each laboratory.

DESCRIPTION OF LABS:

LAB 1: TISSUE MECHANICS-BONE

The purpose of this lab is to investigate biomechanical properties of bone. Topics include stress-strain properties of long bones with specific attention placed on compression modulus, structural stiffness and area moment of inertia. Bones of various size (length, diameter) are compared for differences in biomechanical properties. Factors impacting these biomechanical properties (mineralization, cortical thickness, bone diameter, bone length) are studied and calculated. Clinical conditions (osteoporosis) impacting bone mechanics and clinical case studies demonstrating how to identify, evaluate and manage these conditions in a clinical setting are presented.

LAB 2: TISSUE MECHANICS-TENDON

This lab investigates tendon mechanics, with specific emphasis on comparing tensile modulus vs structural stiffness. Tendons of different size/length are tested to failure to evaluate the effect of structural properties on structural strength. The impact of fibrosis and repeat cycles loading are discussed with respect to their overall impact on tendon/ligament mechanics and tissue injury. Clinical applications of tissue set and fibrosis are discussed in detail and their clinical importance in tissue mechanics are emphasized.

LABS 3 AND 4: ORTHOPEDIC PHYSICAL ASSESSMENT

These two labs are designed to give the student an introduction into fundamental orthopaedic/neurologic physical assessment, with specific emphasis on the art of history taking and physical assessment of the spine and extremities. Topics include assessment of joint ROM (active, passive), general principles of and specific orthopaedic muscle and joint testing, basic neurologic and cranial nerve examination (sensory, muscle, reflex). Topics discussed in class are emphasized in the labs to relate theory to principles and practice in clinical musculoskeletal rehabilitation.

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

TENTATIVE CLASS SCHEDULE (FALL 2016)

September	9	Introduction
September	12	Review of Clinical Applications of Biomechanics
September	14	Classification of Biological Tissues
September	16	Clinical Biomechanics and Energy
September	19	Clinical Biomechanics and Energy
September	21	Joint Mechanics
September	23	Material Mechanics
September	26	Viscoelastic Tissues
September	28	Tissue Loading
September	30	Bone Structure and Formation
October	3	Bone Structure and Formation
October	5	Biomechanics of Bone
October	7	Bone Adaptation and Remodeling
October	10	THANKSGIVING
October	12	Ligament and Tendon Structure
October	14	Ligament and Tendon Biomechanics
October	17	Bryan Porter-Clinical Hx Taking
October	19	Cartilage
October	21	Cartilage
October	24	MID TERM
October	26	Posture
October	28	Posture
October	31	Inflammation and Tissue Healing
November	2	Pain
November	4	Pain
November	7	Guest Lecture: Clinical Management of Pain (Kumbhare)
November	9	Upper Extremity
November	11	Upper Extremity
November	14	Lower Extremity
November	16	Lower Extremity
November	18	Head Neck and Spine
November	21	Head Neck and Spine
November	23	Head Neck and Spine
November	25	Guest Lecture: Exercise Prescription (Bucciarelli)
November	28	Guest Lecture: Exercise Prescription (Bucciarelli)
November	30	Guest Lecture: Musculoskeletal Epidemiology (Nolet)
December	2	Review Lecture

Page | 4

****The schedule for the 3 labs TBA.**

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

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, and be prepared to provide supporting documentation. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08---ac.shtml>

Page | 5

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 the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.csd.uoguelph.ca/csd/>

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 advisort.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

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

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 Winter 2013 courses, without academic penalty, is **Friday March 8, 2014**.

COURSE OUTLINE
HK4610: Health and Injury Biomechanics
Fall 2016
Instructor: J Srbely

For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:
<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08---drop.shtml>

RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Page | 6

GRADING

If you are absent from classes during the semester, you will be expected to make up missed lecture and laboratory material on your own. Assignments handed in late will be penalized 5% for every day that it is late.

GENERAL CAMPUS RESOURCES

IF YOU ARE CONCERNED ABOUT ANY ASPECT OF YOUR ACADEMIC PROGRAM:

make an appointment with a program counsellor in your degree program.

<http://www.bsc.uoguelph.ca/index.shtml> or <https://www.uoguelph.ca/uaic/programcounsellors>

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.

<http://www.learningcommons.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>
- 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.uoguelph.ca/~ksomers/>

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