



HK*4240 Occupational Biomechanics and Ergonomics

Winter 2021

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.75

Version 1.00 - January 06, 2021

1 Course Details

1.1 Calendar Description

This course introduces the methods available for reducing musculoskeletal injuries in the workplace. Topics include: biomechanical, psychophysical, physiological, and integrated approaches to performing physical demands analyses, anatomy and etiology of low back injuries and upper limb disorders, principles of redesigning tasks to reduce the risk of injury, pre-employment screening and legislated guidelines. Students apply the course material to ergonomic assessments performed in industrial environments.

Pre-Requisites: ENGG*1210 or HK*3600

1.2 Timetable

- Lecture: Monday/Wednesday/Friday – 9:30-10:20 am by combination of synchronous Zoom lectures asynchronous recorded lectures.
- Laboratory

1.3 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Stephen Brown
Email: shmbrown@uoguelph.ca
Office: ANNU 358
Office Hours: By appointment (schedule over email).

2.2 Teaching Assistants

Teaching Assistant: Dennis Larson
Email: larsond@uoguelph.ca

Teaching Assistant: Aliza Siebenaller
Email: asiebena@uoguelph.ca

3 Learning Resources

3.1 Required Resources

Physical Ergonomics & Human Factors (Textbook)
"Physical Ergonomics & Human Factors" by Jim Potvin

Available in the bookstore.

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Identify occupational tasks that may cause injuries and/or fatigue.
 2. Identify the specific tissues that may be injured coupled with their injury mechanisms.
 3. Redesign operations to reduce the demands on heavily and/or repetitively loaded tissues.
 4. Have consideration for the unintended effects that ergonomic interventions may have.
 5. Understand why and how to optimize ergonomic interventions.
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5 Teaching and Learning Activities

5.1 Major Topics Covered

- Biomechanics of Injury
- Occupational Injuries

- Low Back
 - Upper Limb
 - Quantifying risk in manual material handling
 - Guidelines
 - Quantification Tools
 - Quantifying risk in repetitive and/or prolonged upper limb tasks
 - Guidelines
 - Quantification Tools
 - Workplace design and redesign
 - Optimization of ergonomic interventions
 - Vibration
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6 Assessments

6.1 Marking Schemes & Distributions

Midterm and final exam will be distributed as Word documents via email immediately prior to the exam starting times. Students will upload their completed midterm and final exam through the CourseLink Dropbox.

Students will be required to be logged into Zoom with their cameras on during the midterm and final exam.

Name	Scheme A (%)
Anthropometrics Laboratory	5
Quantification of Manual Lifting Laboratory (Individual Write-up)	10
Arm Tasks & Demands Description Laboratory (Individual Write-up)	10
Ergonomics Group Project - Written Report	25
Ergonomics Group Project - Presentation	5
Midterm Exam	20
Final Exam	25
Total	100

6.2 Assessment Details

Anthropometrics Laboratory (5%)

Date: Due one week after the lab is performed
Learning outcomes 3, 4, 5.

Quantification of Manual Lifting Laboratory (Individual Write-up) (10%)

Date: Due one week after the lab is performed
Learning outcomes 1, 2, 3, 4, 5.

Arm Tasks & Demands Description Laboratory (Individual Write-up) (10%)

Date: Due one week after the lab is performed
Learning outcomes 1, 2, 3, 4, 5.

Ergonomics Group Project - Written Report (25%)

Date: Due 2 days after presentation
Learning outcomes 1, 2, 3, 4, 5.

Ergonomics Group Project - Presentation (5%)

Date: Presentations in last classes of semester
Learning outcomes 1, 2, 3, 4, 5.

Midterm Exam (20%)

Date: Wed, Feb 10, 9:30 AM
Learning outcomes 1, 2, 3, 4, 5.

Final Exam (25%)

Date: Mon, Apr 26, 7:00 PM
Learning outcomes 1, 2, 3, 4, 5.

6.3 Ergonomics Group Project

- Students will be assigned to groups of 5 or 6.
- Your group will play the role of an ergonomics consulting company being hired by a company to improve the workplace. Each group will submit one "Ergonomics Report" to summarize their findings. This report is expected to be professional in nature.
- Students are encouraged to use any of the assessment tools discussed in this course to strengthen their report. In addition, the group will present their project in class (last classes of the semester).
- **Note:** everyone in a group will normally receive the same mark for the project. However, the instructor reserves the right to assign a higher or lower mark to individuals who have done much more or much less than their share of the allotted work, by consensus of their group.
- **Report Format:**
 - Font - 11 pt Times Roman or Arial, Margins - 1 inch on all sides; Page numbering - mandatory; Spacing – 1.5; Tables & Figures - clearly labelled,

should fully explain the figure or table. Reports should also include a table of contents. Further details will be provided later.

7 Course Statements

7.1 Policies

- In order to pass the course, students MUST pass the final exam.
- Students must attend and complete all laboratories, laboratory individual write-ups, group project including the group project report and group project presentation in order to pass the course. If a laboratory is missed due to illness or other appropriately documented extenuating circumstance, arrangements must be made with the instructor and TA to complete a make-up lab.
- **Late materials** - Labs and the group project report will be assessed a 10% deduction per day late

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.
