



HK*4340 Genomics: Exercise and Disease

Fall 2019

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.50

Version 1.00 - August 08, 2019

1 Course Details

1.1 Calendar Description

This course is an in-depth examination of how exercise 1) effects gene transcription to influence elite performance (ie. training for sport) and 2) can be used as a therapeutic strategy to influence the expression of specific genes to recover the health of an individual (ie. exercising for health). The course represents a unique opportunity to understand the beneficial effects of physical activity and exercise at the genetic level.

Pre-Requisites: NUTR*3360

1.2 Timetable

Lectures will be Tuesday and Thursday mornings from 10-11:20 in MINS 106

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:	Dr. Graham Holloway
Email:	ghollowa@uoguelph.ca
Telephone:	+1-519-824-4120 x53688
Office:	ANNU 332
Office Hours:	To be determined during the first class

3 Learning Resources

3.1 Required Resources

Courselink (Website)

<https://courselink.uoguelph.ca>

This course will make use of the University of Guelph's course website on D2L (via Courselink). Consequently, you are responsible for all information posted on the Courselink page for HK*4340. Please check it regularly.

3.2 Recommended Resources

Undergraduate Calendar (Website)

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

Undergraduate Calendar is the source of information about the University of Guelph's procedures, policies and regulations, which apply to undergraduate programs. Link provided.

3.3 TEXTBOOK AND READINGS

There is no required text for this class. Background readings (e.g. review articles from the scientific literature) will be provided as PDF files on the course website. Students are responsible for any additional background reading they think is necessary – instructors will provide suggestions of reading material. For the Research Presentation and Research Paper, students are expected to search and read current scientific literature, including original research papers, relevant to their topic. Instructors will provide groups with a short list of recommended readings once student groups and topics have been assigned.

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. [B.Sc. Academic Advising](#) or [Program Counselling](#)

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. [The Learning Commons](#)

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. [Counselling Services](#)
- Student Health Services is located on campus and is available to provide medical attention. [Student Health Services](#)
- 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. [Stress Management and High Performance Clinic](#)

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: [Centre for Students with Disabilities](#)

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Have an understanding of the importance of genetics for elite performance.
2. Have a thorough appreciation of exercise physiology, with a particular emphasis on skeletal muscle.
3. Have an extensive understanding of the current state of knowledge regarding how exercise training affects gene regulation.
4. Have an understanding of mechanisms thought to cause various diseases from a genetic perspective.
5. Understand how exercise combats many diseases at the molecular level in muscle.

6. Critically evaluate scientific reports.
7. Have improved small group work and self-directed learning skills.
8. Successfully work in small groups.
9. Have improved scientific writing and oral presentation skills.

4.2 Course Goal

The objective of this course is to expand on the introductory laboratory practices developed previously in 'Lifestyle Genomics'. While 'Lifestyle Genomics', the prerequisite to this course, focused on the basic understanding of how lifestyle choices (ie. diet and exercise) interact to effect health, the current course represents an in depth examination of how exercise 1) effects gene transcription to influence elite performance (ie. training for sport) and 2) can be used as a therapeutic strategy to influence the expression of specific genes to recover health of an individual (ie. exercising for health). The students will be introduced to the underlying concepts of various molecular processes in lecture, and strengthened through journal club discussions and a critical evaluation of the scientific literature (presentation and paper). This course therefore represents a unique opportunity to merge many facets of your previous University training, including molecular biology, physiology, cell biology and lifestyle genomics, to understand the beneficial effects of exercise at the genetic level. To apply this knowledge to various pathologies, a general understanding of the mechanisms causing specific diseases will also be explored. The goal for this course is to ensure that the student will emerge with a greater understanding of exercise training at the molecular level, as well as fully appreciate the notion of the 'specificity of training', as different training regimes will be discussed in the context of genetic adaptations. To achieve this, students will explore the potential for genetics to be a prerequisite for elite performance and how training in elite athletes can improve performance by altering the expression of specific genes. In addition, students will explore the genetics for disease (examples include obesity, insulin resistance, type 2 diabetes, heart failure) and how exercise can recover health of the individual by altering the expression of specific genes.

5 Teaching and Learning Activities

5.1 Course Teaching / Learning Approach

The course comprises a combination of lectures, journal club discussion and small group presentations. This course will consist of 10 weeks of lectures (2 lectures per week, each lasting 1.5 hours) and 2 weeks of student presentations. Lectures will consist of 'classical didactic' lectures and interactive journal club discussions of key research papers. The journal club discussions are aimed at strengthening the students understanding of key concepts, while also improving their critical thinking/ability to critique primary science articles, skills necessary to succeed with their independent research projects. The student presentations will take place during lecture times on November 14th, 19th, 21st and 26th and will be supervised by the course instructors. An overview of the course content will be provided on the course website, accessible via D2L (web link indicated below). However, students should be aware that these notes will be provided primarily as a structural draft for the lectures. For students to acquire the necessary information to succeed in this course they will be required to attend all lectures and student presentations. In addition, review papers from the current

scientific literature will provide background reading for the lectures and will be made available as PDFs on the course website. Students are expected to read all papers and any additional background reading they think is necessary.

It is expected that once Research Presentation groups are established students arrange meetings outside of class time in which to organize and plan their presentations. Students are given a minimum of 8 weeks to prepare for their presentation. You can contact the instructor by email if you have any questions pertaining to the presentation. It is highly encouraged that groups meet weekly to discuss progress and to interact on the presentation. Meeting on a regular basis will be evident in the quality of the final presentation. Note that content presented in the Research Presentations will be included in the final exam. This will be an invaluable opportunity for small group discussion and interaction and is critical to achieving the learner-centered objective of this course as outlined above.

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

Please read the journal club papers before coming to class.

5.2 ATTENDANCE EXPECTATIONS

Since lecture and Research Presentation content will be assessed in the final exam, it is strongly encouraged that students attend all lectures. The structural overview of lectures will be made available on the website and students who have missed classes will need to interact with their fellow students to obtain the material. While appointments can be made to discuss course content with the instructors, do not contact the instructors requesting lecture notes for missed lectures.

6 Assessments

6.1 Assessments

Form of Assessment	Weight (% final grade)	Learning Outcomes
Midterm (Oct. 17th, in class)	15%	1-3, 6
Final Exam (TBD)	35%	3-6
Research Paper (Oct. 29th-start of class)	20 or 30%	6-9
Research Presentation (TBD)	20 or 30%	6-9

6.2 Note

Note: The better mark between the research paper and presentation will count for 30%, while the lower grade will comprise 20% of the students' final grade.

MIDTERM EXAM: The midterm exam will assess the students understanding on the material

presented prior to the exam date. The midterm will be in class on October 17th.

FINAL EXAM: The final exam will assess the students understanding of course content and their ability to integrate and apply the various concepts presented during this course. This will compose 35% of the final grade.

RESEARCH PRESENTATION AND RESEARCH PAPER: The Research Presentation and Research Paper, when combined will comprise 50% of the final grade. The better mark (of the two assignments) will account for 30% of a student's final grade and the lower mark will account for the remaining 20%.

Research Presentation: Presentation topics will be selected by students, however they must be verified as acceptable by the course instructor. It is expected that topics relate to the general focus of the course, however, student groups will be required to use journal articles, books, etc to further develop each topic. Groups will consist of 3-4 students. PowerPoint presentations will be 15-25 minutes in length, and it is obligatory that each student in the group present material related to the topic. Each presentation will be followed by 5 minutes of questions. Student attendance at these presentations is mandatory and content presented by student groups will be incorporated into the final exam. Students will be required to meet and work as a group outside of scheduled lecture times.

Research Paper: Each student will be required to prepare and submit an independent Research Paper related to the Research Presentation. The final Research Paper must not be longer than 10 typed pages (double spaced, 12 point Times font, ¾ inch margins), not including figures, tables, and references. The Research Paper will be submitted at the start of class on October 29th. A late penalty of 10% will be deducted for each day the paper is late (starting at 10:01 when lecture commences), with a maximal deduction of 100% after 10 days. Please submit your paper in class (i.e. MacKinnon 231)

7 Course Statements

7.1 Grading

If you are absent from classes during the semester, you will be expected to make up missed lecture material on your own. Assignments handed in late will be penalized 10% for every day that it is 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/>

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>