

University of Guelph
College of Biological Science
Department of Molecular and Cellular Biology
COURSE OUTLINE

Genomics, MBG*3660,
Winter, 2016

Course description

This course examines how genome projects are generated through mapping and sequencing. Will also examine the various information generated from eukaryotic and prokaryotic genomic projects, including transcriptomics, polymorphisms, proteomics. Finally we will explore how genomic data is used for understanding and treating human disease and for the study of evolution.

Credit value: 0.5

Pre-requisites: MBG*2020 or MCB*2050

Restrictions: MBG*3600

Teaching team

Dr. Terry Van Raay

SSC 3460

tvanraay@uoguelph.ca

Office Hours: By appointment

Course schedule

Lectures: **Tuesdays and Thursdays, 10:00AM-11:20AM MCKN 224**

Computer Lab #1 SSC 1304:

Tuesday February 2nd: Aalbers to MacKey

Thursday February 4th: Malcom to Zarnett

Computer Lab #2 SSC 1304:

Tuesday March 1st: Aalbers to MacKey

Thursday March 3rd: Malcom to Zarnett

Computer Lab #3 SSC 1304:

Tuesday, March 22nd: Aalbers to MacKey

Thursday March 24th: Malcom to Zarnett

Learning goals and rationale

Overall, it is my objective for my students to develop an appreciation and understanding of different 'omics' projects, be it population genomics, transcriptomics or proteomics and to synthesize this information related to a specific gene of interest. Below I list the learning outcomes for my course. By the end of my course, my students should be able to:

- 1) Describe the history of the human genome project.

- 2) Demonstrate the strategies involved in completing a genomics project.
- 3) Explain the different types of information that can be obtained from a genome project (eg., aneuploidy or genome evolution).
- 4) Challenge the ethical issues surrounding human genome projects and the concept of personalized medicine.
- 5) Integrate different databases, such as a genome browser and its associated databases (eg. Human Genome Browser) with other databases (eg., Genbank), and synthesize the various elements displayed in these databases.
- 6) Apply information gathered from various databases to a gene of interest.
- 7) Resolve the discrepancy between expressed genes and translated genes in genomic studies.
- 8) Understand methods to manipulate genomes
- 9) Explain the basics of mass spec and its application to the 'omics' field.

Course Resources

Online Databases particularly: UCSC Human Genome Browser
 There is no required textbook for this course. However, I will be using information from the following textbooks, which will be on reserve in the library:

Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition, by A. Malcolm Campbell and Laurie J. Heyer

Genomes 3, T.A. Brown

Course Content

This course will be run using CourseLink.

Major course components:

- 1) Lecture
- 2) Computer Lab
- 3) Individual Student project
- 4) Student presentations

Schedule

Week	Topics Covered in Lecture (Subject to Change)
1 January 12 th and 14 th	Introduction and Overview of Topics Mapping: Genetic and Physical Maps, Huntington's Disease.
2 January 19 th and 21 st	Mapping Huntington's Disease Genome Sequencing Project and Annotation
3 January 26 th and 28 th	What's in a genome? Finding genes and other stuff Other genomic projects and Genome evolution

4 February 2 nd and 4 th	Computer Lab 1: SSC 1304
5 February 9 th and 11 th	Yeast genome, micro arrays Midterm, Thursday, Feb 11 in class
February 15 th -19 th	Winter Break
6 February 23 rd and 25 th	Microarray mining; Microarrays in the clinic Genomic Assignment #1 Due on Tuesday Feb 23rd
7 March 1 st and 3 rd	Computer Lab 2: SSC 1304
8 March 8 th and 10 th	Aneuploidy, Proteomics Genomic Assignment #2 Due on Thursday, Mar 10th
9 March 15 th and 17 th	Quantitative Proteomics, Metabolomics, Interactomes. Comprehensive Genomic analyses
10 March 22 nd and 24 th	Computer Lab 3: SSC 1304
11 March 29 th and 31 st	Personal project presentations 1-15 Personal project presentations 16-30
12 April 5 th and 7 th	Personal project presentations 31-45 Personal project presentations 46-60

Methods of Assessment

Assessment				
Form of Assessment	Weight of Assessment	Due Date of Assessment	Course Content /Activity	Learning Outcome Addressed
Midterm	30	Thursday, Feb 11 th	Lecture based material	1,2,3,4
Genomic Assignment #1	15	Tuesday, Feb 23 rd	Computer Lab/ Independent learning	2,3,5,6
Genomic Assignment #2	15	Thursday, March 10 th	Computer Lab/ Independent learning	2,3,5,6,7

Genomics Presentation	10	March 29 th to April 7 th	Computer Lab/ Independent learning	2,3,4,5,6,7
Final Genomics Assignment #3	30	Monday, April 11 th	Computer Lab/ Independent learning	1,2,3,5,6,7,8,9
Snippet (bonus)	1	Various	Personal interest	3,6

Important Dates

Midterm: Thursday, February 11th in class

Genomic Assignment #1 Due in Dropbox: Tuesday February 23rd by midnight

Genomic Assignment #2 Due in Dropbox: Thursday, March 10th by midnight

Final Genomic Assignment #3 Due in Dropbox: Monday, April 11th by midnight

Dropdate without a penalty: Friday, March 11th

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 coordinator 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>

Late assignments will be penalized 5 percentage points for every 24 hour period starting at 00:01 AM on the day after the assignment is due.

Missed presentations will be rescheduled.

There is no make up Mid-Term.

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 (and Centre for Students with Disabilities) as soon as possible.

For more information, contact Student Accessibility Services at 519-824-4120 ext. 56208 or email <mailto: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 advisor.

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

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.

Campus Resources

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

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:

Student Accessibility Services (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. For more information, including how to register with the centre please see: