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**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered in Lecture (Subject to Change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 12th and 14th</td>
<td>Introduction and Overview of Topics Mapping: Genetic and Physical Maps, Huntington’s Disease.</td>
</tr>
<tr>
<td>January 19th and 21st</td>
<td>Mapping Huntington’s Disease Genome Sequencing Project and Annotation</td>
</tr>
<tr>
<td>January 26th and 28th</td>
<td>What’s in a genome? Finding genes and other stuff Other genomic projects and Genome evolution</td>
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</tr>
<tr>
<td>4</td>
<td>February 2(^{nd}) and 4(^{th})</td>
</tr>
</tbody>
</table>
| 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 23\(^{rd}\)**                            |
| 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**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight of Assessment</th>
<th>Due Date of Assessment</th>
<th>Course Content /Activity</th>
<th>Learning Outcome Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form of Assessment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midterm</td>
<td>30</td>
<td>Thursday, Feb 11(^{th})</td>
<td>Lecture based material</td>
<td>1,2,3,4</td>
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<tr>
<td>Genomic Assignment #1</td>
<td>15</td>
<td>Tuesday, Feb 23(^{rd})</td>
<td>Computer Lab/ Independent learning</td>
<td>2,3,5,6</td>
</tr>
<tr>
<td>Genomic Assignment #2</td>
<td>15</td>
<td>Thursday, Mar 10(^{th})</td>
<td>Computer Lab/ Independent learning</td>
<td>2,3,5,6,7</td>
</tr>
</tbody>
</table>

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

**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-ami misconduct.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: