

Department of Biology Course Outline

SC/BIOL 4020 3.00 Genomics Winter 2016

Learning Outcomes

The main objective of the Genomics course is to develop understanding of the basic molecular techniques developed for genome sequencing and annotation, and the implication of the emerged Genomics field on basic science and on the future of medical treatment and disease prevention.

Prerequisites

- SC/BIOL 2060 3.00 or SC/MATH 2560 3.00 or SC/MATH 2565 3.00 or HH/PSYC 2020 6.00 or HH/PSYC 2021 3.00 (or equivalent);
- SC/BIOL 3200 3.00;
- SC/BIOL 3110 3.00.
- or permission of the course director to enrol the course without the prerequisites; (not relevant to BIOL3110 as this prerequisite will be enforced in all cases).

Course Instructors and Contact Information

Course Director: Dr. Motti Anafi: Office: Room 108, Farquharson Building
moanafi@yorku.ca

Office hours:

Email to set up an appointment

Schedule

Course Schedule and Location

Mondays and Wednesdays between 1:00-2:30pm at LSB 101

Evaluation

Mid-Term Exam 1 (25%)

Date: Monday, Feb 8, 2016 (updated time)

Time: 1:00pm

Location: ACE 001

Mid-Term Exam 2 (25%)

Date: Wednesday, March 16, 2016

Time: 1:00pm

Location: CLH J

Final Exam (50%)

During Winter exam period. Date, Time, Location: will be published by the registrar office

Important Dates

Classes start: Jan 3

Last date to add a course **without permission** of instructor: Jan. 17

Last date to add a course **with permission** of instructor: Jan. 29

Last date to drop course without receiving a grade: March 4

Winter Reading Week: Feb. 13-19

Winter classes end: April 4

Winter examinations: April 6-20

NOTE: for additional important dates such as holidays, refer to the "Important Dates" section of the Registrar's Website at <http://www.yorku.ca/yorkweb/cs.htm>

Course Content (and Recommended Resources)

PART I: The Genetic Revolution-from Traditional Genetics to Synthetic Biology

- EMBO Rep. 2009 August; 10(Suppl 1): S50–S53.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2726003/pdf/embor2009156.pdf>
- EMBO Rep. 2009 August; 10(Suppl 1): S42–S45.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2725998/pdf/embor2009130.pdf>
- Hamilton Smith (2014) Synthetic Biology for Genetic Engineering in the 21st Century
<http://www.mediatheque.lindau-nobel.org/videos/33653/2014-synthetic-biology-for-genetic-engineering-in-the-21st-century/laureate-smith-2>
- *Nature* 456, 310-314 (2008)
<http://www.nature.com/news/2008/081119/pdf/456310a.pdf>

PART II: Methods in Genomics, Transcriptomics and Epigenetics.

- *Nature Reviews Genetics* 11, 31-46 (January 2010)
<http://www.nature.com/nrg/journal/v11/n1/abs/nrg2626.html>
- *Hum Genet.* 2011 Apr;129(4):351-70
<http://www.ncbi.nlm.nih.gov/pubmed/21331778>
- *Nature* 461, 814-818 (8 October 2009)
<http://www.nature.com/nature/journal/v461/n7265/abs/nature08390.html>
- *Nature* 415, 530-536 (31 January 2002)
- *Cold Spring Harb Protoc* 2009. Chromatin Immunoprecipitation (ChIP)
<http://cshprotocols.cshlp.org/content/2009/9/pdb.prot5279.full.pdf+html>
- *BMC Bioinformatics* 2009, 10:80 doi:10.1186/1471-2105-10-80
<http://www.biomedcentral.com/content/pdf/1471-2105-10-80.pdf>

PART III: Medical Genomics

The Human Genome Project

- <http://www.genome.gov/>
- *Current Opinion in Biotechnology* 2000, 11:581–585
http://www.who.edu/science/B/people/mhahn/Broder_581.pdf

Genome-Wide Association (GWA) and Genetic Testing

- *Nature Reviews Genetics* 9, 356-369 (May 2008)
<http://www.nature.com/nrg/journal/v9/n5/abs/nrg2344.html>
- *PLoS ONE* 2(12): e1361.

<http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0001361&representation=PDF>

- <http://www.genome.gov/26525384>

PART IV: Human Kinome and Cancer Genomics

- Retroviruses: chapter 3- Oncogenesis
<http://www.ncbi.nlm.nih.gov/books/NBK19409/>
- Nature Reviews | Molecular Cell Biology Volume 2 | June 2001 | P. 467
- Science. 2013 March 29; 339(6127): 1546–1558
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3749880/pdf/nihms496129.pdf>
- Nature Genetics 45: 1113-1120 (2013)
<http://www.nature.com/ng/journal/v45/n10/full/ng.2764.html>
- Science. 2007 Nov 16;318(5853):1108-13.
<http://www.google.ca/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=0CEkQFjAD&url=http%3A%2F%2Fwww.gastricbreastcancer.com%2Fpdf%2Fscience%2520genome%2520breast%2520colrec%2520vogelstein.pdf&ei=uNPzUvKLMomuyQGUjYCABg&usq=AFQjCNFDk5W26CcdDAP5zCrdELbnwwJe7g&sig2=eXFS3IASpkuyUvYVkgXkWA>
- Cell, Volume 144, Issue 5, 646-674, 4 March 2011 [http://www.cell.com/abstract/S0092-8674\(11\)00127-9#Summary](http://www.cell.com/abstract/S0092-8674(11)00127-9#Summary)
- The Journal of Clinical Investigation 117(8) 2036-2043 (2007)
<http://www.jci.org/articles/view/31691/files/pdf>

PART V: Ancient Genomics

- Nature 499, 74–78 (04 July 2013)
<http://www.nature.com/nature/journal/v499/n7456/abs/nature12263.html>
- Nature 468, 1053–1060 (23 December 2010)
<http://www.nature.com/nature/journal/v468/n7327/pdf/nature09710.pdf>
- Published online 6 May 2010 | Nature
<http://www.nature.com/news/2010/100506/full/news.2010.225.html>

PART VI: Sequence Analysis

- Comparative Genomics Volumes 1 and 2 <http://www.ncbi.nlm.nih.gov/books/NBK2590/>
- <http://www.expasy.org/tools/>
- The Online Bioinformatics Curriculum, PLOS Computational Biology, (2012) Volume 8 Issue 9
<http://www.ploscompbiol.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pcbi.1002632&representation=PDF>
- For more relevant readings, go to the documentations/tutorials in the website of each tool or database. Try each tool by yourself.

Experiential Education and E-Learning

The Course MOODLE web site

To access Moodle, please follow the instructions below.

1. Go to: <http://moodle.yorku.ca>
2. Log in with your Passport York account.

Here you will find

- An updated course outline
- Optional reading
- The course wiki
- Forum
- Announcements
- Grades

Please note that the course director's announcements on the Moodle and in-class updates take precedence over any other information in the course MOODLE web site. The course director is not responsible for the accuracy of the notes posted by students in the wiki/forum. The exam is not restricted to the material posted on wiki. If you have technical Moodle-related questions, please direct them to UIT Client Services at 416.736.2100 x55800 or email helpdesk@yorku.ca.

Other Information

Tips on studying for this course:

- For the exams, you must know and understand the material presented in the lectures.
- The online resources (specified above) and textbooks can help students consolidate and expand their understanding of the material. However, much of the online resources and textbooks will not be covered in class. For the exams you are NOT expected to know material from the online resources and textbooks which has not been covered in the lectures.
- Students need to attend **all lectures** in order to do well in the course. The discussions in class are critical for the understanding of the material. The center of the course is the lectures. It is your responsibility to attend lectures as my multimedia presentations will not be provided outside the classrooms. Do not rely on the Wiki: take your own notes.
- The material presented in the lectures and other components of the course such as tests and exam have been developed from a large variety of resources, including websites, textbook supplements and the material mentioned above.
- In general, it is best that a student who was unable to attend a lecture borrow the relevant notes from a classmate. You may also wish to check the course Moodle website for additional relevant material. Here, you can find an updated course outline and many on-line resources. In addition, you can use the course wiki. Furthermore, you have my permission to use an audio tape-recorder in class (or to arrange with a classmate to do it for you).
- I will usually be available before/after each lecture to address individual questions. If you need to speak with me out of class, please send me an email to set an appointment.

Course Policies

Tests and Exams

Attendance for all exams is mandatory. Exams missed on the ground of medical circumstances must be supported by an Attending Physician's Statement, which can be downloaded from: http://www.registrar.yorku.ca/pdf/attend_physician_statement.pdf, or a statement by a psychologist or counsellor. Students are NOT expected to disclose the nature of the illness. The document must specify:

- 1) date of consultation
- 2) contact information (e.g. phone number of the hospital; legible name of the health provider) that would allow verification of the document
- 3) a statement that the student would not have been able to attend class (or carry out activities) during the relevant period of time

The documentation must be dated on the same day as the exam or earlier, or it will not be accepted. The Course Director must be notified by email within 24 hours in the case of a missed test or exam. Appropriate documentation must be submitted to the Course Director within one week after the test or exam. **No opportunities to make up missed mid-term exams will be offered. However, after acceptable justification for a missed exam has been received, the percentage value of the missed mid-term will be added to the final exam.** If the final exam is missed, the student must petition the Registrar for permission to write the final exam. Deferred exams are similar to the original exam in terms of material covered and level of difficulty, However, the format will not be identical to the original. Accordingly, all approved deferred exams will be consisting of short-answer questions (no multiple-choice).

Emailing the Course Director

Your email will be read and answered as soon as possible. However, we will open only e-mails that fulfill the following requirements:

- Your email must be sent from your regular yorku.ca email account (**not from the moodle server**). Do not use non-yorku.ca accounts (such as hotmail or personal gmail). Emails from non-yorku.ca accounts or from the Moodle will likely languish in a spam folder that is checked

only intermittently.

- Be sure to include your full name and student number in your email text.
- Your email must include "BIOL4020" in the subject line
- Your email must NOT include an attachment.

Copyright Policy at York University (Q & A from YorkU Web site)

“1. Question: Can I (the instructor) include copyrighted content in a class presentation without permission of the rights holder?

Answer: Yes, if you stay within the limits of the Copyright Act. The educational exceptions allow you to:

- “make a manual reproduction of a work onto a dry-erase board, flip chart or other similar surface intended for displaying handwritten material, or”
- “make a copy of a work to be used to project an image of that copy using an overhead projector or similar device”
- “The display must be on campus, there can be no commercial version available that is appropriate for that use and you are not able to distribute copies in either paper or electronic form.”

2. Question: Can I (the instructor) post that same presentation on my Course website?

Answer: “No, the educational exceptions do not allow you to distribute copies in either paper or electronic form.”

Disclaimers

The information presented in the lectures is provided for educational purposes only, and should not be considered as a medical advice.

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <http://www.glendon.yorku.ca/counselling/personal.html>
York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

Ethics Review Process

York students are subject to the York University *Policy for the Ethics Review Process for Research Involving Human Participants*. In particular, students proposing to undertake research involving human participants (e.g., interviewing the director of a company or government agency, having students complete a questionnaire, etc.) are required to submit an *Application for Ethical Approval of Research Involving Human Participants* at least one month before you plan to begin the research. If you are in doubt as to whether this requirement applies to you, contact your Course Director immediately.

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete an Examination Accommodation Form, which can be obtained from Student Client Services, Student Services Centre or online at

http://www.registrar.yorku.ca/pdf/exam_accommodation.pdf (PDF)

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-and-or-harassing-behaviour-in-academic-situations-senate-policy/>