Department of Biology Course Outline

SC/BIOL 4010 3.00 Biology of Cancer
Fall 2024-5

Land Acknowledgement
York University recognizes that many Indigenous Nations have longstanding relationships with the territories upon which York University campuses are located that precede the establishment of York University. York University acknowledges its presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken of by the Anishinabek Nation, the Haudenosaunee Confederacy, and the Huron-Wendat. It is now home to many First Nation, Inuit, and Métis communities. We acknowledge the current treaty holders, the Mississaugas of the Credit First Nation. This territory is the subject of the Dish with One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.

Course Description

The main objective of the Biology of Cancer course is to develop an understanding of the basic molecular and cellular concepts and principles related to the development of cancer, and its medical application to treatment and prevention.

The course discusses molecular and cellular aspects that affect the development of cancer in humans, approaching DNA mutations and viral infections as major causes of the disease. Furthermore, the course will illustrate rational treatments and preventions for cancer.

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

Learning Outcomes

Upon completion of the Biology of Cancer course, students will

- be able to explain concepts related to different mechanisms involved with the development of cancer
- be able to explain concepts related to different types of drugs and other treatments for cancer.
- be able to describe the role of cancer-causing viruses in the development of some cancers and the involvement of the host immune responses with cancer.
- develop and use critical thinking skills related to the biology of cancer
- use the scientific process and scientific data from this course as a basis for the understanding of other biological systems.

Prerequisites

- SC/BIOL 3130 3.00 or SC/BCHM 3130 3.00.
  The prerequisites will be enforced in all cases.

Course Instructors and Contact Information

Course Director: Dr. Motti Anafi:
moanafi@yorku.ca

I will usually be available after each in-class meeting to address individual questions. If you need to speak with me out of class, please send me an email to set an appointment.

Emailing the Course Director
Your email will be read and answered as soon as possible. However, I 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 eClass server**). As much as possible, do not use non-yorku.ca accounts (such as Hotmail or personal Gmail). Emails from non-yorku.ca accounts or the eClass 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 "BIOL/4010" in the subject line. (I am teaching other courses).

Schedule

Course Schedule
Course Schedule and Location: Wednesdays at 2:30 pm in ACW 306

Evaluation

Mid-Term Exam 1 25%
Date: Wednesday, Sept 25, 2024
Time: 2:30 pm
Duration: 60 minutes
This exam will be on **Parts 1 and 2** of the course.

Mid-Term Exam 2 25%
Date: Wednesday, Oct 23, 2024
Time: 2:30 pm
Duration: 60 minutes
This exam is **cumulative,** but it will concentrate on **Part 3** of the course.

Final Exam 50%
Date: During the formal Fall examination period (December 5-20): The specific date/time/location will be posted by the registrar's office.
Duration: 180 minutes

All exams are cumulative: everything discussed in the pre-recorded lectures, applications, and related principles from the required readings is a "fair game" on the exam.

Mid-terms and final exams will take place in class only. NOT online. You must be in class to write them.

Course Content and optional/required reading

Part 1: The Nature of Cancer

Weinberg Textbook Reading: Chapter 1, 11

The development of tumors from normal tissues

The hallmarks of cancer *(read required reading no. 1)*

Epidemiology of sporadic (non-heritable) cancers

Part 2: Oncogenes

Weinberg Textbook Reading: Chapters 3, 4, 5, 13

Retroviruses and the discovery of oncogenes

Activation of protooncogenes in human cancer

Tyrosine kinases as cellular oncogenes *(read required reading no. 2)*

Ras and uncontrolled proliferation

Parts 1 and 2 consist of 405 minutes (6.75 hours) of prerecorded lectures to be covered in the first three weeks of the course. This is the material for Mid-term 1 to take place on week 4 of the course

Part 3: Tumor Suppressor Genes in Cancer

Weinberg Textbook Reading: Chapters 7, 8, 9

Inherited Cancer and tumor suppressor genes

pRb: retinoblastoma and cancer

BRCAs, APC, and other TSG in cancer

P53 and cancer

Part 3 consists of 218 minutes (3.6 hours) of prerecorded lectures to be covered in weeks 4 and 5 of the course. Parts 1-3 are the material for mid-term 2 (cumulative, to take place on week 7 of the course)

Part 4: Mechanisms of Cancer Development

Weinberg Textbook Reading: Chapters 3, 8, 9, 13, 14, 15,

Inflammation and human cancer

Angiogenesis in tumors

Tumor metastasis and invasion

Immortalization and telomerase

Smoking and cancer

Part 4 consists of 285 minutes (4.75 hours) of prerecorded lectures to be covered in weeks 6-9 of the course.

Part 5: The Future of Rational Treatment and Prognosis of Cancer

Weinberg Textbook Reading: Chapters 13, 16

Cancer genomics *(read required reading no. 5)*

The path from Abelson leukemia virus to Gleevec *(read required reading no. 6)*

Part 5 consists of 269 minutes (4.5 hours) of prerecorded lectures to be covered in weeks 10-12 of the course.

The overall prerecorded lecture time is about 1177 minutes (around 20 hrs.) You are expected to cover 1.5-2 hours of pre-recorded lectures every week. This way you will still have some extra time for the in-person session. If for some reason you choose not to cover the lecture in a certain week (e.g. due mid-term for the course), you need to catch up and cover ~4 hrs of lecture in the following week. As for writing a mid-term, you will write it 1-2 weeks after you were supposed to complete covering the material for that mid-term. Do not wait to cover the material of the second (or third) package until the time after the evaluation of the previous package. By the time of the first mid-term, you need to study the second material package, etc.

You need to cover the material in order at the indicated time. You need to cover the material before the in-person meeting as the discussion on the in-person is based on the fact that you covered the pre-recorded lecture on time.

Experiential Education and E-Learning

The Course eClass website

To access eClass, please follow the instructions below.
1. Go to: https://eclass.yorku.ca/eclass/my/
2. Login with your Passport York account.

Here you will find

- An updated course outline with optional reading
- Discussion Forum: here students can discuss the course material, ask questions about the material, etc.
- Announcements
- Grades
- Pre-recorded lectures
- Documentation

Please note that the course director's announcements on the eClass take precedence over any other information (especially if you are communicating with each other via WhatsApp etc.).

Resources

Required Readings (Review articles)

1) Hanahan D. and Weinberg R.A. (2011) The hallmarks of cancer. Cell 144(5), 646-74 (http://www.cell.com/cell/fulltext/S0092-8674(11)00127-9 or https://www.sciencedirect.com/science/article/pii/S0092867411001279)

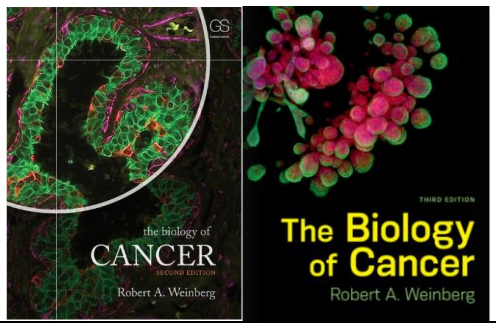
2) Blume-Jensen P. and Hunter T. (2001) Oncogenic kinase signaling. Nature 411, 355-65. (http://www.nature.com/nature/journal/v411/n6835/full/411355a0.html or https://www.researchgate.net/profile/Tony-Hunter/publication/11981125_Oncogenic_kinase_signaling/links/09e4151329687a16b2000000/Oncogenic-kinase-signaling.pdf)

3) Bert Vogelstein et al. (2013) Cancer Genome Landscape. *Science.* 339(6127): 1546–1558 (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3749880/pdf/nihms496129.pdf or https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3749880/)

4) Hunter T. (2007) Treatment for chronic myelogenous leukemia: the long road to imatinib The Journal of Clinical Investigation 117(8) 2036-2043 (http://www.jci.org/articles/view/31691/files/pdf or https://www.jci.org/articles/view/31691)

Recommended Readings:

1) The Biology of Cancer, by Robert A. Weinberg (Second or Third Edition)
Available on reserve in Stacie Library and YorkU bookstore).



2) Additional textbook:
Go to http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=Books Search BOOKS with the keyword: “Cancer”. The most relevant books are:

- **Cancer Medicine,** 6th edition**.**
- **Retroviruses.** Coffin, John M.; Hughes, Stephen H.; Varmus, Harold E.
- http://cancerresearch.org/CRI/media/PDF-Content/Cancer-and-the-Immune-System_2017-final_print.pdf

Teaching methods

- In the last couple of years, we had at the university many discussions about the best teaching methods for “online” and “in-person” courses. As for BIOL4010 Fall 2024, I decided to take the best from both methods and combine them. I decided to use **here flipped course strategies.**
- **What is a flipped course strategy?** Flipped lessons replace teacher lectures with instructional material—here, prerecorded lectures—that students watch and interact with at home. Later, they apply what they learned at home from the prerecorded lectures in sessions in-class through various activities such as questions answers, and discussions.
- Accordingly, the lectures and the discussions are going to be delivered in two different modes:
- First, students need to cover the relevant pre-recorded lecture/s on their own, and second, we will have In-class / in-person meetings for further discussions of the material covered in the pre-recorded lectures, including Q&A sessions, after exam reviews and much more.
- The online portion will be online only (I will not repeat the entire lecture in class).
- The in-class portion will be in-class only. For many reasons, the in-class “in-person” sessions will not be recorded. YOU NEED TO ATTEND THE CLASS FOR IN-CLASS ACTIVITIES.
- Still, I opened for you an activity called WIKI where students can post summaries of the in-class activities. Furthermore, the FORUM can be used for questions and discussions as well.
- **All exams (mid-terms and final) will take place in class only.** There is no online version for these evaluations.
- The pre-recorded lectures consist of the complete material of the course. As for the in-class portion of the course: We will meet in class once a week on Wednesdays. This portion is considered optional, however, it is highly recommended to attend the in-class meetings.

- The pre-recorded lectures will be posted in three “waves”: the first cluster, and the lectures for the chapters to be covered on the first mid-term. Later, as the second cluster, the lectures cover the second mid-term. Later, I will post the rest of the material for the course.

- Students can use the delivery method in quite a flexible way: For example, you can access the visual material covered in high-resolution pre-recorded lectures at any time convenient to you as many times as you wish. You will have the flexibility to view the entire lecture at once or to stop the lecture at any stage of the lecture. You can run the lecture more quickly or slowly. You can turn down/up the audio as you wish.

- The prerecorded lectures are based on multimedia presentations run by several programs. It is not “PowerPoint slides". The lectures were developed using a Video editor which stitched together videos, animations, images, text, and many other activities.

- In order to have a "PowerPoint-like experience," you can mute my voice, and run the high-resolution video on a full screen. Here you can stop the video any time you wish to have the image for as long as you need it.

- As for the exams, you must know and understand the material presented in the pre-recorded lectures and their applications.

- The textbook and the other readings can help students consolidate and expand their understanding of the material. However, much of the textbook will not be covered in class, and some material to be covered in my lectures is not in the textbook. On the exams, I will **concentrate** on topics covered in the pre-recorded lectures and their applications. However, reading the required material and attending the “in-class” meetings are likely to be very helpful.

- The material presented in the lectures and other components of the course such as tests and exams have been developed from a large variety of resources, including websites, textbook supplements, and other material mentioned.

- I will usually be available after each in-class meeting to address individual questions. If you need to speak with me out of class, please send me an email to set an appointment.

- For the required reading: cover my lecture first. Later read the relevant review article by identifying the most important principles rather than trying to memorize all the details. The best way to my mind is to go first to the abstract. If you are not familiar with the topic, check the introduction as well. Later, go to the figures and legends to be followed by the discussion. And from here, you will be able to read the rest of the article focusing on the important principles.

Course Policies

Tests and Exams

- No opportunities to make up missed mid-term exams will be offered. In all cases of missed mid-term exam, 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 her/his home faculty for permission to write the final exam.
- **If the petition will be granted**: The level of difficulty and the material covered on the deferred final exam will be similar to the original exam. However, **the format of all deferred mid-terms/final exams is likely to be different from the original exam (e.g., short answer questions or oral exams instead of multiple-choice questions).**
- If the deferred final exam is missed the student must petition their home faculty again for permission to write a second deferred final exam. **If the petition will be granted the student is likely to be evaluated on an oral exam.**
- No doctor notes or any other documentation is required for missed mid-terms. For the petition after missed final exams to write a deferred exam, the documentation needed is according to the policy of your home faculty.
- It is your responsibility to ensure that you are available to sit for final examinations during the entire exam period for the Fall term (Dec 5-20, 2024)

Rules for viewing term tests:

After each exam, we will have an academic feedback session in the following in-class meeting.

If you are interested in viewing your exam and comparing it against the key, you need to send an e-mail to the course TA (TBA) **by two weeks after the day the grades were posted** on the eClass. Every exam viewing session will be up to 20 minutes for viewing the exam and comparing it against the detailed key. During test viewing sessions the regular examination rules will apply. If after you viewed your exam against the key, you feel that you deserve more marks you can send an e-mail to the course director (Attn: Dr. Motti Anafi, e-mail: moanafi@yorku.ca).

Dealing with weather and technical issues

In general, students need to be prepared to deal with weather and technical issues.

1) If you do not have the internet working at home for any reason (technical issues, weather, etc.)
    A. You should go to the university. Here, the internet is always on.
    B. You can use your cellular data by making your cellphone a “hotspot”.
    C. You should always take offline notes and have summaries of the lectures. Make sure not to fully rely on the internet.
    D. Cover the lecture **on time** and take notes as you cover the prerecorded lecture. Do not wait until the last moment before the exam.

E. Make the appropriate travel arrangements to be in class on time for classes and exams.

F. If you have technical eClass-related questions, please direct them to UIT Client Services at 416-736-2100 x55800 or email helpdesk@yorku.ca.

Copyright protection of the posted pre-recorded lectures

1) The material presented in the pre-recorded lectures has been developed from a large variety of resources, including websites and textbooks.

2) I am doing my best to post the credit for the developers of each external resource that was included in my lectures. However, in some cases, the original material is no longer available on the web, and finding the person or organization that deserved the credit may not be possible despite my efforts.

3) The prerecorded lectures are copyright-protected by the course director and many third parties, private people, and organizations.

4) The prerecorded lecture will be available for you through the course on the eClass. You can use them in the eClass only. The prerecorded lectures are "unlisted" on my personal YouTube channel- **do not share the link to the lectures with others and do not use the link directly. First, you need to go to eClass to sign in with your York Password, and to use it there.**

5) Students are NOT allowed to copy the videos and/or to post them elsewhere, directly or as an embedded link.

6) Not complying with any of the above will be considered an infringement of copyright law.

Emailing the Course Director

Your email will be read and answered as soon as possible. However, I 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 eClass server**). As much as possible, do not use non-yorku.ca accounts (such as Hotmail or personal Gmail). Emails from non-yorku.ca accounts or the eClass 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 "BIOL/4010" in the subject line. (I am teaching other courses).

Important Dates

Important Dates for Fall (F)

EVENT	FALL (TERM F)
Classes start	September 4
Last date to announce components of final grades	September 18
Fall Reading Week[1]	October 12-18
Last date to submit Fall term work	December 3
Fall classes end	December 3
Fall Study Day[2]	December 4
Fall examinations[3]	December 5-20

Add/Drop Deadlines

	FALL (TERM F)
Last date to add a course **without permission** of instructor (also see Financial Deadlines)	September 18
Last date to add a course **with permission** of instructor (also see Financial Deadlines)	October 2
Drop deadline: Last date to drop a course without receiving a grade (also see Financial Deadlines)	November 8
Course Withdrawal Period (withdraw from a course and receive a grade of "W" on transcript – see note below)	November 9 - December 3

University Policies

University Policies

Important Dates

Drop Deadline: For appropriate term (last day to drop without course on transcript)
Course Withdrawal Deadline: For appropriate term (course still appears on transcript with 'W")

Grading Scheme

In accordance with the York University Undergraduate Calendar Regulations, the letter grades assigned in undergraduate courses at York conform to the descriptions and grade ranges shown here: https://calendars.students.yorku.ca/2022-2023/grades-and-grading-schemes

Academic Honesty and Integrity

Academic misconduct undermines the values of honesty, trust, respect, fairness, and responsibility that we expect in this class. York University provides supports such as academic integrity workshops to ensure that all students understand the norms and standards of academic integrity that we expect you to uphold.

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. Please review and familiarize yourself with the policy.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve your research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website:

Examples of actions that do not adhere to York's Academic Integrity Policy include:

- Plagiarism (passing off someone else's work as your own)
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams
- Uploading work to third party repository sites (e.g., Course Hero, One Class, etc.)
- Scanning, sharing, uploading, or publishing exams, tests, or scholarly work

For more information on what academic integrity is and why it is important see: https://spark.library.yorku.ca/academic-integrity-what-is-academic-integrity/. Information on the process of investigations into breaches of academic honesty: https://spark.library.yorku.ca/academic-integrity-breach-of-policy-on-academic-honesty/

Important Note from the FSc Committee on Examinations & Academic Standards (CEAS): Numerous students in Faculty of Science courses have been charged with

academic misconduct when materials they uploaded to third party repository sites (e.g., Course Hero, One Class, etc.) were taken and used by unknown students in later offerings of the course. Whenever a student submits work obtained through an external site (e.g., Course Hero, Chegg), the **submitting student will be charged with plagiarism** and the **uploading student will be charged with aiding and abetting**. To avoid this risk, students are urged not to upload their work to these sites.

Assistance for Students (Academic and Well-Being)

Academic Advising*: https://www.yorku.ca/science/academic-advising/ * Departments also offer program-specific advising. Check with your Department's Undergraduate Office.

Centre for Human Rights, Equity, and Inclusion: https://rights.info.yorku.ca

Centre for Indigenous Students Services: https://aboriginal.info.yorku.ca/

Good2Talk 24-hour Ontario Student Helpline: 1-866-925-5454 /Text: GOOD2TALKON to 686868

Keep.meSAFE: https://myssp.app/keepmesafe/ca/home

Learning Commons (general academic learning supports including library research, time management, study skills, career planning, etc.): https://learningcommons.yorku.ca/

Peer Assisted Study Sessions (PASS): https://www.yorku.ca/colleges/bethune/get-help/pass/

Peer Tutoring: https://www.yorku.ca/colleges/bethune/get-help/peer-tutoring/

Sexual Violence Response and Support: https://thecentre.yorku.ca

Student Counselling, Health & Well-being: https://counselling.students.yorku.ca/

Support Services for International Students: https://yorkinternational.yorku.ca/international-student-support/

Writing Services: https://www.yorku.ca/colleges/bethune/get-help/writing/

York University Student Services: https://family.yorku.ca/student-services/#SCD

York University Student Well-being Resources: https://www.yorku.ca/well-being/resources/students/

Accessibility

York University is committed to principles of respect, inclusion, and equality of all persons with accessibility needs across campus. The University provides services for students with accessibility needs (including physical, medical, learning, and psychiatric needs) 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 accessibility 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 accessibility 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:

Student Accessibility Services: https://accessibility.students.yorku.ca

York Accessibility Hub: http://accessibilityhub.info.yorku.ca/

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. To arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete and submit an accommodation request form at least 3 weeks before the exam period begins. https://secure.students.yorku.ca/pdf/religious-accommodation-agreement-final-examinations.pdf

Student and Instructor 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-andor-harassing-behaviour-in-academic-situations-senate-policy/.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

https://calendars.students.yorku.ca/2021-2022/policies-and-regulations