

## Department of Biology Course Outline

### SC/BIOL 4010 3.00 Biology of Cancer Summer 2020

#### Learning Outcomes

The main objective of the Biology of Cancer course is to develop the 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 examines 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.

#### Prerequisites

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

#### Course Instructors and Contact Information

Course Director: Dr. Motti Anafi:  
[moanafi@yorku.ca](mailto:moanafi@yorku.ca)

##### Office hours:

Office hours: Each Monday 5-6 pm (using ZOOM). E-mail to set the online ZOOM appointment.

##### 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**). 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 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 "BIOL/4010" in the subject line. (I am teaching other courses).
- Your email must NOT include an attachment.

#### Schedule

##### Course Schedule

The course will be offered on Mondays, Wednesdays from 11:30 am using remote teaching technologies (ZOOM). The remote teaching sessions will be used as an opportunity for further discussions on the material discussed in the prerecorded lectures, to be posted for you on the Moodle. The discussion including questions-answers, comments, and extension of the material covered in the lectures. The ZOOM session will be opened each Monday and Wednesday exactly on 11:30 am and will stay open as long students will be in attendance.

## Evaluation

**All exams will be delivered remotely on the Moodle.**

Mid-Term Exam 1      25%  
Date: Wednesday, July 22, 2020  
Time: 11:30am  
Duration: 60 minutes

This exam will be on **Parts 1 and 2** of the course.

Mid-Term Exam 2      20%  
Date: Wednesday, Aug 5, 2020  
Time: 11:30am  
Duration: 60 minutes

This exam **cumulative** but it will concentrate on **Parts 3** of the course.

Final Exam              55%  
Date: will be published by the registrar office.  
Duration: 150 minutes

**All exams are cumulative: everything discussed on the pre-recorded lectures and related principles from the required readings is a “fair game” on the exam.**

Important:

- 1) **Exams and other assessments may be conducted with the aid of an online proctoring service**
- 2) Students SHOULD NOT use any notes or textbooks. All exams are based on the CLOSED BOOKS environment. The duration of the exams is based on the normal duration we are using “in class” exams (without using textbooks or notes, which are not allowed in class as well).
- 3) You must start the exam on time. The extra time the exam will be opened is not to signal that you can start the exam late. If you start writing late, the grade may not be counted at all, or you will not receive any buffer points if added.
- 4) Students should not use the same IP address during the exam as any of the other students writing the exam.
- 5) Students are responsible to have the appropriate internet connections to write the exam without interferences.
- 6) For a student who will not be able to write a mid-term exam **for any reason whatsoever** (technical: computer or internet-related problem of all kinds, health-related, family matter. Just anything), the weight of the mid-term will be transferred to the final exam.
- 7) If the online final exam is missed for any reason, the student will be able to write a regular final exam (in-class) to be arranged as a deferred exam when the university will be open. The format of all deferred exams is likely to be different from the original exam (e.g. short answer questions). We will have only one deferred exam for everybody missed the online final exam. If this deferred exam is missed the student must petition his home faculty for permission to write a deferred exam.
- 8) No doctor notes or any other documentation are required for missed exams.
- 9) It is your responsibility as a student to ensure that you are available to sit for final examinations during the entire exam period for the term corresponding to your course (Aug 14-21).

## Course Content and optional/required reading

- The lectures to cover for mid-term 1 (part 1 and 2) will be posted on June 28.
- The lectures to cover for mid-term 2 will be posted on July 12
- The lectures to cover for the rest of the course will be posted on July 26

**Introduction:** Tips on studying for the course

**Part 1: The Nature of Cancer** (Pre-recording time: 145 minutes)

*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** (Pre-recording time: 278 minutes)

*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*)

G proteins and uncontrolled proliferation

**Part 3: Tumor Suppressor Genes in Cancer** (Pre-recording time: 225 minutes)

*Weinberg Textbook Reading: Chapters 7, 8, 9*

Inherited Cancer and tumor suppressor genes

pRb: retinoblastoma and cancer

BRCAs and breast cancer

**Part 4: Infection, Inflammation, and Other Mechanisms of Cancer** (Pre-recording time: 343 minutes)

*Weinberg Textbook Reading: Chapters 15*

Inflammation and human cancer

Papilloma viruses and Cervical Neoplasia (*read required reading no. 3*)

Angiogenesis in tumors and metastasis

Smoking and cancer

**Part 5: The Future of Rational Treatment and Prognosis of Cancer** (Pre-recording time: 234 minutes)

*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*)

## 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 with required and optional readings
- Forum

- Announcements
- Grades
- Pre-recorded lectures
- Documentations
- Online exams

The course will be delivered remotely using the application Zoom and pre-recorded lectures on the Moodle. All exams will be delivered online using the “Quizzes” on the Moodle.

If you have technical problems using ZOOM or Moodle-related questions, please direct them to UIT Client Services at 416-736-2100 x55800 or email [helpdesk@yorku.ca](mailto:helpdesk@yorku.ca). I will not be able to solve personal technical problems during the lecture. Please make sure your audio and video are set properly before the session.

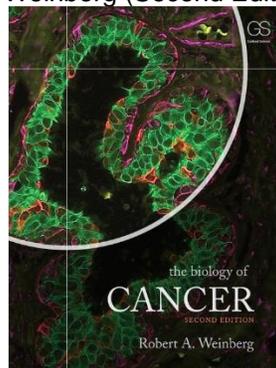
## Resources

### 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](http://www.cell.com/cell/fulltext/S0092-8674(11)00127-9) )
- 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> )
- 3) Munger K. *et al.* (2004) Mechanisms of Human Papillomavirus-Induced Oncogenesis. *Journal of Virology* 78, 11451–11460. (<http://jvi.asm.org/content/78/21/11451.short> )
- 4) 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>
- 5) 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>

### Recommended Readings:

- 1) *The Biology of Cancer*, by Robert A. Weinberg (Second Edition)



A. Available at York University bookstore and on reserve in Stacie Library

There are additional ways to get the book in other (cheaper) formats

B. CRC Press <https://www.crcpress.com/The-Biology-of-Cancer/Weinberg-Weinberg/9780815342199>

C. Vital Source e-chapters

<https://www.vitalsource.com/textbooks?utf8=%E2%9C%93&sort=&term=9780815342205+chapter>

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](http://cancerresearch.org/CRI/media/PDF-Content/Cancer-and-the-Immune-System_2017-final_print.pdf)

## Important Dates

### ▼ Summer 2020 Sessional Dates (revised March 25, 2020)

EVENT	SU	S1	S2
Course start date	May 11	May 11	June 29
Last date to add a course without permission of instructor	May 25	May 15	July 3
Last date to add a course with permission of instructor	June 8	May 26	July 10
Last date to drop course without receiving a grade	July 17	June 8	July 29
Reading Week	June 23-26	N/A	N/A
Study days	Aug. 8 Aug. 9 Aug. 11 Aug. 13	June 23	Aug. 11 Aug. 13
Course Withdrawal Period (withdraw from course and receive a "W" on transcript - see <b>Add and Drop Deadline Information</b> below)	July 18-Aug. 12	June 9-June 22	July 30-Aug. 12
Course end date	Aug. 12	June 22	Aug. 12
Examinations	Aug. 14-21	June 24-26	Aug. 14-21

## Other Information

### Tips on studying for this course:

- For the exams, you must know and understand the material presented in the lectures and the required reading mentioned above.
- 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.
- The textbook can help students consolidate and expand their understanding of the material. However, much of the textbook will not be covered in class. For the exams, you are NOT expected to know the material from the textbook which has not been covered in the lectures.

### Technical quality of the pre-recorded lectures

I am trying to bring you the lectures at their best quality. However, as I am using quite a lot of multimedia (animations, figures, and videos) as part of the lecture, the size of the lecture files is getting quite large. In few places, especially when I am using heavy animations, I have made for you, or when I bring up a heavy figure or video, the volume of my voice is reduced/chopped in response to this activity. I believe that in these cases even my strong computer and video editing software have some difficulties with the load during the lecture recording. So, it is not the microphone (I am using a professional microphone), but my attempt to give you a clear audio-visual multimedia lecture. As the animations and the figures are very important for the lectures and since you can still get the lecture information even when the volume of my voice is reduced/chopped for few seconds, this is the best balance I can make for you. (Yes, I did quite a lot of experiments on this including recording each lecture several times under different conditions).

So how to get the best quality? Most importantly, use good headphones when you are listening to my lectures. By doing so you would be able to hear my voice even when the volume is reduced or chopped to some level. The quality of the videos would be better if you use a strong computer and a fast internet. Use a regular PC or laptop. Do not watch them on a cellphone or other weaker devices. Periodically, when many students are watching the same file, the servers (YouTube and the Moodle) are getting slow. Overall, it is about a balance: And I hope I created the best balance for you.

## Course Policies

### Copyright protection of the posted videos and exams

- 1) The material presented in the pre-recorded lectures and other components of the course such as tests and exams has been developed from a large variety of resources, including websites, textbook supplements and the material mentioned above.
- 2) I am doing my best to post the credit for the developers of each figure and videos that were included in my lectures. However, in many cases, the original material is no longer available on the web, and my ability to find the person or organization deserved the credit might not be possible despite my efforts.
- 3) **The prerecorded lectures and the questions on the online exams** are copyright protected to the course director and many third parties, private people and organizations.
- 4) Although the material will be available for you through the course on the Moodle, **students are NOT allowed to copy the videos and exam questions and/or to post**

**them elsewhere, directly or as an embedded link. This activity will be considered an infringement of copyright law.**

**From the Dean of Science Office:**

“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. The Faculty’s Committee on Examinations and Academic Standards (CEAS) found in these cases that the burden of proof in a charge of aiding and abetting had been met, since the uploading students had been found in all cases to be willfully blind to the reasonable likelihood of supporting plagiarism in this manner. Accordingly, to avoid this risk, students are urged not to upload their work to these sites. Whenever a student submits work obtained through Course Hero or One Class, the submitting student will be charged with plagiarism and the uploading student will be charged with aiding and abetting. **Note also that exams, tests, and other assignments are the copyrighted works of the professor assigning them, whether copyright is overtly claimed or not (i.e. whether the © is used or not). Scanning these documents constitutes copying, which is a breach of Canadian copyright law, and the breach is aggravated when scans are shared or uploaded to third party repository sites.**”

**Disclaimers**

The information presented in the lectures is provided for educational purposes only and should not be considered as 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/spark/academic\\_integrity/index.html](http://www.yorku.ca/spark/academic_integrity/index.html)

**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 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-counselling/what-is-counselling/>

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](http://www.registrar.yorku.ca/pdf/exam_accommodation.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 endeavor. 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/>