

Department of Biology Course Outline

SC/BIOL 4010 3.00 Biology of Cancer
Fall 2015

Course Description

This course will explore the basic molecular and cellular concepts and principles related to the development of cancer, and medical applications to treatment and prevention of the disease. Three lecture hours. One term. Three credits.

Prerequisites

SC/BIOL 3130 3.00 or SC/BCHM 3130 3.00.

Course Instructors and Contact Information

Dr. Keith Wheaton Farquharson Building, Room 243
416 736-2100 Ext. 20893
kwheaton@yorku.ca

Office Hours: Thursdays 11 AM-12:30 PM and 6:00 PM-7:30 PM Farq 243

Schedule

THURS	14:30	180 min	LSB 105
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Evaluation

Mid-term test 1	25%
Written Assignments:	
In class group work: 2%/each	10%
Major Assignment: Public Awareness Campaign	15%
Mid-term test 2	25%
Final exam	25%

Important Dates

First day of class:	Sept 10
Midterm I:	Oct 8 (in class)
Major Assignment	Oct 28
Fall Break	Oct 29 –Nov 1
Last date to drop without grade	Nov 9
Midterm II:	Nov 12 (in class)
Final	TBA

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>

Resources

Lecture slides and assignment descriptions will be made available on Moodle at the beginning of the course.

Textbook: The Biology of Cancer, by Robert A. Weinberg 2nd edition (2014; Garland Science)

Readings including review articles and primary research articles will be posted on Moodle. These act as a supplementary source for understanding the hallmarks of cancer and some of the specific studies covered in the course.

Hanahan and Weinberg (2000) The Hallmarks of Cancer. *Cell* **100**:57-70

Hanahan D. and Weinberg R.A. (2011) Hallmarks of Cancer: The Next Generation. *Cell* **144**, 646-674.

Learning Outcomes

By the end of the course, learners will be able to efficiently:

- 1) Identify and describe the causes of cancer when evaluating case studies in terms of the environment and risk factors.
- 2) Describe the type of DNA mutations that occur in cancer and categorize these in the framework of the six hallmarks of cancer.
- 3) Understand how oncogenes and the mutation of tumour suppressor genes contribute to the onset of cancer in the context of various forms of cancer.
- 4) Identify cell signalling pathways that are important targets of chemotherapy and how this can be applied to the treatment regimens of various cancers.
- 5) Assess the relative contributions of each hallmark of cancer to the progression and clinical outcome of various forms of cancers.
- 6) Evaluate how environmental causes, DNA mutation, oncogenes, tumour suppressors, biochemical pathways, the hallmarks of cancer and chemotherapies all define the clinical presentation, severity and outcome of various case studies of cancer.

Course Content

This course will explore the molecular and cellular mechanisms that underlie the development and progression of cancer. We will examine the genetic basis of cancer and learn fundamental concepts that are common to all forms of human cancer. The course will expose students to modern cancer biology and the primary cancer research literature.

Lecture	Corresponding Hallmark of Cancer
1) The nature of cancer	All
2) Tumour Viruses and Oncogenes	Sustaining proliferative signalling
3) Cellular Oncogenes	"
4) Growth factors, Receptors and Signalling	"
5) Tumour suppressor genes & Cell cycle regulation	Insensitivity to anti-growth signals
6) Apoptosis & Cellular survival pathways	Evading apoptosis
7) Limitless replicative potential	Limitless replication Potential
8) Multistep Tumorigenesis and Genomic Integrity	Genomic instability and mutation
9) Angiogenesis	Sustained angiogenesis
10) Invasion and metastasis	Tissue invasion and metastasis

Experiential Education and E-Learning

In class group and class discussions

Visiting clinician/specialist lecture for each section of the course

Group project: Public awareness campaign video and pamphlet/social media/website.

Small group assignments

Moodle forum discussions

All Lectures will be available by pod cast

Other Information

I would appreciate that any questions related to course material be posted in the moodle forums, so that everyone has access to the answers. Please only contact me by e-mail: kwheaton@yorku.ca for other course related issues.

Course Policies

Missed Test or Exam:

Students with a documented reason for missing a course test (illness, compassionate grounds, etc.), which is confirmed by supporting documentation (e.g., doctor's letter) may request accommodation from the Course Instructor.

Appropriate documentation must be submitted to the Course Instructor as soon as possible. There will only be a **limited** time and opportunity to make up for a missed mid-term test. If all opportunities are missed and an acceptable justification for a missed test has been received, I will **reluctantly** add the percentage value of the missed mid-term test to the final exam (which will be worth 50% of the final grade). I highly recommend you make the effort to take both midterms and I will track you down to do so. Please Note: ignorance of this course outline and its dates is not a legitimate excuse.

If the final exam is missed, the student must petition the Registrar for deferred standing (permission to write a deferred exam).

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.

Student's 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-andor-harassing-behaviour-in-academic-situations-senate-policy/>