Biochemistry 4450A: Molecular Genetics of Human Cancer
In-class (Section 001) and E-Course (Section 650)
Department of Biochemistry

Course Description and Goals:
Key cellular pathways that are frequently subverted in tumour cells leading to neoplasia will be discussed, as well as mechanisms by which environmental factors affect tumour development. Cancer models and molecular therapies will also be investigated and related to the cancer hallmarks. *This course has two sections*, including a traditional in-class, face-to-face section (001) as well as an online section (650). Students can access the lectures in real-time or via the course’s OWL site, where the lectures will be archived throughout the term for all students.

Biochemistry 4450A Learning Outcomes (L.O.):
Upon completion of the course students should be able to:

1. **Demonstrate** a critical understanding of recent breakthroughs and advances in our understanding of the causation and treatment of multiple types of cancer. Students will be able to understand and evaluate news reports and new breakthroughs reported in the popular press in proper scientific context.

2. **Interpret and explain** detailed, current knowledge about the molecular mechanisms and abnormalities responsible for cancer development.

3. **Critically evaluate** diverse information sets related to cancer; offer opinions and exhibit theoretical understanding of novel treatment scenarios.

4. **Clearly communicate** technical concepts and experimental results to diverse audiences in writing, in a style consistent with practice in the field.

Prerequisites: Biology 2581b, Biochemistry 3381

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Instructor: Dr. Fred Dick
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Course material:
All course material, including scholarly research papers and reviews, and the lecture notes in pdf format will be accessible from the course's OWL site (under 'Resources'). As well, lectures are recorded ‘live’ by webcam for viewing, and are also archived on the course’s OWL site (under ‘Collaborate CV’). Students will also be provided with additional short video and web-based news articles prior to lectures (referred to as ‘Appetizers’) that will offer news-based, scientific context to the upcoming lectures, for the students to peruse prior to class.

Required Textbook: no required textbook
Topics and timeline for studies: including the links between assessments and the course’s Learning Objectives (L.O.). This is a general timeline which will be finalized by Sept 1, 2016.

lecture 1: Course Introduction and Cancer 'by the Numbers' Rodenhiser
lecture 2: The Hallmarks of Cancer Rodenhiser
lecture 3: The 'Cancer Genes' I Dick
lecture 4: The 'Cancer Genes' II Dick
lecture 5: Cancer Genomics and lessons in cBioPortal Dick
lecture 6: Model organisms used in Cancer Biology Dick
lecture 7: Multistage Progression (and the 2 hit (more or less) hypothesis) Dick
lecture 8: Immortality and Senescence Dick
lecture 9: Genome Integrity I: Apoptosis Dick

Take home Quiz using cBioPortal to problem solve (linked to L.O. #2)

lecture 10: Genomic Instability: enabling Cancer progression Dick
lecture 11: DNA Repair: Overview and Concepts Dick
lecture 12: DNA Repair Errors in Specific Cancers I Dick

In class discussion of Quiz Results + Instructions for Mini-Review Term Paper

lecture 13: DNA Repair Errors in Specific Cancers II Dick

Midterm 2 hours (on topics from Lectures 1-13; linked to L.O. #2 and #3)

lecture 14: Gene-Environment interactions Rodenhiser
lecture 15: Cancer Epigenetics Rodenhiser
lecture 16: Targeting the Epigenome in Cancer Rodenhiser
lecture 17: Metastasis and Angiogenesis Rodenhiser
lecture 18: Cancer Pharmacogenetics and Proteomics Rodenhiser
lecture 19: Molecular Diagnostics and Counselling Rodenhiser
lecture 20: Molecular Profiling of tumours: array technology Rodenhiser
lecture 21: New Cancer Therapies I: Antisense technologies Rodenhiser

Mini-Review / Term Paper due (linked to L.O. #2 and #3)

lecture 22: New Cancer Therapies II: Immunotherapies Rodenhiser
lecture 23: New Cancer Therapies III: Viral therapies Rodenhiser

Final Review Lecture: Summing up, feedback Rodenhiser

Final exam 3 hours (on ALL topics from Lectures 1-23; linked to L.O. #1, #2, #3 and #4)

Evaluation:
'InteractiveLinks': (5%) ... Quiz: (10%) ... Midterm: (25%) ... Term paper: (15%) ... Final: (45%)

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Exams: See [http://www.registrar.uwo.ca/applying/distance_studies/examinations.html](http://www.registrar.uwo.ca/applying/distance_studies/examinations.html) for information regarding Distance Studies Examinations.

NB: If you need to change the location of your exam you need to contact the Distance Studies office at least 3 weeks prior to the exam date at 519-661-2111 ext. 84879 or [distexam@uwo.ca](mailto:distexam@uwo.ca).

It is each student’s responsibility to determine where she/he is to write each examination and to appear at the designated room on time. Students must provide their own pens, pencils (HB) and erasers for the examination.

No student will be allowed to write an examination without either a [Western ONECard](http://www.onecard.uwo.ca/) student ID or another piece of government-issued photo identification. Electronic devices, including (but not limited to) calculators, cell phones and iPods are NOT allowed in the exam room.

Missed test/examination: “Students who are unable to write a scheduled midterm test must inform their instructor and provide proper documentation to their academic counsellor. IF approval is made for a make up test and your exam centre is in London, your instructor will arrange the time and location of your rewrite. If you are writing at an off-campus exam centre, you must contact Distance Studies office if your make up test is approved to arrange your rewrite. Students will be required to pay an off-campus make-up exam fee.”

Academic Offenses: All students are responsible for reading the list of Academic Rights and Responsibilities at the following website: [http://www.westerncalendar.uwo.ca/2016/pg111.html](http://www.westerncalendar.uwo.ca/2016/pg111.html). Infractions may result in a grade of zero on the exam in question.

Useful Links

Office of the Registrar – Distance Studies

Academic Counselling (Science and Basic Medical Sciences): [http://www.uwo.ca/sci/undergrad/academic_counselling/index.html](http://www.uwo.ca/sci/undergrad/academic_counselling/index.html)

Student Center: [https://student.uwo.ca/psp/heprdweb/?cmd=login](https://student.uwo.ca/psp/heprdweb/?cmd=login)

Student Development Centre: [http://www.sdc.uwo.ca/](http://www.sdc.uwo.ca/)

Student Health Services: [http://www.health.uwo.ca/](http://www.health.uwo.ca/)

Students who are in emotional/mental distress should refer to MentalHealth@Western [http://www.uwo.ca/uwocom/mentalhealth/](http://www.uwo.ca/uwocom/mentalhealth/) for a complete list of options about how to obtain help.