

BIOL 465 (CRN 10413 - A01)

Molecular Biology of Cancer

Fall 2018

Tues/Wed/Fri 8:30 am - 9:30 am

Location: Engineering/Computer Science (ECS) ECS116

Lecture: ECS116 Tues/Wed/Fri 8:30 am - 9:30 am

Office: Cunningham 217 Tues and Fri 9:30 - 10:30 am (Also Thursday 11-1 pm by appointment).

Instructors: Dr. Patrick Walter
Dr. Julian Lum

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Description:

This course will cover molecular events that lead to cancer. The course will be divided into sections structured around first understanding important signal transduction pathways in cancer and then discussing some of the major types of cancer, including leukemia, breast, prostate and CLL. Special emphasis will be placed on understanding the signal transduction pathways important in driving tumorigenesis in each of the sites, in particular the role of tumor suppressors and oncogenes. We will also discuss the role of stem cells, and the concept of the cancer stem cell. The course will consist of formal lectures and assigned journal article reading from the current literature, discussions and class questions using TopHat (an electronic interactive lecture experience, described below). The goal of the journal article reading, discussions and questions will be to create an interactive environment to introduce students to the role of scientific discovery in the development of ideas in understanding cancer mechanisms and treatments. The use of genetic tools such as transgenic and knockout mouse models to dissect oncogenic pathways will be examined, and experimental design will be discussed. Students are expected to have familiarity with cell biology and cell signaling – i.e. have taken biology 360, Bioc 300, and/or Bioc 403. For those students who wish to review this material, there is an excellent textbook by Dr. Robert A. Weinberg, “The Biology of Cancer” by Garland Science (ISBN 9780815342205) that is recommended. This is NOT a required text but is a useful reference for students who feel they have a deficiency in their background or who simply learn better from textbooks.

Description from the UVic Calendar:

Units: 1.5, Hours: 3-0

Clinical terminology, concepts of cancer epidemiology, DNA mutation and repair, molecular basis of cell cycle regulation, cell proliferation and apoptosis. Special emphasis on chemotherapy, gene therapy, diet and cancer, and the immunology of cancer

Prerequisites: BIOL 225, 230, 360 or either of BIOC 300a or 300b

Office Hours:

Cunningham 217 9:30 – 10:30 Tuesdays and Fridays – The instructor that teaches the lecture that follows will be present. Dr. Walter is adjunct faculty and therefore has limited time on campus, and Dr. Lum is not on campus except for this course. If these times conflict with your schedule, e-mail to set up an alternate time.

CourseSpaces Moodle:

This course uses the university CourseSpaces (Moodle) learning/teaching resource. To access this Course, use your Netlink ID and password and log onto CourseSpaces from your Mypage area (<https://www.uvic.ca/mypage/>).

We will post the course notes outline, journal article guidelines and other important information through this site. We will also post the PowerPoint presentation (in pdf format) for each lecture prior to each class. You may choose to print the slides and add notes to them during class. Please check CourseSpaces regularly, as this is where course announcements will be posted.

Top Hat:

We will be using TopHat as an additional interactive question resource. TopHat will be worth 10% where 4% are participation bonus marks (if you complete 70% of the questions) and 6% are marked and graded as a part of the course total. Review questions, and discussions of scientific papers, and in-class questions will be posted using this site. It is recommended that all students purchase a TopHat account.

You can visit tinyurl.com/StudentStartGuide for Top Hat's Student Quick Start Guide which outlines how you will register for a Top Hat account, as well as providing a brief overview to get you up and running on the system. Also, <https://support.tophat.com/s/> is a great way to get a lot of information as there is a wide variety of articles uploaded there that can help.

Once you have registered and entered in your subscription code, your course can be directly accessed via the following:

Top Hat course name: **The Molecular Basis of Cancer – Fall 2018”**

Direct URL: <https://app-ca.tophat.com/e/106122>

6-digit course code: **106122**

Optional Course Text:

The Biology of Cancer by Robert A. Weinberg. **This text is recommended, but not required.** This text is now available in a digital format and is a great text with extensive clinical information. If you intend to continue studying in the medical field, it would be a good reference text for you to own. We will NOT be covering all the material in the text. The primary source of information will be the lecture slides covered in class. Two copies of the textbook are on reserve in the library. There also may be second hand copies of the text which may be available from the Used Book Store.

Assigned Material and Journal Articles:

Because there is not an assigned text for the course, topics will be drawn from primary and review articles from the scientific literature which will be assigned during class and links posted on Moodle CourseSpaces. Lecture time will be allocated to going over the papers as part of class discussion. Reading assignments are mandatory and will be included in the evaluation (i.e. on the midterm and final exams). In addition, when readings are assigned for a discussion lecture, students must come to the lecture prepared to discuss the paper and having read the assigned reading. Students are also expected to attend all the lectures, to take notes and to participate in discussions. Questions will be asked during class using TopHat throughout the term. Questions on each journal article will be tested on the midterms and final exam. More details regarding the journal articles and sample exam questions will be available on Moodle CourseSpaces. Journal article discussion questions will be posted using TopHat in class.

Course Evaluation:

35% Midterm – Tuesday Oct 16 (50 min in class, cumulative, includes journal articles and will be short answer or multiple choice). If the midterm is missed with a medical excuse, there will be a makeup exam at a scheduled date. If you feel that we should be made aware of any special circumstances or accommodations for your participation in the course, please notify us.

55% Final exam - Date TBA, Saturday Dec 8th or thereafter (3 hours, cumulative but builds on the previous section's material)

Must be completed to receive a final grade for the course. Deferred exams will be handled as outlined in the University of Victoria calendar.

10% TopHat Class Activities:

6% - Graded Course Marks for Top Hat questions and activities.

4% - Of the 10% TopHat Activity, there is 4% Bonus participation Marks for Top Hat questions and activities (must complete 70% or more of the questions during semester).

Students are expected to be present for the midterm and final exam on the specified dates. Failure to write a midterm exam as described above will result in a grade of 0% for the exam unless for illness, accident, or family affliction, and students must provide the appropriate documentation within 48 hours after the midterm exam. Students who miss the midterm exam for one of the legitimate, documented reasons listed above will have the to write a deferred midterm exam within 10 business days of the midterm date.

N grades

Students who have completed the following elements will be considered to have completed the course and will be assigned a final grade: The Midterm and the Final Exam.

Failure to complete one or more of these elements will result in a grade of "N" regardless of the cumulative percentage on other elements of the course. An N is a failing grade, and it factors into a student's GPA as 0. The maximum percentage that can accompany an N on a student's transcript is 49.

Therefore, students must write the midterm exam and the final exam to pass the course. Deferral of a final exam must be requested with an Academic Concession form and submitted directly to Undergraduate Records. Deferred final exams will be arranged by the instructor in the first two weeks of January. Travel is not an acceptable reason to miss the deferred final exam date.

Students are expected to take notes during class, copies of slides will be provided on CourseSpaces (Moodle) before class, however these notes should not be considered complete and students are responsible for all material discussed in class, drawn on board etc. Plagiarism and copying are all academic offences and submitted material must be your own work. Grading will be based on answering of short and long answer exam questions. The exams will test the student's ability to think and incorporate concepts and ideas, and design experiments. Understanding of material will be tested and memorizing the lecture handouts will not be sufficient. Students are expected to have completed 3rd year Cell biology and Biochemistry, and the onus is on students to review pertinent material as needed.

The total mark, calculated from the marks on all of the exams and TopHat questions according to the weighting scheme above, will be converted to a percentage and then to a letter grade in the following way on the next page (Please note the recent changes):

Your final overall mark in the course will be given as a percent and a Letter Grade based on the following guidelines: A+ = 90-100%, A = 85-89.9%, A- = 80-84.9%, B+ = 77-79.9%, B = 73-76.9%, B- = 70-72.9%, C+ = 65-69.9%, C = 60-64.9%, D = 50-59.9%, F = 0-49.9% (if all requirements completed), N (if not all requirements completed). Please see details below.

You are not allowed to cheat or plagiarize in this course, as outlined in the University of Victoria calendar. This course will strive to be an inclusive and safe learning environment recognizing the diversity of the students and their opinions as outlined in the University calendar.

For questions regarding lecture material, students should go to the instructor for that particular topic. General concerns and questions about marks should be addressed to Dr. Walter as course administrator.

Revised UVic Grading Scheme (effective May 1, 2012)

Passing Grades	Grade Point Value	Percentage for Instructor Use Only *	Description
A+ A A-	9 8 7	90 – 100 85 – 89 80 – 84	Exceptional, outstanding and excellent performance. Normally achieved by a minority of students. These grades indicate a student who is self-initiating, exceeds expectation and has an insightful grasp of the subject matter.
B+ B B-	6 5 4	77 – 79 73 – 76 70 – 72	Very good, good and solid performance. Normally achieved by the largest number of students. These grades indicate a good grasp of the subject matter or excellent grasp in one area balanced with satisfactory grasp in the other area.
C+ C	3 2	65 – 69 60 – 64	Satisfactory, or minimally satisfactory. These grades indicate a satisfactory performance and knowledge of the subject matter.
D	1	50 – 59	Marginal Performance. A student receiving this grade demonstrated a superficial grasp of the subject matter.
F	0	0-49	Unsatisfactory performance. Wrote final examination and completed course requirements; no supplemental.
N	0	0-49	Did not write examination or complete course requirements by the end of term or session; no supplemental.

Provisional Lecture Schedule 2018 (Changes will be necessary)

Week 1: SEMESTER STARTS Wed Sept. 5 ENDS Fri Dec. 5 2018

1. Wed Sept 5. Introductions/Outline/Cancer Overview – Walter.
2. Fri Sept 7. Introduction to concepts, terms and overview of Cancer, defining the hallmarks – Walter

Week 2:

3. Tues Sept 11. Hallmarks of cancer – 1st hallmark – self-sufficiency in growth factors - Walter
4. Wed Sept 12. Oncogenes & tumor suppressors how they relate to the hallmarks of cancer - Walter
5. Fri Sept 14. Self sufficiency in growth signals, HER2 / EGF - Walter

Week 3:

Tues Sept 18 Last day for 100% reduction of first-term fees

6. Tues Sept 18. Insensitivity to Antigrowth signals, TGF- β – Walter
7. Wed Sept 19. Insensitivity to Antigrowth signals, Vitamin D – Walter

Fri Sept 21 Last day for adding courses that begin in the second term

8. Fri Sept 21. Cancer Inflammation and metabolism – Walter

Week 4:

9. Tues Sept 25. Cancer immunoediting and metabolism, hypoxia – Walter
10. Wed Sept 26. The tumor microenvironment and the immune system – Walter
11. Fri Sept. 28. The immune system and cancer – Walter

Week 5:

12. Tues Oct 2. The immune system, hypoxia and TAMs and the tumor microenvironment – Walter
13. **Wed Oct 3.** Hypoxia and TAMs and the tumor microenvironment Continued – Walter
14. Fri Oct 5. The immune system and Introduction to Leukemia and DNA damage – Walter

Week 6:

Monday Oct. 8. Thanksgiving Day

Tues Oct 9 Last day for 50% reduction of tuition fees for standard courses

15. Tues Oct 9. The relationship between cancer and DNA damage – Walter
16. Wed Oct 10. DNA damage – Walter
17. Fri Oct 12. DNA damage and repair – Walter

Week 7:

18. Tues Oct 16. Midterm 35% (Walter)

19. Wed Oct 17. Cells of the tumor microenvironment in leukemia - Walter
20. Fri Oct 19. The tumor microenvironment – description of macrophage involvement - Walter

Week 8:

21. Tues Oct 23. Paper “Targeting macrophages sensitizes CLL cells to death and inhibits Disease Progression” - Walter
22. Wed Oct 24. Review of paper targeting macrophages - Walter
23. Fri Oct 26. Review of paper targeting macrophages – Walter

Week 9:

24. **Tues Oct 30** Summary of CLL paper, Breast Cancer and estrogen introduction – Walter

Wednesday Oct 31 Last Day to Drop Courses without Failure

25. Wed Oct 31. Exome analysis - T cell therapy – Lum
26. Fri Nov 2. Molecular Cancer Topics / inherited cancer – Lum

Week 10:

27. Tues Nov 6. Ovarian Cancer topics/stem cells – Lum
28. Wed Nov 7. Introduction to Ovarian Cancer - Lum
29. Fri Nov 9. Angiogenesis introduction – Lum

Week 11:

Monday, Nov. 12 -14 Reading break, Sunday Nov 11, Remembrance Day

30. Fri Nov 16. Angiogenesis – Lum

Week 12:

- 31. Tues Nov 20. Introduction to Autophagy and cancer– Lum
- 32. Wed Nov 21. Autophagy – Lum
- 33. Fri Nov 23 – Autophagy and Apoptosis - Lum

Week 13:

- 34. Tues Nov 27. Breast cancer and Estrogen –Walter
- 35. Wed Nov 28. Breast cancer and Estrogen – Walter
- 36. Fri Nov 30. Breast cancer and Estrogen – Walter

Week 14:

- 34. Tues Dec 4. Biomarkers and Molecular Pathology of Breast cancer – Peter Watson
 - 35. Wed Dec 5. Breast Cancer & Targeted cancer therapies – Walter – this lecture may be changed
- Fri Dec. 5 National Day of Remembrance and Action on Violence Against Women. Classes and exams cancelled from 11:30 am to 12:30 pm.**
- FINAL EXAMS DEC. 8 – 22.**