

Bi123
The Biology of Cancer

Instructor

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Course background and learning outcomes

Cancer has been a recognized disorder for many centuries, but was not considered a serious threat to human health until the 1900s, when advances in medical science began to mitigate the more common forms of morbidity and mortality. Cancer is a collection of over one hundred diseases that show various clinical differences, but have similar underlying causes and effects: the normal genetic controls of cell division malfunction, allowing a cell to undergo unrestrained multiplication, usually leading to an anomalous mass of cells (a tumor), some of which may spread to distant locations in the body to establish further tumors. Cancer is thus rightly called a genetic disease. We will focus our attention on the genetics and cell biology of cancer since tremendous advances in our understanding of the initiation and progression of cancers, and in the promise of effective treatment, have been realized in the past two decades through basic research in genetics and cell biology.

This is an introductory course, meaning nothing more than that there are no prerequisites for enrollment. Though a background in biology is useful, it is neither essential nor necessary. This course will be taught under the assumption that students have no more than a high-school level familiarity with basic life sciences (specifically regarding cells and genes). Those who have no experience with or recollection of biology may find the pace of this course quite rapid; those well-versed in biology may find the pace rather slow at times. Most of the material, however, will be new to all students.

There is a considerable amount of unique terminology in all branches of the life sciences, and this is perhaps most evident in medicine. While we will endeavor to minimize the use of such terminology as can be reasonably done without creating confusion, we will still develop an extensive vocabulary to describe processes or components specific to cell biology, genetics, anatomy, physiology, and cancer. You should approach this course as if you are taking an introductory course in a foreign language, and routinely review the vocabulary in common use.

By the end of the term we hope that you will have developed a thorough understanding of the biological basis of cancer—its causes, conditions, treatments, and prognoses. This can benefit you in several ways: you should be much better able to evaluate scientific articles on cancer in the popular press; you may become an effective advocate, interpreter, or liaison for a family

member or friend facing cancer; you can make more educated choices if you should become a cancer patient yourself; and you may be motivated to adopt a lifestyle that significantly minimizes your lifetime risk of developing cancer.

Format

There will be three 50-minute lectures each week. Attendance is not mandatory, but much of the information that you will be expected to assimilate (and demonstrate on exams) will not be found in the reading. Slides used in the lectures will be made available on Canvas as pdf files a day or two before each lecture.

Labs

Many of the lab sessions are designed to give students “hands on” experience with materials related to the course content, such as viewing cells and tissues in microscopes, and examining the harmful effects of ultraviolet light on cells. Attendance for most of the sessions will count toward your course grade, and there will be work to be completed before or during these sessions. The schedule and details will be provided during the first week’s lab session. It is important that you go the *Modules>Lab* link on Canvas each week for instructions and assignments pertaining to the session for that week. You must attend the section in which you enrolled, and you cannot make up an absence by attending a different section.

Text and references

A “preliminary edition” of an on-line text called *Cancer Biology: A Primer* will serve as our text for the first four weeks. Instructions for its purchase will be provided on the first day of class. For the remainder of the term detailed lecture notes will be provided at the beginning of each week on Canvas.

There are several books worth investigating for those interested in exploring the topic of cancer biology further. *One Renegade Cell*, by Robert Weinberg, is a brief and outstanding overview of the molecular basis of cancer. That focus should not deter anyone lacking a background in biology, as Weinberg’s clarity and effective use of simple analogies make the text accessible to the layperson. A broader general text is the out-of-print *Cancer: The Misguided Cell*, by David Prescott and Abraham Flexer. *Principles of Cancer Biology*, by Lewis Kleinsmith, is a good introductory text, though its detail goes beyond the scope of this course. For a yet more detailed treatment of several topics, *The Biological Basis of Cancer*, by Robert McKinnell, et al., is an excellent resource. Copies of these books will be on reserve in the Science Library.

Course website

The course Canvas site contains the lecture and lab schedules, course announcements, staff contact information and office hours, lecture PowerPoint slides, weekly lecture notes, supplemental reading material, homework assignments, i►clicker answers, and current assignment scores.

Grading

Each student's course grade will be determined from the highest score derived from 3 methods:

	<u>Method 1</u>	<u>Method 2</u>	<u>Method 3</u>
Exam 1	100 pts	140 pts (100 x 1.4)	-
Exam 2	100 pts	-	140 pts (100 x 1.4)
Final exam	150 pts	210 pts (150 x 1.4)	210 pts (150 x 1.4)
Lab	60 pts	60 pts	60 pts
Homework	75 pts	75 pts	75 pts
Lecture participation	25 pts	25 pts	25 pts

Exams will be based upon lecture material, reading, and lab section material. The second exam is not cumulative, but the final exam is cumulative. Seven lab sessions will count toward your grade (10 points each; the lowest score will be dropped). Three 25-point homework assignments will be given during the term. They will be posted on Canvas (*Modules>Homework*), and will be due at your lab section on weeks 3, 6, and 9. The "Lecture participation" component of the grading is in the form of i►clicker responses and occasional pre-lecture assignments. These will be used in most lectures, and answers do not have to be correct for you to receive credit. Only 90% of the responses will be counted so that you will not necessarily be penalized for a few missed sessions. See below for i►clicker policy and registration.

No other opportunities for points will be offered. Early or makeup exams will NOT be offered. Do not ask for exceptions.

If you miss a midterm exam your grade will be based upon the Method 2 or Method 3 scores. Late homework assignments will be accepted the day after they are due (at lecture on Friday), but will be worth only 15 points. Assignments later than that will receive no credit. Absences from lab sessions cannot be made up. Participants in Club Sports activities do not receive exemptions from any of the above policies.

Class conduct

Class starts promptly at 3:00 and ends at 3:50. Please arrive on time and do not pack up before the conclusion of the lecture. Arriving late and leaving early is disruptive to others around you and to the speaker. Do not talk during lecture in a volume audible to anyone but the intended recipient. Please do not use any electronic devices during class; they are of no help to your learning, and are distracting to those around you and to the speaker.

Computers will not be allowed in lecture. If you have a requirement for using a computer to take notes, please make accommodations with me on the first day of class. Your use of the computer may be monitored by a teaching assistant.

All work submitted in this course must be your own and in your own words. Instances of suspected cheating or plagiarism on exams, quizzes, homework, and lab work will be referred to the Office of Student Conduct and Community Standards. Such cases are taken seriously, and charges of academic misconduct will be pursued to the fullest extent allowable. Sanctions may

include a failing mark for the course. For definitions of violations, a description of the hearing process, and a summary of penalties for findings of academic misconduct, go to

<http://uodos.uoregon.edu/StudentConductandCommunityStandards/StudentConductCode.aspx>

Accommodations for students with disabilities

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me as soon as possible, and not later than January 11. Please bring a notification letter from the Accessible Education Center outlining your approved accommodations.

Bi123 i►clicker policy and registration

Since lecture participation via polling by i►clicker constitutes nearly 5% of your total score in this course, it is recommended that you purchase an i►clicker remote from the UO Bookstore. Either version of the i►clicker will work for this course.

In order to receive credit for in class use of the i►clicker, you will need to register your i►clicker remote on Canvas. You must have come to class at least once and responded on all questions posed during that lecture in order to complete this registration properly. Once you have responded in at least one class meeting, go to the *iclicker* section in the Bi123 Canvas site, and complete the registration form. Please try to complete the registration by the third week of class.

The i►clicker response system will be used most days in class, and you are responsible for bringing your remote daily. I will not accept written responses from students who do not bring their remotes to class. However, since not all (90%) of the responses are counted toward a student's total score, missing a couple of sessions will not necessarily result in a lower participation score.

Since the use of i►clicker in this course contributes to each student's final grade, in-class misuse of these devices may be considered as acts of academic misconduct; this includes the loaning your i►clicker to a classmate who registers responses in your absence from lecture. If a student is caught using two i►clicker, both that student and the owner of the loaned device will, at the very least, lose all clicker points for the term. The few points gained from such actions is not worth the risk of a misconduct charge.

Bi123 Lecture Schedule, Winter 2016

Week	Date	Topic	Reading*
1	Jan. 4	Introduction	Supp: Cancer's Crush CBP: Chapter 1
	Jan. 6	Cancer trends	
	Jan. 8	A primer on cells	
2	Jan. 11	Cancer definitions; Cell types and tissues structure	CBP: Chapter 2
	Jan. 13	Tissues structure, continued; Skin cancer	
	Jan. 15	Skin cancer, continued	
3	Jan. 18	Martin Luther King day—no class	
	Jan. 20	Cell division, the cell cycle, and chromosomes	CBP: Chapter 3
	Jan. 22	Chromosomes, DNA, and Proteins	
4	Jan. 25	Genes, mutations, and cancer	CBP: Chapter 4
	Jan. 27	Cancers of the blood	
	Jan. 29	Midterm Exam	
5	Feb. 1	Carcinogens, mutagens and the environmental risk factor	Notes
	Feb. 3	Heredity	
	Feb. 5	Hereditary risk factor and familial cancers	
6	Feb. 8	Retinoblastoma and tumor suppressor genes	Notes
	Feb. 9	Oncogenes	
	Feb. 12	Angiogenesis and Metastasis	
7	Feb. 15	Kate Karfilis: Cancer stem cells and brain cancer	Notes
	Feb. 17	Chronic infections and cancer	
	Feb. 19	Lung cancer	
8	Feb. 22	Midterm Exam	
	Feb. 24	Documentary on the development of cancer therapies	Notes
	Feb. 26	Men's cancers: Prostate	
9	Feb. 29	Dr. Christopher Corless: Targeted therapeutics	Notes
	Mar. 2	Dr. Vern Katz: Cancer in pregnancy	
	Mar. 4	Women's cancers: Breast	
10	Mar. 7	Radiology in diagnosis	Notes
	Mar. 9	Dr. Jonathan Myers: Colorectal cancers	
	Mar. 11	Cancer prevention	
	Mar. 14	Final Exam—2:45-4:45 in 282 Lillis	

*CBP: Cancer Biology: A Primer (on-line text)
 Supp: Canvas>Modules>Supplemental reading
 Notes: Canvas>Modules>Lecture notes