

BIOL 445 Cancer Biology Fall 2020 TR 09:45-11:00

Dr. Gidi Shemer

Our class will be taught **online**. The lectures will be recorded and shared. **All details about Zoom ID and meeting times will be update on the main Sakai page every week.**

Let's start with what this course is not- it is not a clinical cancer course. It is not aimed to describe the pathology of each and every cancer, and students will not learn how to identify cancer stages by going over histological sections of patients. Instead, this course is devoted to the biology behind cancer, with an emphasis on how the basic science of normal cell and molecular biology can teach us of how regulation goes wrong in cancer cells.

Objectives

1. To describe and to predict the cellular and molecular mechanisms of cancer development
2. To develop higher order learning skills, as demonstrated by the ability to analyze and synthesize ideas to help us comprehend the biological phenomenon of cancer
3. To synthesize biological concepts learnt at earlier stages (e.g. in cellular, molecular, and physiological biology courses)

The course consists of class meetings led by the instructor as well as student group projects that will be presented on a topic/molecule of choice. We will also use class time to discuss scientific papers from the primary literature that the students will read and prepare for in advance. Assigned papers and other assignments will be posted on Sakai.

Prerequisites

BIOL 202 and BIOL 205

Your Instructor

Dr. Gidi Shemer

Coker Hall 213A

Office hours: Check our Sakai site

Web page: <http://www.bio.unc.edu/Faculty/Shemer/>

Email: bishemer@email.unc.edu

Textbook

**The Biology of Cancer by Robert A. Weinberg, 2nd edition (available in the bookstore-
<https://unc.bncollege.com/shop/BNCBTBListView?catalogId=10001&langId=-1&storeId=88196>**

Also recommended:

- Natural Obsessions: Striving to Unlock the Deepest Secrets of the Cancer Cell by Natalie Angier
- The Emperor of All Maladies: A Biography of Cancer by Siddhartha Mukherjee

Paper Discussions, GRQs

During the semester, we will discuss primary scientific literature. Before the class discussion you will be asked to read the relevant paper thoroughly and to answer guided reading questions (GRQs), which you will submit as a Sakai assignment in advance.

Class Attendance

Class attendance (online this semester) is mandatory. In case you have any problems with attending synchronously in specific cases, let the instructor know sooner rather than later.

Assignments

Assignments (e.g. readings, Wiki posts, Molecular biology tools) will be given on a regular basis and will be followed by either written assignments or in-class quizzes. The assignments due dates appear on the class schedule (see below) or will be posted on Sakai during the semester.

Student Projects

In the early stages of the course you will get access to a list of topics that are related to cancer biology. You will be divided into small groups and each group will be assigned with a topic. The group will make a comprehensive literature research on the topic and will create a 10 minute powerpoint presentation that will be presented to the entire class in the advanced stages of the semester (see schedule below). Guidelines on what is required for the presentation will be posted on Sakai and discussed in class.

Grading

Your final grade will be determined based on your performance on two midterm exams (26% each), a short home exam (covering the projects, 4%), a cumulative final exam (26%), your research project and presentation (15%), and participation in assignments, and quizzes (3%).

The final exam will be cumulative. It will cover the entire semester.

Grades will not be assigned for individual exams, only points. Final grades will be assigned based on the total number of points for the entire semester:

A	93-100	B+	87-89	C+	77-79	D+	66-69	F	<60
A-	90-92	B	83-86	C	73-76	D	60-65		
		B-	80-82	C-	70-72				

The grade will not be curved. It will be based on your performance and not on comparing your performance to your peers'. Exam questions will be taken from class meetings and assigned readings. **Grades will not round up.** B= 83, NOT 82.96. Exams must be taken on the dates indicated during the regular class period; no makeup exams except in special circumstances, i.e. medical or family emergency documented in writing. The makeup test may be an oral exam. I do not drop specific exam grades.

All course materials including your notes and assignments are covered by University Copyright Policy, @ <http://www.unc.edu/campus/policies/copyright%20policy%2000008319.pdf>

The professor reserves the right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.

Schedule

Date				Class	Pre-lecture assignments	Post-lecture assignments
T	Aug	11	1	Introduction		
R	Aug	13	2	Viral oncogenes- the story of Src		Online- pre-semester test
T	Aug	18	3	Viral oncogenes- the story of Src II	1) Pp. 161-164 + GRQ Integrins 2) Western Blotting (Read Molecular Biology Toolbox)	
R	Aug	20	4	Src paper discussion	Src paper & GRQ	
T	Aug	25	5	Cellular oncogenes	Southern Blotting (Read Molecular Biology Toolbox)	
R	Aug	27	6	The MAPK-Ras pathway	Study the MAP kinase pathway, including pp.188-192	
T	Sep	1	7	Cellular oncogenes- the story of Ras		
R	Sep	3	8	Raf paper discussion	Raf paper & GRQ	
T	Sep	8	9	Introduction to the cell cycle	Pp. 275-283 + GRQ cell cycle	
R	Sep	10		Exam I- Oncogenes (1-8)		
T	Sep	15	10	Control of the cell cycle I		
R	Sep	17	11	Control of the cell cycle II		
T	Sep	22	12	Retinoblastoma I		
R	Sep	24	13	Retinoblastoma II		1) CKIs blog 2) P21-27 (fig. 8.17) sakai assignment
T	Sep	29	14	Ras-Rb paper discussion	Ras-Rb paper & GRQ	
R	Oct	1	15	Catch up		
T	Oct	6		EXAM II- Cell cycle and Rb (9-15)		
R	Oct	8	16	p53- The Guardian Angel	Immunoprecipitation (Read Molecular Biology Toolbox)	
T	Oct	13	17	Apoptosis		
R	Oct	15	18	P53 paper discussion	p53 paper & GRQ	
T	Oct	20		Student presentation 1		
R	Oct	22		Student presentation 2		
T	Oct	27		Student presentation 3		
R	Oct	29	19	Metastasis I	2) GFP Tagging (Read Molecular Biology Toolbox)	
T	Nov	3	20	Metastasis II- Intractions with the stroma		
R	Nov	5	21	Metastasis III- Interactions with the immune system		Pp. 654-655
T	Nov	10	22	Cancer therapy I		Pseudo-science blog
R	Nov	12	23	Cancer therapy II		
T	Nov	17	24	Cancer therapy- Personalized medicine	CRISPR	Take -home exam
				FINAL EXAM- (Cumulative)		