BIOL 445 Cancer Biology Spring 2020 T, R 09:30-10:45

Dr. Gidi Shemer

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 two parts: class meetings led by the instructor, and student projects on a topic/molecule of choice that wasn't covered in the main lectures. 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

Your Teaching Assistant

Sonja Mihailovic sjamiha@live.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 Discussion, 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 is mandatory. Absence from class will require permission of the instructor in advance. The discussion is a major part of this course, and personal as well as group activities will take place in class during the semester.

Assignments

Assignments (e.g. readings, blog posting, 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 genes that are involved in cancer biology. Your individual project will be to choose a gene from this list, make a comprehensive literature research on the function of this gene in development, physiology and cancer, and to create a poster that will summarize your research. We will have poster symposia (see below) where you will present your research to the entire class. During the semester you will meet twice with a teaching assistant, who will help you and review your first outline and the final poster**. It is your responsibility to schedule those meetings with the TA and to come prepared**. Guidelines on what is required for the poster will be posted on Sakai, and discussed in class.

Poster Symposium

We will have three poster symposia, each composed of two 35 min. sessions. In each session 6 students will present their posters while all other students walk through posters in groups of 5. Every 10 minutes, the audience will rotate. Thus, a presenter will have 3 rounds of presentations of their project. After the presentation, the student will submit a power point presentation of the poster. All the slides will be posted on Sakai so the class will be able to review all the projects. There will be a take-home exam that will cover the poster sessions (see below).

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 class discussion, 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 exams count

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 to 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 A1:G34				Class	Pre-lecture assignments	Post-lecture assignments
R	Jan	9	1	Introduction		Online- pre-semester test
T	Jan	14	2	Viral oncogenes- the story of Src		
R	Jan	16	3	Viral oncogenes- the story of Src II	1) Pp. 161-164 + GRQ Integrins 2) Western Blotting (Read Moelcular Biology Toolbox)	
T	Jan	21	4	Src paper dicussion	Src paper & GRQ	
R	Jan	23	5	Cellular oncogenes	Southern Blotting (Read Moelcular Biology Toolbox)	
T	Jan	28	6	The MAPK-Ras pathway	Study the MAP kinase pathway, including pp.188-192	
R	Jan	30	7	Cellular oncogenes- the story of Ras		
T	Feb	4	8	Raf paper discussion	Raf paper & GRQ	
R	Feb	6	9	Introduction to the cell cycle	Pp. 275-283 + GRQ cell cycle	
T	Feb	11		Exam I- Oncogenes (1-8)		
R	Feb	13	10	Control of the cell cycle I		
T	Feb	18	11	Control of the cell cycle II		
R	Feb	20	12	Retinoblastoma I		
T	Feb	25	13	Retinoblastoma II		
R	Feb	27	14	Ras-Rb paper discussion	Ras-Rb paper & GRQ	1) CKIs blog 2) P21-27 (fig. 8.17) sakai assignment
T	March	3	15	Catch up		
R	March	5		EXAM II- Cell cycle and Rb (9-15)		
T	March	10		*SPRING BREAK*		
R	March	12		*SPRING BREAK*		
T	March	17		**Student presentation 1**		
R	March	19		**Student presentation 2**		
T	March	24	16	p53- The Guardian Angel	Immunopercipitation (Read Moelcular Biology Toolbox)	
R	March	26	17	Apoptosis		
T	March	31	18	P53 paper discussion	p53 paper & GRQ	
R	April	2		**Student presentation 3**		
T	April	7	19	Metastasis I	1) Pp. 642-651 2) GFP Tagging (Read Moelcular Biology Toolbox)	
R	April	9	20	Metastasis II- Intractions with the stroma		
T	April	14	21	Metastasis III- Interactions with the immune system		Pp. 654-655
R	April	16	22	Cancer therapy I		Take -home exam
T	April	21	23	Cancer therapy II	CRISPR	
R	April	23	24	Cancer therapy- Personalized medicine		Pseudo-science blog
F	May	1		FINAL EXAM- 8 am (Cumulative)		