Mechanisms of Cancer

Tentative syllabus for BCHM 3400, Fall 2025

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LEARNING GOALS.
In this class students will learn…

1. How genetic mutations and certain viruses cause cancer
2. How a normal cell gets "transformed" into a cancer cell via multiple steps
3. The distinction between oncogenes and tumor suppressor genes
4. The distinction between driver and passenger mutations
5. How cells use signal transduction to communicate their internal and external state and enact a response
6. How cells repair damaged DNA
7. How cells grow and divide
8. How cells age and die
9. How scientists identify and develop targeted therapies to treat cancer
10. Why cancer drug treatments can fail, and the origins of cancer drug resistance
11. The basics of cancer immunotherapy

LECTURES: Tuesdays and Thursdays 2:30-3:45 in BIOT A104. Attendance and participation are required. We will be using Clickers for our lecture and the clicker code for Room A104 is CB.

GRADERS: Chance Sine and Tyler Amos, MCDB PhD students; Zanub Rahman Biochemistry PhD student

COURSE MATERIALS:

- Required textbook: The Biology of Cancer by Robert Weinberg, Third edition
- Clicker
- Lecture slides posted in Canvas at least 30 min before the lecture begins.
- Homeworks posted and submitted in Canvas.

DR. SPENCER'S OFFICE HOURS: Tuesdays and Thursdays right after class for 30 min, or by appointment if you have a conflict with both of those times.

CLASS POINTS:

	Percent
10 weekly homeworks	7 total
Midterm 1	20
Midterm 2	20
Midterm 3	20
Cumulative final exam	20
Clicker points	10
Participation	3
Total	**100%**

90% of class completes FCQ survey: 0.5 points extra credit added to your final grade

CLASS POLICIES

- **Homeworks are due Tuesdays before 2pm** following coverage of the previous week's worth of material, as per the syllabus schedule, via upload to Canvas. Each person must turn in an independent assignment. You will lose 10% of points if you miss the homework upload deadline, and 10% every day thereafter. If you are ill or have an emergency, please contact me for an extension. I will release the homework key at the end of the week for you to look over; once the key is released, you can no longer get credit for the homework.
- **Use of AI in this class:** I strongly encourage you to try the homeworks yourself without using the internet or AI. Since the homeworks will be similar to our in-class/no-AI exams, you will perform better on the exams if you first force yourself to think through and answer the homework questions using only course-provided material. After attempting the entire homework yourself, you may check and revise your answers with a friend, AI, or any internet tool before submitting. If you use AI or other tools for homeworks, please simply document how you used these tools with a short note at the top of the homework.
- Given that any resource may be used to complete the homework, the homeworks will not be graded for correctness, but rather simply for completion rate. You are encouraged to compare your answers with the homework key to assess how your answers measure up.
- There will be 3 in-class midterms and a final exam. If you need an alternative exam time due to an accommodation, emergency, or illness, please contact me.
- Clicker points will be counted starting in Lecture 2.
    - There will be 18 lectures associated with Clicker questions and ~4 Clicker questions per class, for a total of 72 possible Clicker points.
    - For each Clicker question, you get 0.5 points for trying, and 0.5 points if you get the right answer.
    - Clicker questions can be discussed with your neighbors before answering, **but you may not use AI**.
    - Allowing for 3 excused absences, I will normalize final clicker scores to 60 points total (72-(4*3)=60).
    - You cannot get more than 100% for the final clicker score even if you attend every class and get every question right.
- Lectures will be recorded via Classroom Capture and posted to Canvas Pages for you to review if you wish: https://cu-classcapture.mediasite.com/mediasite/Channel/924fc6f777fe49b2a86754e29525e2855f

GRADING SCALE FOR FINAL GRADE:

Name	Range	
A	100%	to 94%
A-	< 94%	to 90%
B+	< 90%	to 87%
B	< 87%	to 84%
B-	< 84%	to 80%
C+	< 80%	to 77%
C	< 77%	to 74%
C-	< 74%	to 70%
D+	< 70%	to 67%
D	< 67%	to 64%
D-	< 64%	to 60%
F	< 60%	to 0%

2026 Dates	Lecture #	Topics	Chapters in Weinberg	HW due Tuesdays at 2pm	
R 8/20	1	Biology and genetics of cells	1		
T 8/25	2	The nature of cancer	2		
R 8/27	3	Tumor viruses	3		
T 9/1	4	Oncogenes	4	HW1	
R 9/3	5	Growth factors and receptors	5 (skip 147-159)		
T 9/8	6	Cytoplasmic signaling circuitry	6	HW2	
R 9/10	7	Tumor suppressor genes	7		
T 9/15		*Catch up; Exam review in class*		HW3	
R 9/17		**EXAM 1 in class (7 lectures)**			
T 9/22	8	Rb and the Restriction Point	8		
R 9/24	9	The cell cycle	8		
T 9/29	10	Paper: Modern view of Rb and the R-point	Spencer et al. Cell 2013	HW4	
R 10/1	11	Apoptosis	9		
T 10/6	12	p53	9	HW5	pre-recorded lecture
R 10/8		mid-semester break, no class			
T 10/13	13	Cell immortalization and telomerase	10	HW6	
R 10/15		Multi-step tumorigenesis (part 1)	11		
T 10/20		*Catch up; Exam review in class*		HW7	
R 10/22	14	**EXAM 2 in class (7 lectures)**	11		
T 10/27	15	Multi-step tumorigenesis (part 2)	11		
R 10/29	16	DNA damage	12		
T 11/3	17	DNA repair; Treatment of cancer (part 1)	12	HW8	
R 11/5	18	Treatment of cancer (part 2)	17		teaching remotely
T 11/10	19	Treatment of cancer (part 3)	17	HW9	
R 11/12	20	Tumor immunology	15		
T 11/17		*Catch up; Exam review in class*		HW10	
R 11/19		**EXAM 3 in class (6 lectures)**			
Nov 23-27		Thanksgiving break, no class			
T 12/1	21	Cancer immunotherapy	16		
R 12/3		*Catch up / course review / snow day makeup*			
W 12/9		**Final Exam, 1:30-4pm**			
Red = I am out of town at a conference					