

Harvard Medical School
Biological and Biomedical Sciences

CB212 Biology of the Cancer Cell: From Molecular Mechanisms to Therapeutic Implications

Course Code:	CB (Cell Biology) 212
Course Offering:	Spring 2021
Course Dates:	January 25, 2019 – April 28, 2019
Meeting Dates:	Mondays & Wednesdays
Meeting Time:	12:30-2:00 pm
Location:	Zoom, information for each session will be provided on Canvas
Course Director:	Alex Toker, PhD (atoker@bidmc.harvard.edu)
Curriculum Fellow:	Jelena Patrnogic, PhD (Jelena_Patrnogic@hms.harvard.edu)
Course Website:	https://canvas.harvard.edu/courses/86791

Course Description: This semester long course takes a molecular approach to examine the basis of human cancer. The main concepts that we will cover include: cancer genetics and epigenetics, tumor suppressor genes and oncogenes, signal transduction, DNA damage and repair, angiogenesis, metastasis and invasion, apoptosis, cancer stem cells, and tumor immunology and immunotherapy. Lectures will be delivered by experts in the various fields to provide an integrated perspective on past, current and future approaches in cancer biology research. Many of the lecturers are also clinical oncologists and hematologists, who will provide insight into how molecular advances are impacting patient care now, and are likely to do so in the future. In addition, students will participate in workshops in which they will delve more deeply into the primary literature of several of these topics.

Course Evaluation:

- Participation 20%
- Student Presentation / Workshop 40%
- Brief Research Proposal 40%

Important Notes:

- We expect you to attend all lectures and student sessions. Please be on time.
- We want to make this a dynamic learning experience and encourage you to ask questions.
- Lecture slides and readings will be listed on the course website.

Participation/Attendance (20%)

Attendance and participation at all course sessions is required and necessary for your success in the course. Excused absences are allowed only at the discretion of the course directors. Students are expected to contribute actively to each class meeting by asking and answering questions of the lecturers and during student presentations (i.e. Student Workshops). In the event that the University cancels classes, students are expected to continue with readings as originally scheduled, unless other instructions are posted at the course website or communicated via email.

Student Workshops (40%)

Students will read research papers selected by course faculty that represent the cutting edge in the field and will take turns presenting these papers in a small group setting. These presentation workshops are to be in a journal club style. This will allow you to synthesize and implement the knowledge that you have gained while practicing your presentation skills. Student presentations will occur during Student Workshops, when the class will be divided into sections of 6-8 students. Lecturers, postdocs from lecturers' labs, and/or course directors, will moderate sections. The presenting student will run the session, providing a presentation of their research paper and topic followed by a discussion session. All students are expected to come prepared to Student Workshops, participate fully in the discussions, and to critically think through the posed discussion questions as a group. Ideally, all students will contribute equally to these sessions. When everyone contributes, regardless of background, some of the most interesting and dynamic discussion can arise. Presentation and grading guidelines will be posted on Canvas.

Brief Research Proposal (40%)

Students will be asked to submit a brief, focused written research proposal related to the topic you presented for your workshop, and should reflect the input and feedback you received. The written research proposal will be due 2 weeks after your presentation at a student workshop. Research proposal and writing guidelines will be posted on Canvas.

Date	Faculty	Lecture Topic
Mon Jan 25	Alex Toker	Introduction to the Course

Part I – Genetic Aberrations in a Cancer Cell

Wed Jan 27	Matthew Meyerson	Cancer Genomics - Applications
Mon Feb 1	William Kaelin	Tumor Suppressors and Oncogenes
Wed Feb 3	Huma Rana	Cancer Genomics – Clinical
Mon Feb 8	Frank Slack	microRNAs
Wed Feb 10	Matthew Freedman	Epigenetics

Mon Feb 15 University Holiday – Presidents’ Day – No Classes

Wed Feb 17	Alan D’Andrea	DNA Damage and Repair
Mon Feb 22	Student Workshops	
Wed Feb 24	Student Workshops	

Part II – Signaling Pathways in a Cancer Cell

On Canvas	Rizwan Haq	Intro to Signaling and Cancer
Mon Mar 1	Wellness Day	
Wed Mar 3	Pasi Janne	RTK Signaling and Mechanisms of Resistance
Mon Mar 8	Kevin Haigis	Ras Pathway
Wed Mar 10	Brendan Manning	PI3K/mTOR Pathway
Wed Mar 17	Jon Aster	Notch Signaling
Mon Mar 22	Student Workshops	
Wed Mar 24	Student Workshops	

Part III – Cellular & Organismal Perspectives on Cancer

Mon Mar 29	Carla Kim	Cancer Stem Cells
Wed Mar 31	Wellness Day	
Mon Apr 5	Matthew Vander Heiden	Cancer Cell Metabolism
Wed Apr 7	Loren Walensky	Cancer Cell Apoptosis
Mon Apr 12	Bruce Zetter	Cancer Invasion and Metastasis
Wed Apr 14	Cathy Wu	Tumor Immunology and Immunotherapy
Wed Apr 21	Student Workshops	
Mon Apr 26	Student Workshops	
Wed Apr 28	Eli Van Allen	Precision Medicine

Academic Integrity

All work in this course is governed by the academic integrity policies of GSAS (<https://gsas.harvard.edu/codes-conduct/academic-integrity>) and HMS

(<https://mastersstudenthandbook.hms.harvard.edu/409-academic-dishonesty-and-plagiarism>).

It is the students' responsibility to be aware of these policies and to ensure that their work adheres to them both in detail and in spirit. Unless otherwise specified by the instructor, the assumption is that all work submitted must reflect the student's own effort and understanding. Students are expected to clearly distinguish their own ideas and knowledge from information derived from other sources, including from conversations with other people. When working with others you must do so in the *spirit of collaboration*, not via a unidirectional transfer of information. Note that sharing or sending completed assignments to others will nearly always violate this collaborative standard. If you have a question about how best to complete an assignment in light of these policies, ask the instructor for clarification.

Community Standards

HMS is committed to supporting inclusive learning environments that value and affirm the diverse ideas and unique life experiences of all people. An equitable, inclusive classroom is a shared responsibility of both instructors and students, and both are encouraged to consider how their own experiences and biases may influence the learning environment. This requires an open mind and respect for differences of all kinds.

Students are encouraged to contact the course director if they are experiencing bias or feel that their learning experience – including a course's content, manner of instruction, or learning environment -- is not inclusive. Curriculum Fellows, program administrators and directors, the [DMS Office of Diversity](#), the [GSAS Office of Diversity and Minority Affairs](#), the [Title IX Office](#), and the [Ombuds Office](#) are also available to discuss your experiences and provide support. Additionally, students can utilize Harvard's Anonymous Reporting Hotline (<https://reportinghotline.harvard.edu/>) to report issues related to bias.

Reasonable Accommodations

As an institution that values diversity and inclusion, our goal is to create learning environments that are usable, equitable, inclusive and welcoming. Harvard University complies with federal legislation for individuals with disabilities and offers reasonable accommodations to qualified students with documented disabilities and temporary impairments. To make a request for reasonable accommodations in a course, students must first connect with their local disability office. The primary point of contact for GSAS students is the Accessible Education Office (www.aeo.fas.harvard.edu). The HMS Director of Disability Services, Timothy Rogers (timothy_rogers@hms.harvard.edu) is another potential source of accommodation information for PhD students and is the primary contact for MD and master's students.

Accommodations are determined through an interactive process and are not retroactive. Therefore, students should contact their local disability office to initiate the accommodation process as soon as possible, preferably at least two weeks before accommodations are needed in a course or immediately following an injury or illness. Students are strongly encouraged to discuss their needs with their instructors; however, instructors cannot independently institute individual accommodations without prior approval from the disability office. Student privacy surrounding disability status is recognized under FERPA. Information about accommodations is shared on a need-to-know basis, and with only those individuals involved in instituting the accommodation.

Academic and other Support Services

We value your well-being and recognize that as a graduate student you are asked to balance a variety of responsibilities and potential stressors: in class, in lab, and in life. If you are struggling with experiences either in- or outside of class, there are resources available to help. Danielle Farrell, the GSAS Director of Student Services (617-495-5005) is available to assist students navigating academic or personal difficulties and connect them to university resources. HILS PhD students have access to free academic tutoring, arranged through the DMS office. A variety of academic support services are also available to GSAS students through the Academic Resource Center (<https://academicresourcecenter.harvard.edu>) and the Center for Writing and Communicating Ideas (<https://gsas.harvard.edu/center-writing-and-communicating-ideas>).

Special Note for Remote Learning

If learning remotely presents specific challenges for you, it is critical that you contact the course director so appropriate actions can be taken. Potential issues include, but are not limited to, reliable access to technology or an appropriate private work space, time-zone related scheduling issues, and challenges balancing other responsibilities. In addition to the course director, your program's leadership and the Academic Resource Center are available to help.

All students have access to Counseling and Mental Health Services (CAMHS) available in Longwood, Cambridge or remotely via webcam or phone. The use of CAMHS is included in the student health fee, regardless of insurance, at no additional cost. More information is available at <https://camhs.huhs.harvard.edu> or by calling the main office at 617-495-2042. Urgent care can be reached 24/7 at 617-495-5711.