



COURSE DESCRIPTION

This semester long course will take you on a molecular approach journey to examine the basis of human cancer – from deep dive on genetic aberrations in a cancer cell, to signaling pathways, and big picture cellular and organismal perspectives on cancer. Some of the main concepts 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. Faculty joining us this Spring are experts in the various fields and will provide you with an integrated perspective on past, current, and future approaches in cancer biology research. Many of our faculty are also clinical oncologists and hematologists, providing you with an insight into how molecular advances are impacting patient care now and are likely to do so in the future. After each part of the course, you will participate in student workshops, where you will get the opportunity to dissect and learn about the major components of a research proposal and how to successfully write them. You will also have the opportunity to engage in an iterative writing and evaluation process with your peers and practice giving feedback and critique.

COURSE DETAILS & GENERAL INFORMATION

Course Code	CellBio 212
Course Dates:	January 23, 2023 – April 26, 2023
Meeting Days	Mondays & Wednesdays
Meeting Time	12:30-2:00 pm
Lecture Location	Longwood Campus (<i>see schedule below and Canvas page for details</i>)
Course Directors	Alex Toker, PhD (atoker@bidmc.harvard.edu)
Curriculum Advisor	Jelena Patrnogić, PhD (jelena_patrnogic@hms.harvard.edu)
Course Website	https://canvas.harvard.edu/courses/117460
Course Prerequisites	Advanced biochemistry, molecular genetics, and cell biology

COURSE OBJECTIVES

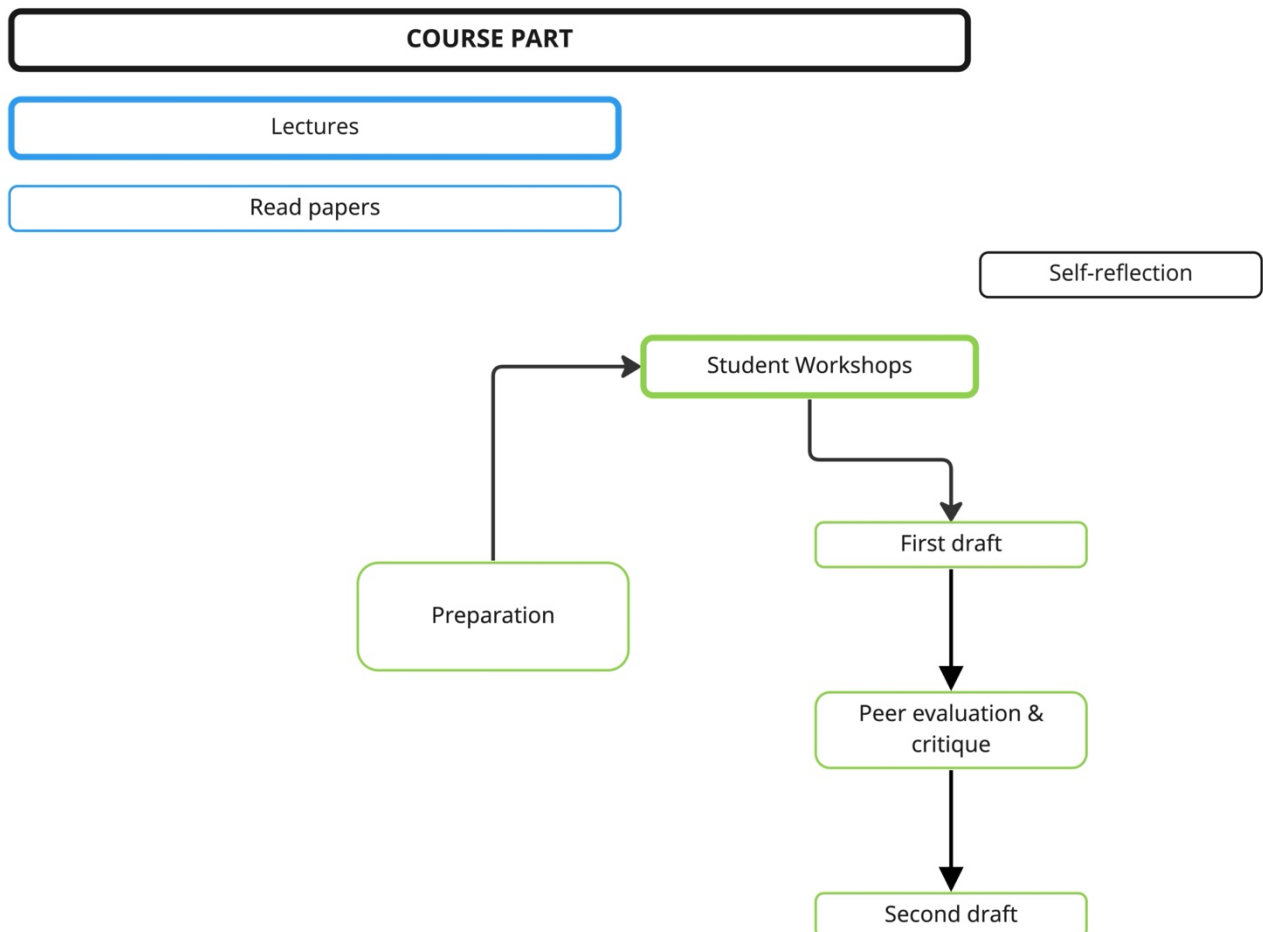
- Understand foundational discoveries that led to major concepts in the field
- Describe the molecular basis of cancer formation
- Identify big open questions in the research areas around these topics
- Synthesize and implement content knowledge while practicing writing skills
- Identify the main components of a research proposal
- Practice your peer evaluation and critique skills



HOW TO SUCCEED IN THE COURSE

- **Attend all the course sessions** – lectures and student workshops. In case you have to miss a class, excused absences are allowed, and you can reach out directly to Jelena_Patnogic@hms.harvard.edu for accommodation. If the University cancels classes, such as for severe weather, students are expected to continue with readings as originally scheduled, unless other instructions are posted at the course website or communicated via email.
- **Ask questions & actively participate in all the sessions** – we want to make this a dynamic learning experience. This includes -
 - group work that you might engage in during some of the sessions
 - group work and peer review during student workshops
- **Read papers** that support lectures within each course part to help you create foundation of the topics that will be covered in class.
- **Come prepared for all student workshops**, engage in group work and peer review.
- **Reflect on course content and learning** and how it relates to relevance of your own research projects and/or interests.

COURSE STRUCTURE





COURSE PARTS

- PART ONE | Genetic Aberrations in Cancer Cell
- PART TWO | Signaling Pathways in a Cancer Cell
- PART THREE | Cellular & Organismal Perspectives on Cancer

How to prepare for lecture sessions

Read papers that support lectures within each course part to help you create foundation of the topics that will be covered in class. List of papers can be found on Canvas within the corresponding course parts.

STUDENT WORKSHOPS

Main goal of the student workshops is to help you work and improve on your writing skills using various components of a research proposal as a way of practice. Your research proposal components can be either based on your own project or you can use one of the papers suggested by faculty as your starting point. In addition to practicing your writing skills, you will have the opportunity to engage in peer review and provide peer evaluation and critique to your colleagues. You will have a rubric to help guide you in this process.

Student workshops objectives

- Understand and draft the components of a research proposal
- Practice peer evaluation and critique skills
- Engage in iterative writing and evaluation process
- Create a community of peers

Session one will focus on a different component of a research proposal and how to approach writing it.

Session two will focus on peer evaluation and critique.

How to prepare for student workshops

For session one, you will use either your own project or one of the papers suggested by faculty as your starting point. Come prepared to briefly discuss either and use it as a foundation for your research proposal component. Instructions for each session preparation will be posted on Canvas.

For session two, upload and bring your written assignment (First draft, see *below and Canvas for assignment details*).

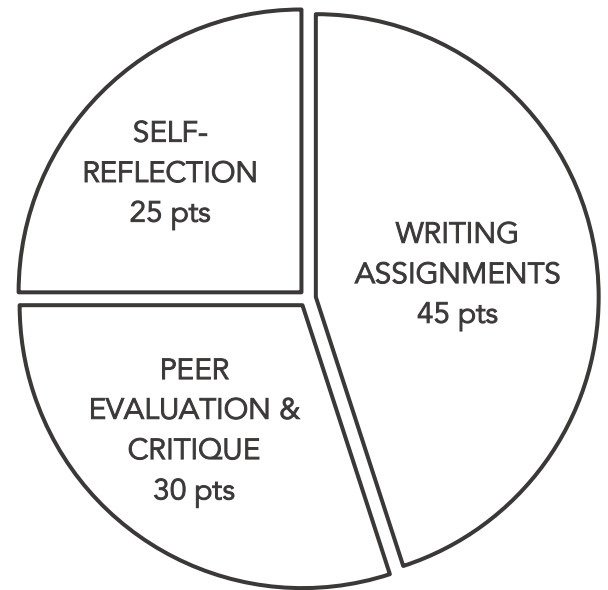


COURSE ASSESSMENT & GRADING

Writing Assignments – 45 pts total

You will be using either your own research or papers provided in the course as a foundation to build various components of a research proposal.

- Graded for completion
- 15 pts per Student Workshop
- First draft 5 pts per Student workshop
 - Total of three assignments (*First draft #1, First draft #2, and First draft #3*)
 - Upload your First draft before coming to Session two
- Second draft based on Peer evaluation & critique 10 pts per Student workshop
 - Total of three assignments (*Second draft #1, Second draft #2, and Second draft #3*)
 - Upload your Second draft based on the feedback you received



Peer evaluation & critique – 30 pts total

You will engage in group work during student workshops to provide peer evaluation & critique to your colleagues. In addition, you will be assigned Peer evaluation & critique assignments on Canvas. Rubrics will be provided to facilitate the process.

- Graded for completion
- 10 pts per Student workshop
 - Total of three assignments (*Peer evaluation & critique #1, Peer evaluation & critique #2, and Peer evaluation & critique #3*)
- You will be assigned your Peer evaluation & critique assignments via Canvas (rubrics will be provided)
- You will receive written Peer evaluation & critique via Canvas on your First draft for every Student workshop

Self-reflection – 25 pts total

By addressing reflection assignment prompts, you will reflect on course content and your own learning throughout the semester.

- Graded for completion
- 5 pts per assignment
 - Total of five assignments (*Pre-course reflection, self-reflection #1, self-reflection #2, self-reflection #3, and post-course reflection*)

Grading scale:

91-100 pts – A

81-90 pts – B

71-80 pts – C

61-70 – D

0 – 60 – F



SCHEDULE (see below detailed schedule with topic, faculty info, and session locations)

Date	Topic & Faculty	Location
Mon Jan 23	Intro to Course Alex Toker	TMEC 227

PART ONE | Genetic Aberrations in a Cancer Cell

Wed Jan 25	Cancer Genomics – Applications Matthew Meyerson	TMEC 227
Mon Jan 30	Oncogenes and Tumor Suppressors Stephen Elledge	TMEC 227
Wed Feb 1	Cancer Genomics – Clinical Huma Rana	TMEC 227
Mon Feb 6	microRNAs Frank Slack	Zoom
Wed Feb 8	Epigenetics Matthew Freedman	TMEC 227
Mon Feb 13	DNA Damage & Repair Alan D'Andrea	TMEC 227

Wed Feb 15 **Student Workshops #1** TMEC 227

Mon Feb 20 *University Holiday – no classes*

Wed Feb 22 **Student Workshops #1** TMEC 227

PART TWO | Signaling Pathways in a Cancer Cell

Mon Feb 27	RTK Signaling and Mechanisms of Resistance Pasi Janne	TMEC 333
Wed Mar 1	Ras Pathway Andrew Aguirre	TMEC 250
Mon Mar 6	PI3K/mTOR Pathway Brendan Manning	TMEC 250
Wed Mar 8	Notch Signaling Jon Aster	TMEC 250

Mon Mar 13
Wed Mar 15 *Spring break – no classes*

Mon Mar 20 **Student Workshops #2** TMEC 250
Wed Mar 22 **Student Workshops #2** TMEC 250



PART THREE | Cellular & Organismal Perspectives on Cancer

Mon Mar 27	Cancer Stem Cells Carla Kim	TMEC 227
Wed Mar 29	Precision Medicine Eli Van Allen	TMEC 250
Mon Apr 3	Cancer Cell Apoptosis Loren Walensky	TMEC 250
Wed Apr 5	Cancer Invasion & Metastasis Bruce Zetter	TMEC 250
Mon Apr 10	Tumor Immunology & Immunotherapy Cathy Wu	TMEC 227
Wed Apr 12	Cancer Cell Metabolism Matthew Vander Heiden	TMEC 227
Mon Apr 17	Student Workshops #3	TMEC 227
Wed Apr 19	Student Workshops #3	TMEC 227



COURSE POLICIES

A note about the return to in-person learning

Though most academic activities will return in-person this semester, we recognize that things have not returned to 'normal'. The COVID-19 pandemic and social unrest of the previous years have impacted our lives in many ways and have revealed ongoing challenges and persistent, systemic inequities. The resources and policies described below represent one facet of HMS' goal to provide all students with an academic environment that is welcoming and accessible. If you are facing academic, social, or emotional challenges we encourage you to use these resources, which are here for your direct benefit.

HMS COVID Policy/Keep Harvard Healthy

You are responsible for following the HMS COVID policies in the classroom and in the buildings on campus. For most up-to-date HMS COVID policies, please visit: <https://hms.harvard.edu/returning-campus>. For the Keep Harvard Healthy website, please visit: <https://www.harvard.edu/coronavirus>.

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/309-academic-dishonesty-and-plagiarism>

It is your responsibility to be aware of these policies and to ensure that your 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 your own effort and understanding. You are expected to clearly distinguish your 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, unless it is part of the assignment, 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 the 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.

You are encouraged to contact the course director if you 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, you should contact your 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. You are strongly encouraged to discuss their needs with their instructors; however, instructors cannot independently institute individual accommodations without prior approval from the disability office. Your 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. The GSAS Student Services Office stuserv@fas.harvard.edu (617-495-5005) is available to assist students navigating academic or personal difficulties and connect them to university resources. HILLS 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>).

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.