Course Title: Cancer biology
Course Number: M320
Credits: 1
Instructor: Pablo Sanchez Vela, MD (sanchezp@mskcc.org)
Course Prerequisites: None
Grading Policy: Letter Grade
Duration: 5 in-person sessions

Course Topics and Learning Objectives
The Cancer Biology course will teach scholars how to think about cancer as a disease and as a biological problem. This course leverages the world-class research and clinical expertise at Memorial Sloan Kettering. This course will feature five in-person sessions.

This course will:

- Provide a review of advanced concepts in cancer biology
- Expose students to techniques and experimental design applied to basic-translational cancer research
- Potentiate the ability to perform critical analysis of basic-translational research
- Strengthen capacities to develop a research project

Scientific topics covered in this course include:

- Cancer as a disease
- Genetic and epigenetic mechanisms
- Computational biology and oncology
- Cancer signaling
- Cancer metabolism
- Metastasis
- Tumor modeling and heterogeneity
- Cancer types and microenvironments

In-Person Sessions

In addition to two required sessions, students must attend at least three additional sessions of their choosing from 17 3-hour (9:30am-12:30pm) in-person class sessions, each of which is taught by an expert in the subject being covered in that session:

- Monday, March 2, 2026: Introduction to Cancer Biology- Pablo Sanchez Vela *(required)*
- Thursday, March 5, 2026: Oncogenes- Asmin Tulpule
- Monday, March 16, 2026: p53 and Tumor suppression- Scott Lowe
- Wednesday, March 18, 2026: Cancer Evolution- Tuomas Tammela
- Friday, March 20, 2026: Digital Oncology- Adam Widman
- Monday, March 23, 2026: Genomic Analysis of Cancer- Jian Carrot-Zhang
- Wednesday, March 25, 2026: Colon Cancer- Karuna Ganesh
- Friday, March 27, 2026: Interactive Session/Group Project- Pablo Sanchez Vela *(required)*
- Monday, March 30, 2026: Lymphoma/IDH Inhibitors- Andrew Intlekofer
- Wednesday, April 1, 2026: Genetic Drivers of Hematopoietic Malignancies- Ross Levine
- Thursday, April 2, 2026: Topic TBD- Ivan Maillard
- Monday, April 6, 2026: Leveraging Cancer Metabolism- Kayvan Keshari

- Monday, April 13, 2026: Metastasis to CNS- Adrienne Boire
- Thursday, April 16, 2026: Epigenetic control of oncogene signaling in sarcoma- Ping Chi
- Friday, April 17, 2026: Lung Cancer- Charles Rudin
- Monday, April 20, 2026: Neuron-Cancer Interactions- Kathryn Taylor
- Friday, April 24, 2026 : Therapeutic Antibodies/Pediatric Cancers- Nai-Kong Cheung
- Monday, April 27, 2026: Breast Cancer - Sarat Chandarlapaty
- Thursday, April 30, 2026: Prostate Cancer- Yu Chen

How students will be evaluated

Written Summary (50%)

Each student must submit a 2-page summary on how the topic(s) discussed in the in-person classes that they attended can be integrated into their own research.

This summary could be intended as an additional exploratory aim of your CTCR or K12 fellowship application outside your area of direct expertise (extension of your project into a new topic or topics introduced during the lectures series).

These papers will be evaluated based on the following criteria:

- Content: The scholar clearly outlines their own research and how a topic (whether that be a research technique or technical approach) discussed in one of the four in-person sessions that they attended could be integrated into their existing research question as part of future aims.
- Organization: The scholar effectively organizes the presentation of their own research, including a background and thesis statement, and integrates a topic outlined from one or more of their four in-person sessions.
- Timeliness: The written summary is turned in on or before Monday, June 1st.

The summary will be returned with comments.

An example is provided below:

a. **Background**: A brief background (one paragraph, less than half a page) will be provided on the topic related to the research question, elaborating on the clinical and biological context to justify the experimental approaches suggested (i.e. *"Gene X is overexpressed in different tumor types and has been associated to worse overall survival in patients. Even if gene X is overexpressed in a subset of lung tumors, to date the role of gene X has not been studied in the context of lung cancer*").

b. **Hypothesis**: A small paragraph (3-4 sentences) stating the overarching hypothesis defining the project (i.e., *"We hypothesize that gene X may have an oncogenic role in a subset of patients with lung cancer in whose tumors gene X is overexpressed*").

c. **Experimental approach**: State the specific aims of the proposal, with a relatively detailed description of the experimental methodology proposed to approach each of the specific aims. Imagine any resource you may need (*in vitro* or *in vivo* model, clinical cohort, clinical tissue,…)

is available for you to leverage, but make sure to describe the model with detail. Please justify why and how you are going to do what (i.e. "*To study the role of X gene in two lung cancer cell lines, we will leverage CRISPR-Cas9 technology and overexpression viral vectors to generate isogenic cell lines with differential X gene expression, and we will perform tumorigencity surrogate assays (proliferation and soft agar*").

d. **Potential pitfalls and alternative approaches**: One short paragraph describing potential limitations or biases of the methods described, and proposing alternative approaches to perform the specific aims, particularly in the case where the previously described methods may be technically challenging (i.e., "*If gene X knock out by CRISPR-Cas9 is not possible, as gene X might be essential and complete abrogation of its expression might be toxic, we will use siRNA technology as an alternative, to downregulate gene X expression*"). This section can also be integrated in (c).

e. **Impact**: One to two short phrases describing the potential implications (significance) of the study (i.e., "*Understanding the role of gene X in lung cancer will help to inform rational therapeutic strategies with patients in which gene X is overexpressed"*).

Class Participation and Attendance (50%)

All scholars are expected to attend all sessions. A scholar must notify the CTCR program director prior to class if he or she is going to be absent. This notice should be sent by email.

Basis of Grade Determination

Students will receive a final letter grade based on their class participation (50%), and performance on written summary (50%). The final letter grade will be determined using the following grading scale:

Letter Grade	Range
A	85-100
A-	82-85
B+	78-82
B	75-78
B-	72-75
C+	68-72
C	65-68
C-	62-65
F	<62

Academic Integrity Policy

Each student in this course is expected to abide by the Gerstner Sloan Kettering Policy of Academic Integrity and Plagiarism.

Students are expected to understand all standard rules associated with plagiarism. Resources available to further inform the student of what constitutes plagiarism can be found in the MSK

Code of Conduct, the content of the Responsible Conduct of Research course as well as in many guides offered to explain the seriousness of any breach of not submitting one's own work for credit. A guidebook "Writing with Sources – a Guide for Students", is offered to each student upon matriculation; an additional copy is available in the student library.

Any instance of suspected plagiarism by a student will be brought to the attention of the Dean for further inquiry and action. Proven instances of plagiarism can result in dismissal from GSK.

Course Evaluation

At the end of the course, students will be asked to complete an anonymized survey that evaluates the course.