

Course title: Cancer biology core class for Bridge postbac scholars

Instructor: Alvaro D. Quintanal Villalonga, PhD; quintaa1@mskcc.org

Grading policy: This class is a not for grade class, but scholars will be evaluated with a grade to get a sense of how they performed in this class

Duration 5 in-person sessions plus 3 recorded lectures

Audience: 17 Bridge postbac scholars

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 Cancer Center (MSK). This course will feature five in-person sessions as well as several recorded lectures that Bridge scholars are required to view on their own time and ahead of the first lecture.

This course will:

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

Scientific concepts covered in the recorded lectures will include:

- Cancer as a disease
- Cancer signaling
- Cancer metabolism
- Metastasis

Recorded lectures

Scholars will be required to watched 3 recorded basic and translational science lectures from scientists in Sloan Kettering Institute and Human Oncology and Pathogenesis Program. These lectures will be viewed on their own time ahead of the first class and will help prime discussions at the in-person sessions. These sessions will be posted on Moodle every week. A list of lecture topics will be provided the first week of class.

In-person sessions

Session 1:

Wednesday, July 19, 2023 – 1:30 to 3:30 PM

Introduction to course and basic techniques applied in basic cancer research

In this session, the structure, aims and evaluation system for the course will be presented. Additionally, an overview of techniques used in basic cancer research will be provided, and general principles of experimental design will be discussed.

Sessions 2-4:

Wednesday July 26, 2023 – 1:30 to 3:30 PM

Wednesday August 9, 2023 – 1:30 to 3:30 PM

Wednesday August 23, 2023 – 1:30 to 3:30 PM

Guided paper discussions

In each of these three sessions, a basic/translational paper will be discussed. Selected papers will include both preclinical (*in vitro* mechanistic data, *in vivo* treatment, patient-derived xenografts, etc) and clinical data.

Paper discussions will include description of figure panels included in the article by the scholars, who will be called by the class lead to provide context, describe the results in each figure, discuss the interpretation and implications of the results, suggest additional experiments or controls that would expand the implications of the results, and criticize the methodology, presentation and description of the results in the paper. The main goal of this activity is to “act as peer-reviewers” and train critical thinking.

The papers to be discussed are:

- Session 2: *Comprehensive molecular characterization of lung tumors implicates AKT and MYC signaling in adenocarcinoma to squamous cell transdifferentiation* (Quintanal-Villalonga et al., Journal of Hematology and Oncology 2021, PMID: 34656143)
- Session 3: *Inhibition of Karyopherin β 1-Mediated Nuclear Import Disrupts Oncogenic Lineage-Defining Transcription Factor Activity in Small Cell Lung Cancer* (Kelenis et al., Cancer Research 2022, PMID: 35748745) *A pre-publication version prior to peer-review will be provided.
- Session 4: *MYC Drives Progression of Small Cell Lung Cancer to a Variant Neuroendocrine Subtype with Vulnerability to Aurora Kinase Inhibition* (Mollaoglu et al., Cancer Cell 2017, PMID: 28089889)

Session 5:

Wednesday August 30, 2023 – 1:30 to 3:30 PM

Guided live research activity

In this activity, scholars will be divided into two groups. A translational research project with preliminary data, common for both teams, will be shared with the scholars at the beginning of the session. As an example, the project could be "Study of the role of X gene in Y cancer type, and therapeutic implications".

The scholars will have time to design which next experiments they would like to conduct, and in 10-minute shifts, the class instructor will be visiting each of the teams providing the results for those experiments in real time (i.e., drawing plots, western blots, etc. on the white board). During the 10 minutes the class instructor is providing results for one team, the other team will have time to design a new set of experiments for their next shift. After 4-5 shifts, the scholars will be given time to structure their results into a consistent story, and then each team will present their "paper" to the other team. During that presentation the whole class will be discussing the approaches taken, missing experiments or controls that might be important for their story to be consistent, etc.

The main goal of this session is that the scholars get familiarized with experimental design and interpretation of results to answer a specific scientific question, in a guided environment.

How students will be evaluated

Take Home (67%)

Similar to the guided live research session, the scholars will be assigned a translational research project with preliminary data, in groups of 2-3 people, as an assignment. The scholars

will have to design a small project (2 pages) addressing the scientific question posed (i.e. a light version of the research strategy section of a grant).

This activity will be divided in two parts:

- a. The project will be submitted (Deadline: *September 13, 2023*), and feedback will be provided by *September 27, 2023*, the latest.
- b. The scholars will have the chance to resubmit after addressing the comments provided (Deadline: *October 11, 2023*). This will make the activity a learning experience, rather than just an evaluation.

Although this is a non-for grade class, the project will be evaluated for the scholars to calibrate how well poised they are for graduate course. As a reference, a letter grade with a minimum of a B is would have been needed to pass the course if it was for grade.

The main goals of this activity are that (1) the scholars face the blank page and individually perform the creative activity of designing a project on their own, and that (2) they hopefully learn from the feedback provided.

Class Participation and Attendance (33%)

All scholars are expected to attend all sessions. A scholar must notify the Bridge team and instructor prior to class if they will absent. This notice should be sent by email.

Basis of grade determination

Although this is a non-for grade class, the project will be evaluated for the scholars to calibrate how well poised they are for graduate course. Scholars will receive a final letter grade based on their class participation (33%), and performance on the take home problem set (67%). 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 scholar in this course is expected to abide by the Gerstner Sloan Kettering Policy of Academic Integrity and Plagiarism.

Students/Scholars 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 MSK.

Course evaluation

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