Bio66: The Molecular Basis of Cancer
Spring 2019

Professor Natasha Grotz
Tuesday/Thursday 2:25-4:15pm, X-hour Wednesday 4:35-5:25pm
LSC Room 205
Email to set up appointments.

Objectives
1. To learn how to critically read primary scientific literature
2. To improve formulating and defending arguments
3. To practice experimental design
4. To understand how basic biological processes are misregulated in cancer
5. To gain an appreciation for how basic research informs/has informed our understanding of cancer

We will use the primary scientific literature as a framework for training critical thinking and data analysis. We will work together to develop skills that can applied beyond biomedical science to any field where information or data have to be evaluated, analyzed and synthesized.

Organization
This course will be a mixture of small group problem solving/active class discussion of the primary literature and lectures/presentations. One or two papers will be discussed in depth each class session.

Grading
15% active participation
15% problem set
10% short presentation on type of cancer
25% paper presentation
15% News & Views paper
20% peer review

Participation
Participation will be based on a student asking thoughtful questions, willingly offering answers to questions in class and generally fueling the classroom dialogue. If do not attend or rarely participate, this can adversely affect your final grade in the course.

Honor Principle
In all work pertaining to this course, students are expected to obey the Honor Principle (http://dartmouth.smartcatalogiq.com/en/current/orc/Regulations/Undergraduate-Study/Academic-Honor). Unless otherwise stated, assignments are to be performed and written independently and any external sources used in preparing assignments are to be formally cited. Only original research articles, reviews, articles, textbooks, or personal communication with researchers may be cited; website URLs are not appropriate references. In addition to putting a list of references at the end of the assignment, you need to note the author, year within your text whenever you use a reference. For more information, please see https://writing-speech.dartmouth.edu/learning/materials/sources-and-citations-dartmouth.

Student Accessibility Needs
Students with disabilities who may need disability-related academic adjustments and services for this course are encouraged to see me privately as early in the term as possible. Students requiring disability-related academic adjustments and services must consult the Student Accessibility Services office (Carson Hall, Suite 125, 646-9900). Once SAS has authorized services, students must show the originally signed SAS Services and Consent Form and/or a letter on SAS letterhead to their professor. As a first step, if students have questions about whether they qualify to receive academic adjustments and services, they should contact the SAS office. All inquiries and discussions will remain confidential.

Religious Observances
Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

Mental Health
The academic environment at Dartmouth is challenging, our terms are intensive, and classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including your undergraduate dean (http://www.dartmouth.edu/~upperde/), Counseling and Human Development (http://www.dartmouth.edu/~chd/), and the Student Wellness Center (http://www.dartmouth.edu/~healthed/).

Sexual Misconduct and Title IX
At Dartmouth, we value integrity, responsibility, and respect for the rights and interests of others, all central to our Principles of Community. We are dedicated to establishing and maintaining a safe and inclusive campus where all have equal access to the educational and employment opportunities Dartmouth offers. We strive to promote an environment of sexual respect, safety, and well-being. In its policies and standards, Dartmouth demonstrates unequivocally that sexual assault, gender-based harassment, domestic violence, dating violence, and stalking are not tolerated in our community.

The Sexual Respect Website (https://sexual-respect.dartmouth.edu) at Dartmouth provides a wealth of information on your rights with regard to sexual respect and resources that are available to all in our community.

Please note that, as a faculty member, I am obligated to share disclosures regarding conduct under Title IX with Dartmouth's Title IX Coordinator. Confidential resources are also available, and include licensed medical or counseling professionals (e.g., a licensed psychologist), staff members of organizations recognized as rape crisis centers under state law (such as WISE), and ordained clergy (see https://sexual-respect.dartmouth.edu/reporting-support/all-resources/confidential-resources).

Should you have any questions, please feel free to contact Dartmouth's Title IX Coordinator (Kristi.Clemens@Dartmouth.edu) or Title IX Office (TitleIX@Dartmouth.edu).

Assignments

Problem Set: You will be given a paper to read and a series of questions to answer.

Paper Presentation: You and your group will present the background for an assigned paper and lead an in-class discussion of the major findings of a primary research article from the current cancer literature.

Short Presentation on Type of Cancer: You and your group will give a short presentation on a specific type of cancer.

News & Views: You will independently prepare a "News & Views" review of the primary research article you present.

Peer Review: You will independently prepare a written review of an assigned primary research article.

For all written work, each student must independently write his/her assignments in his/her own original words. Any suspiciously similar prose on assignments will be considered in light of the honor code. Late assignments will not be accepted without substantial penalty.

Details on Presentations

For the presentations, students will work in small groups of approximately three students.

Paper Presentation: Within the presentation, there should be approximately 25 minutes focused on the introduction of the relevant hallmark and specific paper. This portion should go over the relationship of the subject matter to disease, the key discoveries/experiments that led up to the question(s) being asked in the paper(s) as well as providing a quick review of any fundamental molecular biology or any special experimental techniques. You will then lead the class in a discussion of the paper for the remainder of the class (approximately one hour). This will include preparing questions, slides and talking points directly related to the article. Within the discussion, you should address the major questions raised by the paper as well as what type of experiments might answer them. When relevant, a discussion of any therapeutics related to your topic is encouraged as the final portion of the class.

Short Presentation on Type of Cancer: This presentation is expected to be approximately 20 minutes in duration, and its function is to introduce students to various types of cancer. Within the presentation, you and your group should cover the basic details of that type of cancer and include typical treatment options.

Details on the News & Views

Each student will submit one "News & Views" article based on the research article their group presents. A "News & Views" article is written for a broad scientific audience, and it should appeal to all biologists and hopefully other scientists with some interest in biology. These articles are approximately two pages long and contain eight to 12 references to reviews and key papers from the primary literature. Often, they will include an illustrated figure (different from any figure in the paper) that summarizes the central point of the paper. These articles highlight what is remarkable about the work in the broad context of cancer biology and the particular sub-field within cancer biology. Depending on the particular paper being covered, the "News & Views" article could compare this approach (favorably and/or unfavorably) to others that are being currently pursued in the field, describe how a new approach has allowed the researchers to overcome a major barrier in this field and/or describe how this finding will have a direct impact cancer research.

Details on the Peer Review

Practice peer review process (2-page review)

You will pretend as if you have been asked to review an article before publication. As part of your review you will:

1. Put the work into context by describing what it adds to current knowledge in cancer biology
2. Critically evaluate the main experiments.
3. Summarize the major conclusions that can be made based on how you interpret the experiments. This may differ from what the authors conclude.
4. Present an alternative interpretation of at least one experiment and/or the major model presented in the paper.

Reading

Each week, original research papers will be discussed. Papers for the week will be posted by Friday. It is essential that you read the assigned papers before class begins. Additional background readings that may aid in your analysis of papers will be posted along with papers on Canvas.

Class Schedule

Class Date	Topic
3/26-Tues	Introduction to the Hallmarks of Cancer
3/28-Thur	Ras-GAP
4/2-Tues	Ras-GAP
4/4-Thurs	Ras Targeting
4/9-Tues	Ras Dosage
4/11-Thurs	p53
4/16-Tues	SP (5): HPV, PP (1): Enabling Replicative Immortality
4/18-Thurs	SP (6): Melanoma, PP (2): Inducing Angiogenesis
4/23-Tues	SP (7): Lung, PP (3): Activating Invasion and Metastasis
4/25-Thurs	SP (8): Breast, PP (4): Evading Apoptosis
4/30-Tues	SP (9): Colon, PP (5): Evading Growth Suppressors
5/2-Thurs	SP (1): Prostate, PP (6): Avoiding Immune Destruction
5/7-Tues	SP (2): Leukemia, PP (7): Tumor Promoting Inflammation
5/9-Thurs	SP (3): Brain, PP (8): Genome Instability
5/14-Tues	SP (4): Liver, PP (9): Deregulating Cellular Energetics
5/16-Thurs	Therapeutics
5/21-Tues	Therapeutics
5/23-Thurs	Guest lecture
5/28-Tues	Book Discussion: When Breath Becomes Air

Assignment Schedule

4/4-Thurs	First Assignment Posted/Groups Posted
4/11-Thurs	First Assignment Due
5/23-Thurs	Final Assignment Posted
5/28-Tues	Final Assignment Due