Instructor: Professor Natasha Grotz  
Tuesday/Thursday 2-3:50pm, LSC Room 105

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 help you develop skills that you can then apply 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 short lectures. In general, each 2-hour session will be divided into a combination of small group discussions and classroom discussion of a scientific paper. One or two papers will be discussed in depth each class session. In some classes, there will be a short lecture providing background material for the next class paper.

Grading  
20% active participation in discussion  
80% assignments  
- 15% first  
- 40% second (25% paper presentation, 15% News & Views article)  
- 25% third  

Participation  
Discussion 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 code  
In all written material submitted for this course students are expected to obey the honor code. This means that unless otherwise stated, assignments are performed and written independently and that any external sources used in preparing assignments are 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 with a number or with the author, date within your text whenever you use a reference.
Assignments
Assignment 1: You will be given a paper to read and a series of questions to answer.
Assignment 2: As a small group, you will present the background for a specific hallmark and lead an in-class discussion of the major findings of a primary research article (or articles) from the current cancer literature.
You will independently prepare a “News and Views” review of the primary research paper presented by your group.
Assignment 3: You will prepare a written review of a recent paper. This article will be assigned and will be one of the articles presented by your classmates.

For all three written assignments, each student must independently write the assignment 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.

Written material will be evaluated for content as well as creativity, clarity, brevity and quality of writing.

Details on Second assignment
Presentation
For the presentation, students will work in small groups. Within the presentation, there should be approximately 25 minutes focused on the introduction of the relevant hallmark and specific paper(s). 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. 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.

Written
For the written section, each student will submit a “News & Views” article based on the paper presented. 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 Third assignment
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 Saturday. 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.

Professor-led Topics
In late March/early April, we will focus on Ras signaling and discuss tumor suppressors.

Student-led Topics
Starting in the middle of April and during May, we will focus on student presentations that address various aspects of the hallmarks of cancer. A draft of the presentation schedule is on Canvas; the final draft will be available when the groups are assigned in by the second week of April.

Written Assignment Dates
Assignment 1: This assignment will be posted by April 7th and will be due at the start of class on April 14th.

Assignment 2: Groups will be determined by April 5th, and papers for the presentations must be approved two weeks prior to the presentation date. “News & Views” written assignments are due four days after the presentation and can be submitted via e-mail.

Assignment 3: The article will be assigned by May 26th, and your review is due at the beginning of class on May 31st.
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<td>Introduction to the hallmarks of cancer</td>
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<td>3/31-Thur</td>
<td>Ras-GAP</td>
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<td>4/5-Tues</td>
<td>Ras-GAP; groups assigned</td>
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<td>4/7-Thurs</td>
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<td>4/21-Thurs</td>
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<td>4/26-Tues</td>
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<td>4/28-Thurs</td>
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<td>Group 9: Avoiding immune destruction</td>
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