Cellular Basis of Human Disease
Biol. 416, Fall 2015
Tuesday 7-10 in A247

Instructor: Maureen Peters
Contact information: K210, mpeters@oberlin.edu
Office hours: M 1:30-2:30; T 12:20-2:20, F 9:30-10:30 by signup or by appointment

Course description: This course will explore the current understanding of human diseases at the cell and molecular level. Oral and written communication skills in the sciences will be sharpened through grant proposal writing, peer review and in class presentations. Societal issues surrounding disease incidence, funding, research, and treatment will also be discussed. This is largely a student-led class that promotes independent research and personal responsibility for your own learning.

Goals: 1) Gain experience in performing independent literature research, and crafting informative and engaging graphical and oral presentations.
2) Gain confidence in generating original hypotheses and designing testable predictions by formulating, peer reviewing, and revising research grant proposals.
3) Improve scientific writing skills, specifically in the area of research proposals.
4) Learn how to read primary biomedical literature in a detailed and critical manner and to become more comfortable discussing research findings and implications.
5) Gain an understanding of how societal, cultural, and economic structures interrelate with disease-related research, treatment and health-related education.

Prerequisites: Biology 213. Registration priority is given to advanced Biology majors.

Course materials: Course materials will be made available on blackboard, including the syllabus, assignments, discussion board, etc.

Grading:
- Participation/engagement 22.5 %
- Presentation 22.5 %
- Disease funding letter 5%
- Mini-proposal & revision 12.5%
- Education/outreach project 12.5%
- Grant hypothesis draft 2.5 %
- Grant introduction draft 2.5 %
- Grant (final project) 20 %

Participation: This is largely a discussion-based class so your willingness to provide comments, questions, concerns and ideas is welcome and appreciated. I expect that you will meaningfully participate during each and every class. Please know that you are encouraged to speak even if you might say something that is not completely correct about a figure. We are all embarking on the challenging journey of understanding new material
in rapidly changing fields of biomedical research. Lots of fumbling on this path is expected so try not to be uncomfortable voicing your ideas.

If speaking in class is not challenging for you, please discuss other options for your participation with me as soon as possible. Contributing to online discussion boards and offering thoughtful and helpful feedback to colleagues is another way to engage with the learning community. Arriving to class on time, being collegial, and respectful to others is also important.

_Inclusive Classroom:_ I make every effort to ensure that the classroom environment is inclusive and welcoming. I expect that all students in the classroom will be respectful of others and their opinions. As in any college course, our discussions may include difficult topics. We will attempt to engage with these topics in sensitive ways.

**Attendance is mandatory.** If you are ill or have another emergency contact me as soon as possible.

**Presentation and discussion overview:** Two (or three) students, constituting a disease group, will be responsible for the study of a particular disease. Each group will introduce the class to the fundamental aspects of the disease’s causes, physiology, prevalence, societal impacts, and typical treatment in the “Disease Introduction”. The following class meeting they will lead discussion of selected research article/s investigating a hypothesis about the cell and molecular mechanism underlying the disease during the “Disease Discussion”. Everyone else is expected to put forth their best effort to understand the disease articles and to be active and engaged during presentations and discussions. A fruitful disease discussion requires both the presenters and audience to fulfill their responsibilities as detailed below.

**Presenter responsibilities:**
1) As soon as the disease groups have been assigned (week 2) you should begin learning more about your disease and finding potential research articles. These articles must be hypothesis driven and contain primarily cell and molecular experiments. The articles must present a hypothesis or model about what particular molecules are doing in cellular and/or systems processes associated with the disease state. In class we will discuss ways to identify an appropriate paper.

2) **At least one week prior to your “Disease Introduction” day** your group must send Prof. Peters 3-4 articles that you would like to present. Include a brief written explanation of which 2 articles you think are the best and why. The final discussion paper/s and discussion questions must be determined **at least nine days ahead of the disease discussion week.**

3) **Disease Introduction (~60 minutes)**
During the “Disease Introduction” students will present the information necessary for everyone to understand the background and context of the articles to be discussed in the subsequent discussion meeting (see above for more suggestions). Any techniques or approaches used in the research article that are likely unfamiliar to most students
should be explained. The scope of the introductory material must cover the biological basis of the disease in detail but does not need not to be solely biological. Societal issues related to the disease’s prevalence, treatment, etc. are encouraged to be included. Discussion questions should also be distributed to the class at this time or shortly thereafter. Your presentations should be in powerpoint or a similar software as they will be posted on Bb for other to use in their preparations for discussion. Let Prof. Peters know if you need to borrow a computer one day before the class presentation.

4) Disease Discussion (~75 minutes)
Students will lead and moderate a discussion of the articles, the “Disease Discussion”, using a set of discussion questions you create. These questions must be distributed to the class several days prior to the discussion session. Discussion participants are encouraged to contribute to the online discussion board. Leaders may use board postings as a guide for directing the discussion. Your group will decide how to best structure the discussion format. Try to encourage class participation but be sure to clarify confusing points if necessary.

Participant responsibilities:
1) Everyone needs to thoroughly read each paper and make a conscientious effort to fully understand each part, particularly the figures. This should take two to three hours minimally. You are encouraged to take notes and mark up your paper so that you can quickly recall details as needed. You are also encouraged to contribute to the online disease discussion boards. You are expected to be alert and engaged during class and to attempt to answer and pose questions, provide comments, etc.

Mini-grant proposal (including peer review and revision): You will complete one mini-proposal grant. This a very brief grant, more of a grant outline really, based on the first disease presentation on breast cancer metastasis. The goal of this assignment is to introduce you to the process of developing and revising a research grant. This exercise should help to prepare you for your final class project, a large grant.

Education/outreach project: Propose a project that works to educate others about some aspect of health, biology, disease, and/or research. This is an open-ended assignment that could include anything from writing an op-ed piece or article for the Oberlin Review, the CLEAR or Science Library blog, creating a ‘zine, holding a movie viewing and discussion, making a new display for a window case in the Science Center, giving a talk to groups of fellow students, community members, or others. A project for which you are already getting academic credit in another class cannot count for this assignment. Group projects are encouraged but they must be larger in scope and each person’s role must be clearly delineated. You will create a short proposal for your project by Fall break and provide updates subsequently. Upon completion of the project some form of documentation/evidence of your project is required. A short reflection on the experience (2-3 pages) is also necessary.
Grant proposal/final project *(12-16 pages, double spaced, with one page single spaced summary included)*: The culmination of the course is the final project, due during the finals period. Your project will be to write a grant proposal that addresses open research questions about one of the diseases we have studied. You are encouraged to work on the disease that you present but this is not required. The preparation of the grant should span the second half of the semester. Start thinking and researching as early as possible. Significant background reading will be required to develop a strong proposal. At least twenty references to research papers are expected. Towards the end of the semester various drafts of sections of the grant will be due and we will workshop these drafts. More detailed information will be provided later in the semester.

Honor Code: All assignments must be written entirely on your own. Brainstorming with other students is encouraged but using online sources, i.e. recently funded grant proposals, for ideas is not. Be sure to cite references for all past work, facts and ideas. Be careful that you do not inadvertently plagiarize other materials by taking cut and paste notes from papers. Always write notes from memory, not immediately after reading a passage.

Refer to the guidelines of the Honor System as described at http://new.oberlin.edu/office/dean-of-students/honor/students.dot.
<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPICS/ACTIVITIES</th>
<th>ASSIGNMENTS/ DUE DATES</th>
</tr>
</thead>
</table>
| Tues. 9/1 | Introductions  
Preliminary identification of disease topics  
HeLa cell documentary: The Way of All Flesh (time permitting) |                                                                                                         |
| Sun. 9/6 | **ALL:** Disease funding letters due on Bb                                           |                                                                                                         |
| Tues. 9/8 | Disease list discussion/debate  
Scientific figure analysis and discussion of appropriate research articles  
Technique jeopardy  
Science and Society discussion: The Lacks family and HeLa cells | Read all disease funding letters online; Prepare for HeLa discussion by reading Knoppers, 2013; Caulfield and McGuire, 2013; Szego, et al., 2013 online; bring jeopardy questions |
| Tues. 9/15 | Breast cancer discussion led by Peters  
Mini-proposal brain storming activity  
Writing unit 1 | Read disease 0 paper: Ryu et al., 2013 |
| Tues. 9/22 | NO CLASS – Yum Kippur                                                                      |                                                                                                         |
| Tues. 9/29 | Disease 1 introduction  
Writing unit 2  
Workshop mini-proposals  
Education project discussion and brainstorming | Mini-proposals due, bring 2 paper copies to class and post on Bb; |
| Tues. 10/6 | Disease 1 discussion  
Disease 2 introduction | ALL: Revised mini-proposals due (extension for disease 2 presenters); Read disease 1 papers |
| Tues. 10/13 | Disease 2 discussion  
Disease 3 introduction | Read disease 2 papers; Education project proposals due |
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues. 10/26</td>
<td>Sonia Shah OC ’90 Convocation: Pandemic: Tracking Contagions from Cholera to Ebola and Beyond Disease 3 discussion</td>
<td>Shah readings TBD; Read disease 3 papers Food:</td>
</tr>
<tr>
<td>Tues. 11/3</td>
<td>Disease 4 introduction Writing unit 3 Education project updates Disease funding advocacy discussion</td>
<td>Readings for disease funding advocacy discussion (TBD); Food:</td>
</tr>
<tr>
<td>Tues. 11/10</td>
<td>Disease 4 discussion Disease 5 introduction</td>
<td>Read disease 4 papers Food:</td>
</tr>
<tr>
<td>Tues. 11/17</td>
<td>Disease 5 discussion Grant analysis and brainstorming session</td>
<td>Read disease 5 papers Read posted grants Food:</td>
</tr>
<tr>
<td>Tues. 11/24</td>
<td>Grant hypothesis and outline workshop Writing unit 4</td>
<td>Draft of grant focus, hypotheses, aims and experiments due Food:</td>
</tr>
<tr>
<td>Mon. 11/29</td>
<td>Submit original and revised grant focus, hypothesis and aims on Bb In preparation for private meetings this week</td>
<td></td>
</tr>
<tr>
<td>Tues. 12/1</td>
<td>In lieu of a formal class meeting private meetings with me to discuss your final grant proposals this week</td>
<td>Education project summary/reflection due.</td>
</tr>
<tr>
<td>Sun. 12/6</td>
<td>Introductory drafts due on Bb</td>
<td></td>
</tr>
<tr>
<td>Tues. 12/8</td>
<td>Workshop grant introduction drafts Educational project presentation and discussion Wrap-up!</td>
<td>Read and review assigned grant introductions; Prepare education project presentation Food:</td>
</tr>
<tr>
<td>Sat. 12/20</td>
<td>FINAL PROJECT, GRANT PROPOSAL, DUE at 11 AM</td>
<td></td>
</tr>
</tbody>
</table>