

BIMM 194 – Perspectives on Scientific Discovery Fall 2013

Course Information

Class time and place:	Mondays 10:00AM-11:30AM. York 3010
Professor:	Dr. Eric Bennett 858-822-7900 e1bennett@ucsd.edu Natural Sciences Building Room 5316
Office Hours:	Tuesdays – 3:00-4:00 PM Natural Sciences Building Room 5316
Course Website:	ted.ucsd.edu <u>The website will be the primary mode of communication during the course.</u> All reading assignments will be posted on the website as well as other notifications. You will be responsible for locating and printing the weekly reading assignments.
Other resources:	There is no textbook required for this course. Relevant material can be found on the course website or through pubmed - http://www.ncbi.nlm.nih.gov/pubmed The Nobel website will also be an extremely useful resource. http://www.nobelprize.org/
Prerequisites:	BIMM 100 (Molecular Biology). It is highly recommended to have completed BICD100 (Genetics) and BICD110 (Cell Biology).

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Course Overview:

The purpose of this course is to acquire the skills needed to interpret and evaluate primary scientific literature. To accomplish this we will study several seminal discoveries in molecular and cellular biology that were subsequently awarded Nobel Prizes. This will enable a greater understanding of critical biological principles that form the basis of many biological textbooks. Special emphasis will be placed on understanding the historical significance of the assigned paper and the resulting impact on current and future biomedical fields. The format of the course will be weekly seminar-style presentations, where each student will present at least once during the quarter. Each speaker will be responsible for providing a basic introduction of that week's Nobel Prize winning discovery and lead a class discussion on the specific aims and significance of a selected work from the prizewinners. All students will be required to write 3 "press releases" discussing the importance of the assigned paper and its relevance to human health. This will be due at the beginning of the next class following the chosen presentation to be highlighted. In addition, all students will write constructive peer evaluations of each presentation that will be due at the end of class. Excerpts will be posted on the course website discussion board. The goal of the course is to learn not only about historically significant scientific research, but also to read, critically evaluate and present primary data from research articles.

Grading:

Grades will be determined by the quality of student written work and oral presentations, as well as the level of preparedness and participation in all class discussions.

Evaluations will be based on performance with these requirements:

- (1) Presentations: (30%) Oral group presentation of 1 assigned research article and associated material
- (2) Written Reviews: (30%) One-page "press releases" of 3 Nobel prize winning discoveries.
- (3) Participation: (10%) Involvement in all weekly discussions of research articles and participation in online discussions regarding evaluations
- (4) Evaluations: (20%) Written evaluations submitted at the end of each class. A generalized form for evaluations will be available on the course website.
- (5) Final Written Exam: (10%) Two page position paper submitted at the end of the final class.

Presentations:

Each student will be assigned one paper to present. You will be a member of a group that will make a 60-minute presentation of one of the assigned research articles. This includes approximately 45 minutes for the presentation and 15 minutes for questions

and discussion. Each member of the group should be prepared to answer questions and engage in discussion of the presentation. Presentations should be thoroughly prepared and clearly delivered. You may use the provided review articles to help introduce your subject. In addition, you may need to read additional publications and locate additional resources to assist your understanding and presentation of each paper. Your job is to help the class gain a clear understanding of the conceptual context, purpose, approaches taken and significance of each paper. Presenters will also be required to highlight how the original finding detailed in the assigned paper has led to current advances in biomedical science. A good understanding of the experimental methods employed is essential for a critical reading of any paper. Leading the group discussion consists of taking the class step-by-step through the rationale, approach and results in each paper. This often requires judicious choices regarding which figures and concepts are central and which are secondary.

Preparing the Presentation

Presenters are encouraged to exchange contact information and arrange multiple meetings to prepare your presentations. I suggest that each group meet at least twice before your presentation. These papers are complicated, and the level of background and experience within the class vary. Nevertheless, by working together, the group should achieve a common level of understanding of the research performed. It is recommended that each group schedule a consultation meeting with Dr. Bennett prior to the presentation to assist in presentation preparation. Additional tips and guidelines on presentation content and format are also available online. (“How to present a paper”; “How to make powerpoint presentations”).

Presentation Content

In general, each group presentation should include the following information:

I. Background/Introduction. (25%) Provide the necessary background that gives the context for the paper and the overall discovery. i.e. What are the authors attempting to show? What was known at the time? What was the current dogma at the time of the discovery? What tools are used to approach the problem? If there are multiple prize winners, what was the contribution of each of the prizewinners?

II. Discussion of Data/Results. (50%) Provide a thorough description of the techniques employed in the paper. Describe the specific experiments, highlighting any controls that are important for the interpretation of the data. Summarize the results of the experiment, including whether what you observe within the provided figures actually supports (or not) what the author's write in the text. Discuss any reservations you may have about the data. Figures should be divided between members of the group.

III. Conclusions and implications. (25%) Discuss the major conclusions from the findings presented in the paper and the overall contributions of the prizewinners. Where possible, include a model (often included at the end of the paper) to provide an overview of the findings. Discuss how these findings challenged scientific thinking at the time. Discuss why this discovery was important enough to be recognized by a Nobel Prize. Finally, presenters should provide a current state of the field and how the earlier findings have had an impact on medical sciences or human disease.

Presentation Format

Each presenter should prepare powerpoint (or other suitable presentation software) slides to assist in the clarity of your presentation. We will have a projector available for hook-up to your own or the instructor's computer. In this case, the group's entire presentation should be on one computer. If you will use the instructor's laptop computer to deliver your presentation, you must prepare a PC-compatible presentation and bring it on a memory stick before class.

Written reviews:

You are expected to read EVERY assigned paper before coming to class. Reading the supporting material provided on the website is also a good idea, although not required. In addition, you are required to write a 1-page maximum "press release" for three of the assigned Nobel discoveries (not of the one that you present). These "press releases" should be written in a format that is understandable by non-scientists. The first paragraph should succinctly describe the results of the research (what did they find). This should be followed by details regarding the research with a focus on the assigned paper that was discussed in class (how did they find it). Lastly, you should frame the discovery in a broader biomedical context (why was it important and why should you care). You will turn in your "press releases" at the beginning of class following the chosen presentation (i.e. if you write a press release on the discovery of viral oncogenes, it will be due the week after the viral oncogene presentation). Although each individual should turn in their own write-up, I encourage you to discuss the articles together. Do not leave all three "press releases" for the end of the quarter.

Participation:

You are expected to read EVERY assigned paper before coming to class and to be prepared to discuss it. Participation during discussions will be a major factor of my evaluation in assigning final grades. It is assumed that each student has read carefully, and is conversant with the contents of, each of the papers assigned for a given week. This includes the background information contained in the assigned reviews. Anyone in the class may (and will) at any time be called upon by the presenters or instructor to discuss a particular figure or finding in the paper under discussion. In addition, it is expected that each student will regularly make spontaneous contributions to the discussion.

Evaluations:

After each presentation, you will fill out a peer evaluation form (available online) with constructive and substantive comments on the group's presentation of the background material and data in each paper. It is important to be critical in a productive way (not always easy). Comment on what you liked about the presentation and what you thought could be improved upon. Were parts of the presentation not well-communicated? Was the choice of illustrations helpful or overly complicated? Additionally, you will have a chance to observe and comment on presentation styles of the presenters. The quality of your critique is important. These written evaluations will be due at the end of the class. I will post recurring comments or points of confusion on the course website discussion

board. Discussion on the comments is strongly encouraged and will be integrated into your participation grade.

Final Exam:

During the 2008 presidential election, Sarah Palin made a now famous statement about public funding for fruit fly research (<http://www.youtube.com/watch?v=Eg1vleuQT1s>). Upon watching this, imagine a friend or family member turning to you and asking you (as you are now a well-versed biologist with a greater understanding of the scientific literature), “Why do our tax dollars fund research on fruit flies, or worms, or beer-making yeast for that matter?” Write a two-page (single spaced, 12pt font) position paper that answers this question. Use concrete examples from the class or other primary scientific literature to make your point. You should feel free to write the paper in a way that supports your friend’s assertion (i.e. we shouldn’t be funding this type of research). However, any argument will have to be well-supported by facts and examples from the scientific literature. You should go into detail about what the original aim of some Nobel-winning discoveries were and how those discoveries are now being applied.