The Biology of Disease

Biology Junior Seminar
Pacific University
Fall 2010
Professors Stacey Halpern and Paige Baugher
Biology Junior Seminar Syllabus
Disease Biology: Linking Ecology and Molecular Biology

Seminar Time: Monday 5:45-6:45 p.m.

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Office hours Mon/Fri 2:15 – 3:15 pm, Th 1 – 2 pm Mon/Wed/Th 1 – 2 pm

Course Goals:
Junior seminar consists of small groups of biology majors discussing primary biological literature on a particular topic over the course of a semester. Students will read, present, and discuss current research. The seminar course will provide students with an opportunity to:
- Read and understand primary biological literature
- Appreciate the interconnectedness of different biological perspectives
- Make an effective oral presentation
- Find biological literature and distinguish primary from secondary literature

Grading for Junior Seminar
100 points (20%): Workshop oral presentation: formal presentation to individual professor
150 points (30%): Class oral presentation: formal presentation to entire class
80 points (16%): Participation in discussions (requires attendance)
85 points (15%): Answers to faculty questions about readings
75 points (15%): Student questions from readings
10 points (2%): Library orientation and literature searching exercise
10 points (2%): Attendance at biology seminars or capstone presentations

Oral Presentations
Groups of 2-3 students will present one of the primary literature papers from the attached list. The list includes papers that focus on one of two subject areas: the evolutionary ecology of diseases within populations or communities, and the molecular basis of disease progression within individuals. Each group of students will present their paper twice. In the workshop oral presentation, the group will give a formal presentation to one of the professors. The professor will grade this presentation, and will provide feedback about the quality of the presentation and the students’ understanding. Two to four weeks later, the group will give the class oral presentation. This formal presentation should incorporate changes based on feedback during the workshop presentation. For the class oral presentation, the group will also answer questions and help lead a discussion on the paper following their presentation. Both presentations will include a clear and concise explanation of the paper including: (1) general background information, (2) primary results and (3) summary, conclusions, and implications. See attached evaluation form for oral presentation expectations and grading.

Faculty questions about readings
All students must thoroughly read the journal articles before each seminar. To help you understand the paper and be prepared for discussion, we will give you several questions about key aspects of the study. You will answer these questions in writing before class, and will submit them via the course BlackBoard site. You do not need to answer questions about the paper you present. The first set of these questions (for the cnidarian bleaching paper) is worth 5 points; each remaining set of questions is worth 10 points.
Student questions about readings
To help foster discussion, you must come to class prepared with four typed questions related to the journal article. Two of these questions must be clarification questions, while the other two must be “big picture” types of questions – those that ask about implication and application of the presented results. Please separate your questions with those headings (“Clarification” and “Big Picture”)—this will help us provide feedback on the quality of your questions. You do not need to submit questions for the paper you present. The first set of these questions (for the cnidarian bleaching paper) is worth 5 points; each remaining set of questions is worth 10 points.

Discussion and participation
We expect all students to participate in the discussion of the article by making at least one comment or asking at least one question for each paper’s discussion. Your question or comment may come from the typed questions prepared in advance. We will record both who speaks and the quality of contributions each class period. Discussion participation is worth 10 points for each paper (excluding the one you present).

Library orientation & literature searching
All students must attend one of the two library orientation sessions, held in weeks 4 and 5. These will be led by the science reference librarian. You must sign in and complete the literature searching assignment. The assignment is due Monday, Oct 4, in class.

Attendance
Attendance is required at all scheduled seminar class periods during a given semester. In addition to regular class meetings, over the course of the year juniors must attend two seminar presentations on biological topics of their choice. These presentations may include talks from speakers invited from off-campus or biology senior capstone presentation. Within one week of the presentation you must submit (via e-mail) a short summary of the talk (approximately 1 paragraph) and one biologically relevant question you had about of the talk. Submit your response via BlackBoard. Alternatively, you may ask your question during the talk and receive credit for attendance that way—but make sure one of the faculty members records your question.

While additional seminars may be announced later, the fall seminars (held in Strain 121 at 4:30 pm) currently scheduled are:

<table>
<thead>
<tr>
<th>Date</th>
<th>Speaker</th>
<th>Title or topic of talk</th>
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<tbody>
<tr>
<td>Thursday, Sept 9</td>
<td>Dr. Mary Bricker, Biology Department, Pacific University</td>
<td>Seed predation by mice alters the population dynamics of native plants in Montana prairies</td>
</tr>
<tr>
<td>Thursday, Sept 23</td>
<td>Dr. Anne Krutchen, Biology Department, Linfield College</td>
<td>Remodeling the cytoskeleton in metastatic cancer: a study of cortactin protein levels and phosphorylation</td>
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<tr>
<td>Thursday, October 21</td>
<td>Dr. Greta Binford, Biology Department, Lewis &amp; Clark College</td>
<td>Why are brown recluse venoms so toxic? Answers based on comparative evolutionary analyses</td>
</tr>
<tr>
<td>Thursday, Nov 4</td>
<td>Dr. Cynthia Cooper, School of Molecular Biosciences, Washington State University, Vancouver</td>
<td>What zebrafish stripes can tell us about human pigmentation and disease</td>
</tr>
<tr>
<td>Thursday, Nov 18</td>
<td>Dr. Susan Hormann, Portland Forensic Laboratory</td>
<td>The Past, Present and Future of Forensic DNA Analysis</td>
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Expectations of Students:
We expect that students enrolled in this course are adults who can take responsibility for their education. We will work hard to facilitate your learning, but ultimately only you can actually learn the material through focused time and effort. **As a reminder, Pacific guidelines state that students should put in 2-3 hours outside of class for every credit; that means you should expect to work at least two hours/week on this course outside of class time.**

For papers you present we expect that it will require one hour of work for each minute of presentation. Thus, you should expect to spend about 20 hours on preparing your presentation. This time will include reading the paper multiple times, doing background research in primary, secondary, and tertiary resources, making your slides, and practicing your talk with your group.

For papers you do not present we expect that it will require one hour to read the paper very carefully, possibly another hour to re-read it, and one hour to answer the questions and develop your own questions.

We expect you to come to class on time; to be prepared; to participate cheerfully; and to act in a respectful, professional, and responsible manner towards others. In turn, you can expect the same from us.

Missing class:
If you know you will miss class (e.g., for an approved, scheduled event or family emergencies), please let us know ahead of time. College notices are not sufficient you must discuss these absences with us before hand.

Academic Integrity: According to the Academic conduct Policies in the A&S Catalog; Pacific University has no tolerance for academic dishonesty. It is university policy that all acts of academic dishonesty be reported to the Assistant/Associate Dean. Sanctions that may be imposed for academic dishonesty range from an “F” for the assignment, an “F” for the course, and suspension or dismissal from the university. Forms of academic dishonesty include, but are not limited to, plagiarism, fabrication, cheating, tampering with grades, forging signatures, and using electronic information resources in violation of acceptable use policies. Plagiarism is the use of someone else’s words, ideas, or data without proper documentation or acknowledgement. Please talk to us before you complete assignments if you have a question about what constitutes dishonesty.

For this course, you may discuss answers to faculty questions about readings, but the answers you submit must be in your own words.

Learning Support Services:
We request that any students with disabilities or special needs that affect their capacity to participate in this class or to meet class requirements bring this to our attention. Pacific University has resources available, and we can make reasonable adjustments to accommodate documented needs. It is the responsibility of each student with a disability to contact and work with the office of Learning Support Services (LSS). Students who wish to document needs should contact Edna K. Gehring, Director of Learning Support Services, at extension 2107 (503-352-2107 from off campus) or gehringe@pacificu.edu. She will meet with such students, review the documentation of their disabilities, and discuss the services Pacific offers and any required ADA accommodations for specific courses.

To receive accommodation, you must make arrangements at least 1 week prior to the due date.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Presenters</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 30</td>
<td>Orientation to course</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sept 6</td>
<td>No class—labor day</td>
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<tr>
<td>3</td>
<td>Sept 13</td>
<td>How to present a paper</td>
<td>Dunn et al. 2007: Cnidarian bleaching</td>
<td>Paige &amp; Stacey</td>
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<td>4</td>
<td>Sept 20</td>
<td>Workshop oral presentations</td>
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<td>Librarian gives literature searching orientation</td>
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<tr>
<td>5</td>
<td>Sept 27</td>
<td>Workshop oral presentations</td>
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<td>Librarian gives literature searching orientation</td>
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<tr>
<td>6</td>
<td>Oct 4</td>
<td>Environmental toxins</td>
<td>ET: Greenlee et al. 2004 (paper 1, mechanisms)</td>
<td>Simone &amp; Loryn (workshop Sept 20)</td>
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<tr>
<td>7</td>
<td>Oct 11</td>
<td>Environmental toxins</td>
<td>ET: Rohr et al. 2008 (paper 2, ecology)</td>
<td>Pei &amp; Hau‘oli (workshop Sept 20)</td>
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<td>8</td>
<td>Oct 18</td>
<td>West Nile Virus</td>
<td>WNV: Michaelis et al. 2007 (paper 1, mechanisms)</td>
<td>Cloe, Lisa, &amp; Jack (workshop Sept 27)</td>
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<td>10</td>
<td>Nov 1</td>
<td>Workshop oral presentations</td>
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<td>11</td>
<td>Nov 8</td>
<td>Workshop oral presentations</td>
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<tr>
<td>12</td>
<td>Nov 15</td>
<td>Black Death</td>
<td>BD: Krasnov et al. 2006 (paper 1, ecology)</td>
<td>Liane &amp; Nicole (workshop Nov 1)</td>
</tr>
<tr>
<td>13</td>
<td>Nov 22</td>
<td>Black Death</td>
<td>BD: Latham et al. 2005 (paper 2, mechanisms)</td>
<td>Ryan &amp; Sara (workshop Nov 1)</td>
</tr>
<tr>
<td>14</td>
<td>Nov 29</td>
<td>Malaria</td>
<td>M: Paaijmans et al. 2010 (paper 1, ecology)</td>
<td>Alex, Fernando, &amp; Gaby (workshop Nov 8)</td>
</tr>
<tr>
<td>15</td>
<td>Dec 6</td>
<td>Malaria</td>
<td>M: Tamasauskas et al. 2001 (paper 2, mechanisms)</td>
<td>Mariko &amp; Zak (workshop Nov 8)</td>
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Selected Topics and Papers
We have posted electronic copies of papers on Blackboard. You should bring a copy of each day’s paper to class, either printed out or electronically on your personal computer.

In this seminar, we will read both papers from evolutionary ecology and pathophysiology that tackle questions related to disease biology. In regards to the evolutionary ecology, we will read papers concerning the role of disease in communities and populations; in regards to the pathophysiology, we will read papers concerning the molecular biology of disease infection and progression. The papers are listed below.

How to present a paper
What are the cellular mechanisms underlying cnidarian bleaching? Dunn et al. 2007

1. Environmental Toxins

Paper 2: Pesticides and parasites—effects of herbicides and insecticides on trematode infection of tadpoles. Rohr et al. 2008

2. West Nile Virus
Paper 1: Can an antibiotic cure West Nile Virus? Michaelis et al. 2007

Paper 2: Biodiversity and infectious disease risk—does increasing host diversity lower or raise the risk of infection for humans? Ezenwa et al. 2006

3. The Black Death (Plague)
Paper 1: Plague vectors—can the ecology of fleas predict their role in disease transmission? Krasnov et al. 2006


4. Malaria

Expectations for Junior Seminar Presentations

General guidelines
Your presentation of a primary research paper should demonstrate thorough understanding of the content and its importance.

- To understand the content, you will need to learn about the study’s methods, digest the results, and think carefully about the authors’ conclusions (are they supported by the data?). Typically, this requires reading the paper multiple times.
- To understand the study’s importance, you will need to put it into a broader context. Typically, this requires reading some tertiary (e.g., textbook) or secondary (e.g., review paper) sources, as well as one to several related primary literature articles.

In short, plan ahead for your presentations so that you have time to accomplish these goals.

Your presentation should be 20-25 minutes long, divided into three sections (see below). The presentation will be interrupted by short question and answer periods, where other students (or the professor) can ask clarifying questions about the material you’ve presented. A general discussion, focusing on big-picture questions, will follow your presentation.

Each student in the group will present a part of the paper, and you should divide the presentation reasonably among the members of the team. The actual division will depend on the paper and the group size—please talk with us before your workshop presentation to be sure you understand our general expectations for the division of your paper.

- Do not use notes. You know the material well enough to talk without them.
- One person should present the introduction. In a group of 2, this person will also present some results; in a group of 3, this person may only present the introduction, depending on the paper.
- Do not present a methods section.
- Divide the presentation of results among at least two people.
- One person should wrap up the conclusions—in most (if not all) groups, this will be the person who presented the last results. You should “end with a bang”—finish off in a way that tells us something compelling about the implications of this study.
- Aim to split the time approximately evenly among speakers, but don’t sweat it to the minute.
- Practice so that you have smooth transitions between speakers.
- You will be graded individually on your portion of the presentation.
- You will also receive an overall group grade for the presentation that reflects how well everyone understood and presented the paper, how equitably you shared the presentation, and how smoothly you transitioned between speakers.

Specific guidelines
INTRODUCTION (usually 7-10 min)
Hook the audience with the title slide. Don’t read the title, but instead give a non-technical summary of the paper on the title slide.

The introduction should provide background information about the study beyond what’s in the introduction. This will involve reading textbooks, review papers, and other primary literature papers. Possible types of background information to include:

- additional explanation of critical main concepts that underlie the study (e.g., a broad hypothesis, a cellular structure, a molecular pathway, etc.)
- results from prior results that provide information or support for the question/hypothesis/motivation for the study; it may be helpful to include a figure from prior studies. **Do not** present this information in book-report format—instead, think of it as an example in a lecture.
- different approaches that can be/ have been used to study this question, and their relative strengths & weaknesses. In particular, what are the strengths and weaknesses of the approach this study used?

The introduction also should clearly present these aspects of the study:
- the motivation for the study—why is it interesting or important? why was it published?
- the key conceptual framework for the study
- the main question(s), hypotheses, and predictions
- the general experimental approach

**RESULTS & INTERPRETATIONS (usually 10-15 min)**
This section will vary depending on the paper. It will typically be presented by more than one person, and thus divided into 2-3 approximately 5 minute sections. We will take a question and answer pause after each figure (or small set of figures) to clarify any aspects of the results that were just described. However you organize this section, be sure to consider the following guidelines:

- **Focus on the specific results**, usually included in tables or figures. You need to thoroughly understand the methods underlying the results, but you **should not** present those details. There may be a technique (e.g., a western blot), an experimental design (such as transgenic mice or selection study), or an analysis approach (such as PCA or phylogenetically independent contrasts) that you will have to explain as part of presenting the results, but again, the focus should be on the data.
- **You may present the figures in a different order than they appear in the paper**—pick an order that is best for the flow of your presentation. This is one area where you can show your scientific judgment.
- **While all tables and figures include important information**, not all are critical to include in a talk (especially some tables). Similarly, some important results are only presented in the text—it may be worthwhile to present some of them even though there is not an accompanying figure. Use your judgment about whether to include or exclude specific information; feel free to ask us for advice.
- **You may need to edit tables or figures for the presentation**. For example, axes labels or symbols may be too small to read (replace them with larger text), or tables may include extraneous information (highlight the important points). You can also add to figures (e.g., a colored arrow pointing out a pattern), or show only part of a figure at a time—the goal is to communicate with the audience. You can also modify the presentation—e.g., make a figure based on information in a table, or information from the text. Be clear that you have made modifications—i.e., say that on the slide.
- **Follow our guidelines for what to include on a figure slide**. You should have a descriptive title (including the original table/figure number), a large figure/table, and a conclusion bullet point (which you may bring onto the screen later).
- **For each figure**, walk us through them very carefully:
  - explain axes and symbols, units, and any other details required to understand the figure
  - describe the pattern clearly in words while pointing to it on the screen
  - draw conclusions—does this figure support the authors’ hypotheses as presented in the introduction? are there any caveats or limitations to the strength of the conclusions you can draw? What is the take-home message from this figure?
  - Note that there is an important way in which talks are different than papers—methods, results, and conclusions are more integrated, rather than separated by section.
CONCLUSIONS (usually 2-5 min)

- Summarize the key results again—remind us of the specific key findings and conclusions.
- Draw general conclusions about the study. Questions to consider here include:
  - Were the hypotheses supported? How strongly? What limitations are there—were there weaknesses in the study, or aspects of the hypothesis that this study could not address?
  - What overall conclusions do authors draw? Is data in line with the conclusions? Do you agree with the conclusions? Why or why not?
  - What are the implications of these results for important scientific or societal issues?
  - What are the next steps—what should new studies address?
  - If you are presenting in the second week, how does this study relate to the one from the previous week?
  - Note that you don’t have to address all of these questions—we will consider them in the general discussion as well. Focus on the issues you think are most important.

An example of the set-up for a data figure slide

**Figure 2. Bleaching in response to the inhibition of both apoptosis and autophagy**

Inhibition of both apoptosis and autophagy appears to significantly decrease bleaching
Workshop Presentation Evaluation Form

Topic: ______________________________________________________

Presenters: __________________________________________________

Each of the following will be rated as
zero  = Did not cover this aspect or very poorly done
√-    = Observed but was not a very strong aspect/needed work
√     = Observed and did a good job
√+    = Observed and did an excellent job/one of the strongest aspects of the presentation

As a group:

________ All group members are present for the workshop

________ All group members brought a relevant secondary and tertiary source to the workshop

________ All group members are prepared for the workshop

Presentation:

_______ Organization. Presentation was well organized and easy to follow.

_______ Teamwork. Individuals made substantive contributions, with smooth transitions and easy
integration. Work was evenly distributed.

Overall comments:
Introduction. Presented by:

______ **Informative.** Background information was sufficient for understanding of the results and discussion. Includes good information from tertiary, secondary, or other primary resources.

______ **Relevance.** Presenter clearly understood the motivation for the study and put it in context.

______ **Experimental Design.** Presenter clearly explained the overall conceptual framework for the study, the general experimental approach, and the hypothesis and predictions tested by the authors.

______ **Understanding.** Presenter demonstrated a clear understanding of major scientific principles, the science behind the work, and the results/interpretations of the study.

______ **Delivery.** Presenter spoke clearly, knowledgeably, and at an appropriate pace, avoiding distracting mannerisms and in a professional manner.

______ **Clarity.** Presenter explained concepts, ideas, and information clearly and concisely. Effective use of visual aids.

______ **Response to Questions.** Presenter responded effectively to questions from the audience.
<table>
<thead>
<tr>
<th>Results</th>
<th>presented by ______________________________________________</th>
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</thead>
<tbody>
<tr>
<td>_______</td>
<td><strong>Methodology.</strong> Presenter clearly explained enough of the experimental methods behind each data set/figure/table to facilitate understanding. (Appropriate level of detail, appropriate context).</td>
</tr>
<tr>
<td>_______</td>
<td><strong>Data Set/Results/Figure Presentation.</strong> Presenter clearly explained each relevant data sets/figures/tables.</td>
</tr>
<tr>
<td>_______</td>
<td><strong>Context.</strong> Presenter clearly explained the scientific questions being answered by each data set/figure/table.</td>
</tr>
<tr>
<td>_______</td>
<td><strong>Understanding.</strong> Presenter clearly explained authors’ conclusions regarding each of the data sets/figures/tables. If presenter’s conclusions vary from those of the authors, presenter explains why.</td>
</tr>
<tr>
<td>_______</td>
<td><strong>Delivery.</strong> Presenter spoke clearly, knowledgeably, and at an appropriate pace, avoiding distracting mannerisms and in a professional manner.</td>
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<tr>
<td>_______</td>
<td><strong>Clarity.</strong> Presenter explained concepts, ideas, and information clearly and concisely. Effective use of visual aids.</td>
</tr>
<tr>
<td>_______</td>
<td><strong>Response to Questions.</strong> Presenter responded effectively to questions from the audience.</td>
</tr>
</tbody>
</table>
Discussion/Conclusions presented by ________________________________

_______ Summary. Presenters reminded us of specific KEY findings and conclusions.

_______ Conclusions. Presenters clearly indicated the conclusions made by the authors, described the strength of evidence supporting the hypotheses, and evaluated the merit of the authors’ claims.

_______ Implications. Presenter related the implications of these results to important scientific or societal issues and suggested future studies.

_______ Delivery. Presenter spoke clearly, knowledgeably, and at an appropriate pace, avoiding distracting mannerisms and in a professional manner.

_______ Clarity. Presenter explained concepts, ideas, and information clearly and concisely. Made effective use of visual aids.

_______ Response to Questions. Presenter responded effectively to questions from the audience.