



## Ecological Developmental Biology

16:215:599:02 Graduate Seminar Course: Spring 2015

**Wednesday 12:35-3:35 pm**

Room 145, Ecology and Natural Resources (ENR), Cook Campus

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### Course Description:

This seminar course will investigate the interactions between the environment and developing organisms and the subsequent consequences for medicine, ecological interactions and evolution. Outside of the lab, organisms from humans to beetles develop in a milieu where competitors, food, predators, toxins, stress, temperature, and even mechanical shear can vary widely and influence developmental processes. Thus, both the environment and genotype can cause advantageous and detrimental phenotypes – providing the raw material upon which species interactions, disease, and natural selection act. We will use Gilbert and Epel's book "Ecological Developmental Biology: Integrating Epigenetics, Medicine, and Evolution" as a framework for exploring how multiple disciplines come together to define a new perspective on the dynamics of phenotypic and genotypic diversity in the real world.

### Student Responsibilities:

As a student in this course, you are expected to attend and participate in each class meeting. Your grade will be determined from three components: Overall class participation and contribution to the seminar, a chapter presentation, and a peer-reviewed proposal. As a culminating experience to the course, this proposal will give you an opportunity to more fully explore a component of ecological developmental biology that interests you. We highly encourage you to choose a topic that relates to your research.

1) Class Participation and Overall Contribution to the Course (30%) Owing to the nature of this course as a seminar, it is imperative that you attend class regularly and actively participate in discussions of topics. It is critical that everyone complete the readings before class and come prepared to discuss them. The more actively involved we are in discussions, the more rewarding the seminar will be for everyone!

2) Presentation of Topics (30%) At least once during the semester, you will lead the discussion of the chapter or readings for that week. You should (a) first summarize the main points of the chapter (this should take the form of a powerpoint presentation and the option of a written outline/handout for your classmates), with the assumption that your audience has at least a first-order familiarity with the material; (b) present a more in-depth case study associated with the chapter (the example can come

directly from the chapter or can be related to the chapter; you are expected to pull from materials beyond the book including the primary literature; additional reading on the case study can be circulated ahead of time at the discretion of the presenter); and (c) pose questions for the students in the class to promote discussion for the class meeting (e.g., questions related to why this is important, how this relates to larger ecological, developmental or evolutionary processes, what issues might be confusing, etc.). The first half of each class will be devoted to the chapter overview and discussion; and then, the second half of the class will be devoted to presentation and discussion of the case study.

3) Proposal (Presentation, Reviewer Critiques, and Paper, 15%, 10%, and 15%, respectively) The proposal is an opportunity to apply the concepts from the course to your own research interests. The proposal is expected to be in the format of a pre-proposal following the NSF BIO guidelines (see below for details). During the last two classes, we will hold mock proposal review panels in which students will give a ~15 minute oral presentation of the proposed work followed by a panel review. The pre-proposals should be circulated to the class by the Friday before your presentation. Each proposal will have a primary and secondary reviewer and a scribe. The primary and secondary reviewer will prepare a short written critique ahead of the panel, based on the NSF review guidelines (detailed below), and lead the discussion of the proposal. The scribe will prepare a panel summary of the proposal. The presentation grade will be determined based on the panel's recommendations and ranking. Students are expected to incorporate responses to the reviewer critiques into their final written proposal, **due electronically to both professors by 5pm, Friday May 8<sup>th</sup>**. We are available if you have questions or would like some guidance with your project.

**Course Website:** You should have access to the course Sakai site. Announcements, additional readings, and resources will be posted there.

**Academic Integrity Policy:** Students are expected to follow the Rutgers Academic Integrity Policy in every aspect of this course. To review the policy, please see:

[http://academicintegrity.rutgers.edu/files/documents/AI\\_Policy\\_2013.pdf](http://academicintegrity.rutgers.edu/files/documents/AI_Policy_2013.pdf)

**ADA Policy:** Rutgers University welcomes students with disabilities into all of the University's educational programs. If you require special accommodations to complete this course, please bring this to the instructors' attention and share your Letter of Accommodation as early in your courses as possible. More information and to begin the process to acquire a Letter of Accommodation, please visit the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

<b>Week</b>	<b>Date</b>	<b>Topic</b> (*subject to change as necessary, with advanced notice)
<b>1</b>	Jan 21	Introduction
<b>2</b>	Jan 28	Chapter 1: The Environment as a Normal Agent in Producing Phenotypes
<b>3</b>	Feb 04	Chapter 2: How Agents in the Environment Effect molecular Changes in Development
<b>4</b>	Feb 11	Chapter 3: Developmental Symbiosis
<b>5</b>	Feb 18	Chapter 4: Embryonic Defenses
<b>6</b>	Feb 25	Chapter 5: Teratogenesis
<b>7</b>	Mar 4	Chapter 6: Endocrine Disruptors
<b>8</b>	Mar 11	Chapter 7: The Epigenetic Origin of Adult Diseases
<b>9</b>	Mar 18	NO CLASS – SPRING BREAK
<b>10</b>	Mar 25	Chapter 8: The Modern Synthesis
<b>11</b>	Apr 1	Chapter 9: Evolution through Developmental Regulatory Genes
<b>12</b>	Apr 8	Chapter 10: Environment, Development, and Evolution
<b>13</b>	Apr 15	Synthesis, Work on proposals
<b>14</b>	Apr 22	Panel Review #1
<b>15</b>	Apr 29	Panel Review #2
	May 8	Final proposals due

**NSF BIO Preliminary Proposal Instructions** (edited from NSF solicitation [15-500](#) & [13-600](#))

Preliminary proposals must contain the items listed below and strictly adhere to the specified page limitations. No additional information may be provided as an appendix or by links to Web pages. Figures and tables must be included within the applicable page limit. All elements of the proposal, including legends and tables, must meet the formatting requirements for font size, characters per inch, margins, etc. as specified in the GPG.

Preliminary proposals should contain an overview of the proposed research with sufficient detail to allow assessment of the major ideas and approaches to be used. Preliminary proposals must include the following components.

- **Project Summary (1 page):** Provide an overview of the proposed research, addressing separately the intellectual merit and broader impacts. The summary should be written in the third person, informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader. **Preliminary proposals that do not contain the Project Summary, including an overview and separate statements on intellectual merit and broader impacts will be returned without review.**
- **Project Description.** Maximum 5 pages total, containing the two following sections:
  - I. ***Title & Personnel (This section is limited to one page. Any remaining space should be left blank.)*** Title should begin with the prefix: "Preliminary Proposal:" and additional acronyms for Small Grants "SG:", Accomplishments Based Renewal "ABR:", or Research in Undergraduate Institutions "RUI:" if applicable. Provide a list of project personnel plus each person's institutional affiliation, and a minimal description of that person's role(s) in the project. The description of role(s) may not exceed two lines per person and cannot include external links.
  - II. ***Project (This section is limited to four pages and must address separately both the intellectual merit and broader impacts. We suggest the use of the sub-sections listed below, organized as appropriate. For the purposes of DEB Core Programs, sub-sections 1 through 4 are equivalent to an explicit "intellectual merit" header.)***
    1. "Conceptual Framework" or "Objectives" or "Specific Aims"
    2. "Rationale and Significance" or "Background"
    3. "Research Question(s)" or "Hypotheses"
    4. "Research Approach" or "Experimental Plan"
    5. "Broader Impacts"
- **References Cited** are limited to 3 pages, see GPG for format.

**Reviewer Guidelines ([edited from NSF 15-1 GPG, Dec 26, 2014](#))**

All NSF proposals are evaluated through use of two National Science Board approved merit review criteria (listed below). Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. ([GPG Chapter II.C.2.d.i](#)) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including [GPG Chapter II.C.2.d.i](#), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to:
  - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?