

SIO 122: Ecological Developmental Biology

Spring Quarter 2018

Course Instructor:

Dr. Deirdre Lyons

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Office Hours: by appointment

Course Structure:

Lecture Tu/Th 2:00pm-3:20pm, 100 Vaugn Hall, SIO

Discussion: Th 3:30p-4:20p, 100 Vaugn Hall, SIO (required)

Course Description:

In this course, students will learn about the development of multicellular organisms and how they interact with their environments in the natural world. Organisms have evolved the ability to use the environment as a source of important cues that can influence the trajectory of their developmental program. The rapidly expanding field of Ecological Developmental Biology (“Eco-Devo”) focuses on how factors such as physical forces, temperature, nutrition, symbionts, microbes, predators, conspecifics, and hormones influence development. Lectures will examine the major theories and the latest discoveries of how the environment influences development at both macro- and micro-evolutionary timescales. Particular emphasis will be given to the genetic basis of phenotypic plasticity and responses to the environment, drawn from studies in aquatic and terrestrial animals, and plants. Themes covered include: polyphenism, genetic accommodation, symbiosis, endocrine signalling, niche construction, genetic assimilation, canalization, and transgenerational epigenetic inheritance, among others. We will discuss how an Eco-Devo framework can inform our understanding of human disease and climate change.

Communicating with the class and instructor:

This quarter we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, and myself. Rather than emailing me directly, I encourage you to post your questions on Piazza. The quicker you begin asking questions on Piazza (rather than via emails), the quicker you'll benefit from the collective knowledge of your classmates and instructors. I encourage you to ask questions when you're struggling to understand a concept—you can even do so anonymously.

Find our class page at: <https://piazza.com/ucsd/spring2018/sio122/home>

Reading (Required)

1. *Endless Forms Most Beautiful: The New Science of EvoDevo*

2nd Edition, 2008, Sean Carroll

<https://www.amazon.com/Endless-Forms-Most-Beautiful-Science/dp/0393327795>

This popular science book will be discussed in the first three discussion sections and will provide an overview of some of the fundamental topics in developmental biology and evolutionary biology on which we will build.

2. *Ecological Developmental Biology: The Environmental Regulation of Development, Health, and Evolution*

2nd Ed., 2015, Scott Gilbert and David Epel

https://www.amazon.com/Ecological-Developmental-Biology-Environmental-Development/dp/1605353442/ref=sr_1_1?s=books&ie=UTF8&qid=1522825000&sr=1-1&keywords=ecological+developmental+biology

This updated text will cover in detail many of the topics covered in lectures

3. Subsequent discussion-section meetings will focus on reading primary literature related to the lectures and will be posted on Piazza

Grading

	Points per	Total points	Percentage
Quizzes	5 x 20 pts	100 pts	10%
Midterms	2 x 200 pts	400 pts	40%
Final Project:		300 pts:	30%
Drafts	2x 50 pts	100 pts	
Oral Presentation	1x 100 pts	100 pts	
Written/Media	1x 100 pts	100 pts	
Participation:	TBD	200 pts	20%
Homework assignments			
Participation in Discussion Sections			
Participation in discussion on Piazza			
Filling out CAPE, etc			
Total		1000 pts	100%

Regrading Policy

Requests for regrades must be submitted to the instructor within one week of the exam return. Please attach a sheet noting which questions you would like regraded, along with a brief justification. Note that regrades are primarily an opportunity to fix grading errors. Only exams written in non-erasable ink will be considered

Academic integrity

Integrity of scholarship is essential for an academic community. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. All suspicions of integrity violation will be reported to the Academic Integrity Office according to university policy. Integrity violation is not just blatant cheating (e.g., copying off another student during an exam), but include copying other students' papers or homework, copying or using old papers/report, working with others on individual assignments without proper acknowledgement, plagiarism in written work, etc. Those students found to have committed academic misconduct will face administrative sanctions imposed by their college Dean of Student Affairs and will also face consequences for this course which may range in severity from an F on the exam or assignment to an F in the course. Students who assist in or are complicit with cheating could also be in violation of the Policy. Thus, students who become aware of their peers either facilitating academic misconduct or committing it should report their suspicions to us for investigation. For more information on academic integrity please refer to The Policy on Integrity of Scholarship (academicintegrity.ucsd.edu).

Schedule (tentative)

Date	Topics	Assessment	Reading
L1 Tu 04/03/18	Life History Strategies—Intro to Development I Direct vs Indirect Dev., Sea Urchin and Mollusc Dev.		
L2 Th 04/05/18	Gene Regulation—Intro to Development II Induction, Patterning, Cis-Regulatory Control, Frog Dev.		<i>Eco. Dev. Bio.:</i> Appendices A and C
D1 Th 04/05/18	<i>Endless Forms Most Beautiful (EFMB)</i>		<i>EFMB</i> : Thru Chapter 2
L3 Tu 04/10/18	Abiotic Influences on Development I Nutrition, Endocrine Signaling, Insect and Nematode Dev.	Quiz 1	<i>EFMB</i> : Chapters 3, 4, 5
L4 Th 04/12/18	Abiotic Influences on Development II Temperature, Physical Forces, Chicken Dev.		<i>EFMB</i> : Chapters 6 and 7
D2 Th 04/12/18	<i>EFMB</i> and discussion of final projects		<i>EFMB</i> : Chapters 3 Thru 7
L5 Tu 04/17/18	Biotic Influences on Development I + Review Predators, Conspecifics, Crustacean Dev.	Quiz 2	<i>EFMB</i> : Chapters 8 and 9
L6 Th 04/19/18	Midterm L1-L5; D1-D2	Midterm 1	<i>EFMB</i> : Chapter 10
D3 Th 04/19/18	<i>EFMB and snacks</i> ☺		<i>EFMB</i> : Chapters 8 thru 10
L7 Tu 04/24/18	Biotic Influences on Development II Sex determination, Microbes, Cephalopod Dev.	Quiz 3	<i>Eco. Dev. Bio.:</i> TBD
L8 Th 04/26/18	Genetic Basis of Phenotypic Plasticity Methylation, Mutation, Transgenerational Effects, Fish Dev.		Research Paper 1: TBD
D4 Th 04/26/18	Research Paper Discussion	Paper Qs	Research Paper 1: TBD
L9 Tu 05/01/18	Genetic Accommodation and Assimilation I Heat-shock proteins, selection and plasticity	Quiz 4	<i>Eco. Dev. Bio.:</i> TBD
L10 Th 05/03/18	Genetic Accommodation and Assimilation II Canalization, Robustness in GRNs	Pre-CAPE	Research Paper 2: TBD
D5 Th 05/03/18	Research Paper Discussion + Project Ideas	Paper Qs	Research Paper 2: TBD
L11 Tu 05/08/18	Symbiosis + Review Microbes/Animals, Inter-Kingdom,	Quiz 5	<i>Eco. Dev. Bio.:</i> TBD
L12 Th 05/10/18	Midterm L7-L11; D4-D5	Midterm 2	Research Paper 3: TBD
D6 Th 05/10/18	Research Paper Discussion and snacks☺		Research Paper 3: TBD
L13 Tu 05/15/18	Eco-Evo-Devo of Plants, Fungi, and Parasites Crops, Mycorrhizae, Flower Development		<i>Eco. Dev. Bio.:</i> TBD
L14 Th 05/17/18	Regeneration and Colonialization Self/Non-self, Niche Construction, Ascidian Dev.	Paper Qs	Research Paper 4: TBD
D7 Th 05/17/18	Research Paper Discussion + Project Ideas		Research Paper 4: TBD
L15 Tu 05/22/18	Eco-Evo-Devo and Human Health I Epigenetics, Endocrine Disruptors, Human Dev		<i>Eco. Dev. Bio.:</i> TBD
L16 Th 05/24/18	Eco-Evo-Devo and Human Health I Gut microbes, Immune Response, Defense	Paper Qs	Research Paper 5: TBD
D8 Th 05/24/18	Research Paper Discussion + Presentation Skills		Research Paper 5: TBD
L17 Tu 05/29/18	Eco-Devo and Global Climate Change I Warming Oceans; Cnidarian/Coral Dev.	Paper Qs	<i>Eco. Dev. Bio.:</i> TBD
L18 Th 05/31/18	Eco-Devo and Global Climate Change II		Research Paper 6: TBD
D9 Th 05/31/18	Research Paper Discussion + Science-Writing Skills		Research Paper 6: TBD
L19 Tu 06/05/18	Student Presentations	Peer Review	
L20 Th 06/07/18	Student Presentations	Peer Review	
D10 Th 06/07/18	Student Presentations	Peer Review	
06/11/18	Final Project Due 5:00pm PST		Please fill out your CAPEs!