

# BIOSci 2370: EVOLUTIONARY GENETICS & DEVELOPMENT OF PHENOTYPES

## SPRING TERM 2015



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### **GENERAL INFORMATION**

**Time:**

**Thursdays, 2:00PM – 3:50 PM**

**Location:**

**Crawford Hall 343**

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### **MAIN INSTRUCTOR:**

**Dr. Mark Rebeiz**

Life Sciences Annex 202A

Office hours:

By appointment, TBA

Phone Numbers:

412-624-2261 (office)

Email:

rebeiz@pitt.edu

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### **INTRODUCTION**

In 1973, Theodosius Dobzhansky wrote his famous words “Nothing in Biology Makes Sense Except in the Light of Evolution”. This course will integrate molecular and evolutionary concepts for graduate students interested in both MCDB and E&E topics to provide a balanced (and hopefully more “sensible” view) of biology. Evolutionary Biology is a vast field, which spans a diverse array of inquiries into the formative events of the natural world. We will cover major molecular aspects of evolution from several complementary angles: covering a wide variety of model organisms and traits in which evolutionary studies have been performed at the molecular level, and exploring topics such as the evolution of gene regulation, epigenetics, and multicellularity. The course will consist of lectures, many of which are presented by guest lecturers who are world experts on their topic of discussion. Lectures will be followed by a classroom discussion of one or two journal articles or essays relevant to the lecture topic.

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### **ORGANIZATION**

#### *Lectures*

Each class will include a lecture, often from a guest lecturer who will introduce a particular topic. The lecture portion of the class will generally last about an hour. Although it is a “lecture”, students are encouraged to participate as much as possible – ask questions, and seek discussion.

#### *Journal article discussions*

The second half of class will be used to discuss journal articles pre-selected by the lecturer regarding the topic of the day. This will include a combination of historically important papers and essays, as well as current research articles. Students are expected to read each assigned paper thoroughly, and be prepared to discuss any aspect of the paper as we evaluate its contents.

### *Class activities*

In at least one case (Lecture #2 by Dr. Sam Donovan), the second half of class will involve a hands-on workshop. Dr. Donovan will instruct the class on how to build and interpret phylogenetic trees. **Make sure to bring your computer to this lecture.**

### *Proposals*

For **two** of the **current** research papers (i.e. published within the last 5 years) discussed in class, students will write a 3-page proposal of experiments to advance the study (single spaced, 12 point font, 1 inch margins). Due dates are listed in the schedule on the last page. This is a chance to **think creatively** about a topic covered in class and discussions, and to devise and propose a **novel research strategy**. Proposals should contain an introductory paragraph that briefly describes the background literature, and lays out the motivation for the proposed research. This should be followed by 1 or 2 aims, and a concluding paragraph. The three page limit is intended to keep the focus of your proposal succinct (Remember that a picture paints a thousand words....use figures to explain complex ideas). References may be included on a fourth page.

### *Proposal rewrites*

A critical step in technical writing is to improve one's written presentation to be more clear or persuasive by implementing feedback. I will make detailed comments on your proposals alongside your grade. To maximize the benefit of these comments, you will have the chance to rewrite your proposal based on my input for an improved grade. Due dates for re-writes are given in the class schedule on the last page of this syllabus.

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## **GRADES**

The total points possible in this class are distributed as follows:

Attendance	20%
Participation	40%
Research Proposal	40%

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## **ATTENDANCE**

Attendance is mandatory for all sessions. Your grade for the day missed will be zero. All absences must be excused directly by the instructors prior to the class meeting. Email is the best method. All absences must be justified, and we reserve the right to require documentation.

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## **OFFICE HOURS**

We will normally have time during class to deal with most of the issues that will come up. However, meetings can be scheduled at other times. E-mail me to arrange a meeting time.

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### **RECOMMENDED TEXT**

There is no textbook for the course. We will be evaluating articles from the primary literature, almost all of which are available online through institutional access. For more difficult-to-find articles, PDFs will be provided through CourseWeb.

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### **DISABILITIES**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union, [412-648-7890/412-383-7355(TTY)] as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Lecture	Date	Lecturer	Topic	Proposal Due
1	1/8/15	Rebeiz	Introduction to the course	
2	1/15/15	Donovan	Phylogenetic Trees	
3	1/22/15	Rebeiz	Morphology and the evolution of gene regulation	
4	1/29/15	Rebeiz	Epigenetics and Evolution	
5	2/5/14	Campbell	Multicellularity	Proposal #1
6	2/12/15	Campbell	Diversification of Transcription Factors	
7	2/19/15	Lawrence	Microbial Evolution	
8	2/26/15	Nicotra	Cnidarian/Basal Metazoan evolution	Proposal #1 Edits due
9	3/5/15	Hinman	Echinoderm Evolution	
	3/12/15	Spring Recess, No Class		
10	3/19/15	Hinman	Evolution of Gene Regulatory Networks	
11	3/26/15	Boyle	Evolution of Host-pathogen interactions	Proposal #2
12	4/2/15	Rebeiz	The evolution of novelty	
13	4/9/15	Pruitt	Collective Traits	
14	4/16/15	Kalisz	Population Genetics/Measuring Selection	Proposal #2 Edits due
	4/23/15	Final Exam Period	No Final exam	