

Evolution (PCB 4674)

Time: Wednesdays 10-11:15 am

Location: Wolfe Center 100 (BBC)

- **Professor:** Jose Eirin-Lopez, Ph.D.
- **Website:** [environmentalepigenetics.com](http://environmentalepigenetics.com)
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- **Office:** MSB-360 (BBC)
- **Office Hours:** by appointment

#### Course Description and Purpose

**Evolution constitutes the unifying theory of biology**, and that is why you are taking this course as seniors, to help you integrate all the knowledge you have acquired during your studies. All you have learned so far fits within different levels of organization and interaction in the living world, establishing the basis for evolutionary change. This course will give you a comprehensive vision of the Theory of Evolution, including historical perspectives, foundations of evolutionary thinking, mechanisms driving evolution, and outcomes for conservation and health. The course will help you **understand the mechanisms driving evolution at different levels and how those shape the extraordinary biodiversity surrounding us**. We will do that by surveying modern evolutionary theory, including experimental and empirical evidence for evolution from a variety of scientific disciplines.

The course is divided into four parts:

- **Part I** will introduce the students to the **evidence of evolutionary change and to natural selection** as an agent of these changes
- **Part II** will explore the other **mechanisms that cause evolutionary change through time**: mutation, migration and genetic drift
- **Part III** will explore **adaptation** in depth
- **Part IV** will deal with the consequences of the four **evolutionary processes over the sweep of Earth's history** with an emphasis on humans

#### Course Objectives

Upon successful completion of this course, you will be able to:

- Explain why evolution is true

- List the theories underlying the theory of evolution
- Define natural selection
- Construct a phylogenetic tree
- Illustrate the change of gene frequencies in populations
- Explain how adaptation occurs
- Describe the different mechanisms driving evolution
- Discuss the links between evolution and human health
- List the mechanisms underlying evolution at the molecular level
- Explain how new species arise

#### How This Course Will Help You Succeed

The study and understanding of evolution is fundamental to complete your education and to grow as a human being. After all, we are part of this magnificent process. Charles Darwin ends his book “On The Origin of Species” emphasizing precisely that:

*There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.*

In addition, this course will help you acquire a conceptual and practical framework that you can apply to solve complex problems in in your future research, professional practice, or clinical practice.

Beyond its formal learning objectives, I hope that this course will inspire you to:

- Realize your potential to learn and master complex concepts
- Be open minded about science and evolution
- Appreciate the role of evolution shaping life on earth
- Care about nature and the environment and their benefits for society
- Be understanding about others' interests, limitations and background
- Become curious and creative in using evolutionary thinking to solve biological, medical and legal problems

#### Course Modality

This course will be taught in **hybrid** mode. In a hybrid class, the face-to-face meeting time is reduced by 50%. The other 50% of the class takes place outside of the classroom; whether online, in the field, in the community, or some place else. It is important to note that this out-of-class “meeting time” is in addition to the homework and

preparation that are assigned in all classes regardless of format. If you take a Hybrid course, **you will need to self-regulate your out-of-class time so that you can keep up with both the face-to-face and out-of-class assignments and preparation.** Some tasks must be completed prior to class and some after class. Paying attention to how the in- and out-of-class materials are connected is important.

#### Course Prerequisites

This course builds on knowledge acquired by students throughout the Biology/Marine Biology major. Students are required to have taken and passed the following courses with a satisfactory grade (C or higher grade):

- PCB 3063 -Genetics
- PCB 3043 -Ecology

#### Proctored Exam Policy

There are no online proctored exams for this course. **Students will complete exams IN PERSON in class** using their laptop computers through Respondus Lockdown Browser.

#### Textbook and Course Materials

#### **Evolutionary Analysis, 5th edition (Optional)**

Jon C. Herron, Scott Freeman  
Pearson, 5th Edition, 2013  
ISBN-10: 0321616677  
ISBN-13: 978032161667-8

Note: this book is **recommended**, however, you will be able to go through the course successfully with the materials provided by the professor.

You may purchase your textbook online at the [FIU Bookstore \(Links to an external site.\)](#)[Links to an external site.](#).

#### **iClicker (Required)**

You may purchase one of the following models at the [FIU Bookstore \(Links to an external site.\)](#)[Links to an external site.](#):

- original i>clicker
- i>clicker +
- i>clicker 2

**PLEASE NOTE, REEF iClicker (the mobile application) WILL NOT be accepted in the present course.** You must register your clicker within this course as soon as possible (click on "**iClicker Student Registration**" on the course menu and follow instructions. **Do not register your clicker on iclicker.com.** If you do, I will not be able to match your responses with your name and you will not receive credit.

#### Important Information

Before starting this course, please review the following pages:

- [Policies](#)
- [Technical Requirements and Skills](#)
- [Accessibility and Accommodation](#)
- [Academic Misconduct Statement](#)

This course utilizes the following tools:

- Respondus Lockdown Browser. See [Important Assessments Information](#) page.
- iClicker

#### Class Policies

##### **Make-Ups**

there are no make-ups for assessments, so make sure to prepare ahead of time.

##### **Incomplete Grades**

An incomplete grade will be delivered under very exceptional documented circumstances such as major sudden and unexpected serious health problem of the student or his/her family. Other excuses will not be accepted to provide an incomplete grade.

##### **Letters of Recommendation**

Letters of recommendation will only be written for the top 10 students in the class based on the final numeric grade. In addition, in order to be eligible for that letter, students **MUST HAVE COMPLETED ALL ASSIGNMENTS in the course.**

#### Expectations of this Course

As a student in this course, you are expected to:

- Review and follow the course calendar

- Submit assignments by their respective due dates
- Log in to the course at least **2 times per week**
- Respond to emails **within 2 days**

I, the professor, will:

- Log in to the course at least **3 times per week**
- Respond to emails **within 2 days**
- Respond to General Discussion posts **within 2 days** (see Course Communication section)
- Provide feedback on assignments **within 7 days** of submission

Course Communication

Outside of our in-person meetings, we'll stay in touch through Canvas

- **Inbox.** Use it for personal, or time-sensitive questions. Check out the [Canvas Conversations Tutorial \(Links to an external site.\)](#) to learn how to communicate with your instructor and peers using Announcements, Discussions, and the Inbox.
- **General Discussion Forum.** Post your question or comment here if it is related to class material and your classmates could also benefit from my response. Keep in mind that your discussion forum postings will likely be seen by other members of the course. Please review our [netiquette policies \(Links to an external site.\)](#).

Online Group Discussions

After the add/drop date, the class will be randomly divided into online groups.

During the semester, you will engage in two **online group discussions within your group's discussion forum**. The group discussions will be based on topics/academic papers provided in the course at the beginning of the semester. The goal is to promote critical thinking, engagement, and application of the material. Please refer to the course calendar. Further details will be given in class.

General Requirements:

- Addressed discussion prompt in **3-5 complete sentences**
- Commented on **at least 3 peers' posts**

Keep in mind that your discussion forum postings will likely be seen by other members of the course. Care should be taken when determining what to post.

Assessments

In order to mitigate any issues with your computer and online assessments, it is very important that you take the [Practice Quiz](#) from each computer you will be using to take your graded quizzes and exams.

### Syllabus Quiz

- Available **online**
- Will test you on your knowledge of the syllabus
- 10 multiple-choice questions and 10 minutes to complete
- **You must pass this quiz with 100% to gain access to the rest of the course content (you're allowed multiple attempts)**

### iClicker Questions

An iClicker is a radio frequency device that allows students to respond to questions that the instructor poses during the in-person sessions. This lets you and your instructor quickly know how well you understand the lesson material.

During each **in-person** session, I will use iClicker to ask two (2) general questions about the contents of the lectures that will be discussed for that week. Therefore, you are required to **read through the lectures BEFORE class** to prepare for these questions.

Your iClicker responses count toward your final grade. To receive credit for the responses you submit during class, you must register the device **as soon as possible** within your course.

**Cheating:** I consider bringing a fellow student's iClicker to class to be cheating and a violation of the University Honor Code. If you are caught with a remote other than your own, you will be penalized accordingly. See Academic Misconduct Statement section.

### Quizzes

- Available **online** during week scheduled from **Monday 12:00 AM - Sunday 11:59 PM**. See the course calendar.
- Cover content from corresponding lecture
- Contain five (5) multiple-choice questions, and **10 minutes to complete**
- You may view quiz results (e.g., overall score, submitted and correct answers) after the due date in the Quizzes section. See Canvas Student Guide [How do I view quiz results as a student? \(Links to an external site.\)](#)[Links to an external site.](#)

### Exams

- You **MUST** come to **in-person** class to complete the exams **in Canvas using your laptop**.
- Contain **60 to 80 multiple-choice questions**, with 70 to **90 minutes** to complete (this will be notified to students the week before of the exam).

- You may view exam results (e.g., overall score, submitted and correct answers) after the due date in the Quizzes section. See Canvas Student Guide [How do I view quiz results as a student? \(Links to an external site.\)](#)[Links to an external site.](#)
- There will be three (3) exams: Exam 1 will consist of 60 questions covering Lectures 1 to 6; **Exam 2 will be CUMULATIVE** and will consist of **80 questions covering Lectures 1 to 14** (at least 50% of questions in Exam 2 will be referred to Lectures 7-14); **Exam 3 will be CUMULATIVE** and will consist of **80 questions covering Lectures 1 to 20** (at least 50% of questions in Exam 3 will be referred to Lectures 15-20).

#### How to Succeed in this Course

First and foremost, **YOU ARE RESPONSIBLE FOR KEEPING UP WITH ALL ASSIGNMENTS, there will be NO EXCEPTIONS for late assignments**, if you fail to complete an activity on time you will miss the opportunity of collecting those valuable points, **no excuses**. Over the years I have come to the conclusion that the MOST SUCCESSFUL students are those who CONSTANTLY check the course progress and are meticulously punctual when submitting assignments.

And then, there is the rest:

**Utilize Your Resources.** Make sure that you purchase the required textbook. I follow that book to prepare my class lectures, which are the guiding thread of the present course. In addition, I will provide you with online materials and other resources such as quizzes so you can work on your own during the online segment of the course. All these materials will be available for you in Canvas.

**Participate.** This course will not be any good to you or your future if you don't take an active part on it. First, I want you to be excited and happy about the course, so you can loosen up and start participating. I know sometimes is tough to speak up in front of everybody but guess what, everybody is as frighten as you are, so relax. They key for that is to know what you're talking about, so prepare the class in advance of the in person session: read the book chapters assigned to that session, revise the lecture presentation and complete the quizzes.

**Communicate.** We will see each other in person once a week, so we will have the chance of discussing and clarifying all your questions. Don't let that opportunity go to waste, come to me and ask all questions you have. You should let me know what ideas and tools are challenging to you and how you are doing in the class. If you start this habit early in the semester, then I will be able to better tailor our activities to help you learn.

**Have Fun.** I don't want to get external distractions, prejudices or invisible barriers in our way to knowledge, so we'll get rid of those right away from the very beginning. In my experience, being relaxed, friendly, funny and close to each other is a great way to do so. I guarantee you that if you do that, you will be having tons of fun and you will be making the most of this learning process. Follow this Buddhist proverb: happy face, happy life.

#### Grading

Course Requirements	Number of Items	Weight for Each	Total Weight
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Course Requirements	Number of Items	Weight for Each	Total Weight
Syllabus Quiz - <i>Required</i>	1	N/A	N/A
iClicker Questions	20	0.5%	10%
Quizzes	20	1%	20%
Online Group Discussions	2	5%	10%
Exams	3	20%	60%
<b>Total</b>	<b>46</b>	<b>N/A</b>	<b>100%</b>

Letter	Range%	Letter	Range%	Letter	Range%
A	95 or above	B	83 - 86	C	70 - 76
A-	90 - 94	B-	80 - 82	D	60 - 69
B+	87 - 89	C+	77 - 79	F	59 or less

### Weekly Calendar

Weeks	Content Covered	Activities
Week 1 Aug 20- Aug 26	<b>PART I - Introduction to Evolution</b>  L1: Course Welcome and Introduction (Ch. 1) <ul style="list-style-type: none"> <li>L2: Evolution in Action: Lessons from HIV (Ch. 1)</li> </ul>	In-person <ul style="list-style-type: none"> <li>iClicker questions</li> <li>Lectures discussion</li> </ul> Online <ul style="list-style-type: none"> <li>Syllabus Quiz</li> <li>Quiz: Lecture 1</li> <li>Quiz: Lecture 2</li> </ul>
Week 2 Aug 27 - Sep 2  Aug 27 Add/Drop	L3: Why Evolution is True (Ch. 2)  L4: Darwin's Hard Road to Natural Selection (Ch. 3)	In-person <ul style="list-style-type: none"> <li>iClicker questions</li> <li>Lectures discussion</li> </ul>



<b>Weeks</b>	<b>Content Covered</b>	<b>Activities</b>
		<p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 3</li> <li>• Quiz: Lecture 4</li> </ul>
<p>Week 3 Sep 3- Sep 9</p> <p><i>Sep 3 Labor Day</i></p>	<p>L5: What Lies Behind Natural Selection? (Ch. 3)</p> <p>L6: Evolutionary Trees Tell Evolutionary Stories (Ch. 4)</p>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 5</li> <li>• Quiz: Lecture 6</li> </ul>
<p>Week 4 Sep 10- Sep 16</p>	<ul style="list-style-type: none"> <li>• No Lectures</li> </ul>	<p><b>In-person</b></p> <p><b>Sep 12, EXAM 1 (L1- L6)</b></p>
<p>Week 5 Sep 17- Sep 23</p>	<p><b>PART II - Mechanisms of Evolutionary Change</b></p> <p>L7: The Power of Mutation (Ch. 5)</p> <ul style="list-style-type: none"> <li>• L8: Do I Evolve or Do We Evolve? Genes in Populations, I (Ch. 6)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 7</li> <li>• Quiz: Lecture 8</li> </ul>
<p>Week 6 Sep 24- Sep 30</p>	<ul style="list-style-type: none"> <li>• L9: Ch-ch-ch-ch-changes: Genes in Populations, II (Ch. 7)</li> <li>• L10: Genetic Linkage and Evolution (Ch8)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 9</li> <li>• Quiz: Lecture 10</li> </ul>
<p>Week 7 Oct 1-</p>	<p><i>No lectures.</i></p>	<p><b>Online</b></p>

<b>Weeks</b>	<b>Content Covered</b>	<b>Activities</b>
Oct 7		<ul style="list-style-type: none"> <li>• <b>Group Discussion 1</b></li> </ul>
Week 8 Oct 8- Oct 14	<ul style="list-style-type: none"> <li>• L11: It All Comes Down to Adaptation (Ch. 10)</li> <li>• L12: Is Sex Necessary After All? (Ch. 8)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 11</li> <li>• Quiz: Lecture 12</li> </ul>
Week 9 Oct 15- Oct 21	<ul style="list-style-type: none"> <li>• L13: How Attractive Do You Need to Be? Sexual Selection (Ch. 11)</li> <li>• L14: Family Values: The Evolution of Social Behavior (Ch. 12)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 13</li> <li>• Quiz: Lecture 14</li> </ul>
Week 10 Oct 22- Oct 28	<ul style="list-style-type: none"> <li>• No Lectures</li> </ul>	<p><b>In-person</b></p> <p><b>Oct 24, EXAM 2 (L7- L14)</b></p>
Week 11 Oct 29- Nov 4	<p><b>PART III - Adaptation</b></p> <ul style="list-style-type: none"> <li>• L15: Aging and Other Life-History Characters (Ch. 13)</li> <li>• L16: Pathogens vs Humankind: Evolution of Human Health (Ch. 14)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 15</li> <li>• Quiz: Lecture 16</li> </ul>
Week 12 Nov 5 - Nov 11	<ul style="list-style-type: none"> <li>• L17: Genome Evolution: Changes in Our Instructions Manual (Ch.15)</li> <li>• L18: How Do Species Form (Ch. 16)</li> </ul>	<p>In-person</p> <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> <p>Online</p> <ul style="list-style-type: none"> <li>• Quiz: Lecture 17</li> <li>• Quiz: Lecture 18</li> </ul>

<b>Weeks</b>	<b>Content Covered</b>	<b>Activities</b>
Week 13 Nov 12- Nov 18	<b>PART IV - The History of Life</b> <ul style="list-style-type: none"> <li>• L19: Evolution Pioneers: The First Living Things (Ch17)</li> <li>• L20: Take Your Stinking Paws off Me You Damn Dirty ape! A Primer of Human Evolution (Ch20)</li> </ul>	In-person <ul style="list-style-type: none"> <li>• iClicker questions</li> <li>• Lectures discussion</li> </ul> Online <ul style="list-style-type: none"> <li>• Quiz: Lecture 19</li> <li>• Quiz: Lecture 20</li> </ul>
Week 14 Nov 19- Nov 25	No Lectures Thanksgiving	
Week 15 Nov 26- Dec 2	<i>No lectures.</i>	<b>Online</b>  <b>Group Discussion 2</b>
Week 16 Dec 3 - Dec 7	No Lectures	<b>In-person</b>  <b>Dec 5, EXAM 3 (L15- L20)</b>

**Assignments are weighted by group:**

<b>Group</b>	<b>Weight</b>
<b>iClicker Questions</b>	10%
<b>Quizzes</b>	20%
<b>Exams</b>	60%
<b>Online Discussions</b>	10%
<b>Total</b>	<b>100%</b>