

Course Syllabus

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Summary

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| Course Title | Introduction to Evolution and Scientific Inquiry |
| Course No. | BIOL01104 |
| CRN | 24281 |
| Start/End Dates | January 18, 2022- May 9, 2022 |
| Term/Module | Spring 2022 |

| Delivery Method | Number of Face-to-Face Meetings |
|-----------------|---------------------------------|
| ONLINE | 0 |

Course Description

This laboratory course is designed for freshman Biology majors and is the first of a four-course introductory sequence. This course introduces students to organismal diversity and its evolutionary origins, covers the fundamental concepts of evolutionary theory, and surveys many of the ways that organisms have become adapted to their environments. In addition, students in this course will learn some of the basic skills necessary for scientific inquiry, including the scientific method, critical thinking, experimental design, and the gathering, analysis, and presentation of quantitative data. Credit will not be given for both Introduction to Evolution and Scientific Inquiry (BIOL 01104) and Biology I (BIOL 01100). Priority for enrollment will be given to students declared as Biology majors, Biology minors, Bioinformatics majors, Computer Science ROWAN UNIVERSITY UNDERGRADUATE CATALOG 2019-2020 414 Course Descriptions majors, Biochemistry majors, Environmental Studies majors, Environmental Studies minors, or Pre-Medical concentration.

Instructor

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| Name | Daniel McArdle |
| Email | mcardled@rowan.edu |
| Phone | 856 256 4500 x53457 |
| Virtual Office Hours | Post questions and comments for the instructor to the Office Hours board (in Discussions Area). The instructor will respond within approximately 48 hours. For faster or more private correspondence, use email or phone. |

Objectives

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In this course, we will focus on fundamental biological concepts, specifically those relating to the causes and consequences of evolution, as well as the development of basic skills for biological inquiry.

Student Outcome Goals:

- Familiarity with experimental design, data collection, and basic data analyses.
- Familiarity with both the creation and interpretation of graphs and data tables.
- Comprehension of evolutionary concepts and an appreciation of their scientific basis and relevance to biological phenomena.
- Basic understanding of patterns in organismal diversity and their causes.
- Development of critical thinking skills.
- Increased ability to function as part of an effective team.

Prerequisites

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- MATH 01100 to 01499 or STAT 02100 to 02499 or MATH 03100 to 03499 with min of grade of D- or S02 min score 550 or S12 min score 570 or A02 min score 24 or ALG min score 77 or CLM/CLMR min score 40

Materials and Texts

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Required texts

- *Introduction to the Science of Evolution*, by Luke Holbrook
 - We are using the web version of the book. You can purchase an access code from the book store or through Kendall Hunt at <https://www.khpcontent.com/>.

Required Software

- If you are using a Mac, please set up the Citrix Virtual Desktop. To install Citrix on a personal computer, visit go.rowan.edu/workspace. When prompted for an email address, enter your Rowan University email address and follow the steps to complete installation.

- Other free software: Note, these programs will not work with MacOS 10.15 (Catalina) or later. Mac users should use the Virtual Desktop and download and install the Windows versions of these programs.
 - Bugsville: <http://faculty.washington.edu/herronjc/SoftwareFolder/Bugsville.html/>
 - Evodots: <http://faculty.washington.edu/herronjc/SoftwareFolder/EvoDots.html/>
 - AlleleA1: <http://faculty.washington.edu/herronjc/SoftwareFolder/AlleleA1.html/>
- We will also use the site <https://ngphylogeny.fr/>.

Additional resources will be available through Canvas.

Required technology

- Computer running Windows or MacOS. Note that some programs used for the lab do not run on Chromebooks.
- Webcam and microphone. For communicating face-to-face with the instructor or with peers.

Schedule

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The following schedule is tentative and may be changed with prior notification from the instructor.

| Weeks | Start Date | Readings, Activities & Assignments |
|-------|------------|--|
| 1 & 2 | 01/18/22 | <p>Topics:</p> <ul style="list-style-type: none"> • Scientific method and the Five Theories Model of evolution <p>Readings:</p> <ul style="list-style-type: none"> • <i>Introduction to the Science of Evolution</i> Chs. 1 and 2 <p>Lectures:</p> <ul style="list-style-type: none"> • Lecture 1 - Introduction • Lecture 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 - What is Science? <p>Discussions:</p> <ul style="list-style-type: none"> • Discussion Question 1 • Discussion Question 2 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> • Assessments 1 to 4 • Lab Quiz 1: Experiments--Good, Bad, and Ugly <p>Assignments:</p> <ul style="list-style-type: none"> • Assignment 1: Experiments: Good, Bad, and Ugly • Lab 1: Stickleback statistics lab |
| 3 & 4 | 2/1/22 | <p>Topics:</p> |

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| | | <ul style="list-style-type: none"> ● Natural selection: population growth, variation, and heritability <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 3 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 4-1, 4-2: Population Growth ● Lecture 5: Variation ● Lecture 6: Correlation ● Lecture 7: Heritability <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 3 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 5 and 6 ● Lab Quiz 2: Bugsville <p>Assignments:</p> <ul style="list-style-type: none"> ● Lab 2: Bugsville lab |
| 5 & 6 | 2/15/22 | <p>Topics:</p> <ul style="list-style-type: none"> ● Natural selection: differential reproduction, fitness, modes of selection, sexual selection, and interactions between different types of selection <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 3 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 8: Natural Selection ● Lecture 9: Modes of Selection ● Lecture 10: Sexual Selection ● Lecture 11: Interactions Between Different Types of Selection <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 4 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 7 to 11 ● Lab Quiz 3: Evodots <p>Assignments:</p> <ul style="list-style-type: none"> ● Lab 3: Evodots lab |

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| <p>7 & 8</p> | <p>3/1/22</p> | <p>Topics:</p> <ul style="list-style-type: none"> ● Evolution as changes in allele frequencies: the Hardy-Weinberg equilibrium <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 4 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 12-1, 12-2, 12-3, 12-4: Populations Genetics <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 5 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 12 to 15 ● Lab Quiz 4: AlleleA1--Introduction and Natural Selection ● Lecture Exam #1 <p>Assignments:</p> <ul style="list-style-type: none"> ● Lab 4: AlleleA1: Intro and Natural Selection lab |
| <p>9 & 10</p> | <p>3/22/22</p> | <p>Topics:</p> <ul style="list-style-type: none"> ● Genetic drift, migration, and summarizing causes and consequences of changes in allele frequencies <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 4 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 13-1, 13-2: Genetic Drift and Tasmanian Devils ● Lecture 14-1, 14-2, 14-3: Migration and Causes and Consequences <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 6 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 16 to 18 ● Lab Quizzes 5 and 6: AlleleA1--Drift; AlleleA1--Migration <p>Assignments:</p> <ul style="list-style-type: none"> ● Lab 5: AlleleA1: Drift lab ● Lab 6: AlleleA1: Migration lab |
| <p>11 & 12</p> | <p>4/5/22</p> | <p>Topics:</p> <ul style="list-style-type: none"> ● Phylogenetics, homology, and classification |

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| | | <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 5 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 15-1, 15-2, 15-3, 15-4, 15-5: Phylogenetics ● Lecture 16: Homology ● Lecture 17: Classification <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 7 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 19 to 23 ● Lab Quiz 7: Primate Mitochondrial DNA ● Lecture Exam #2 <p>Assignments:</p> <ul style="list-style-type: none"> ● Lab 7: Primate Mitochondrial DNA lab |
| 13 & 14 | 4/19/22 | <p>Topics:</p> <ul style="list-style-type: none"> ● Species, speciation, biogeography, temporal patterns in evolution, and the evidence for the origin of life <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Chs. 6, 7, and 8 <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 18-1, 18-2: Speciation ● Lecture 19-1, 19-2: Biogeography ● Lecture 20: Fossils and Geologic Time ● Lecture 21: Origin of Life <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 8 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 24 to 26 ● Lecture Exam #3 |
| 15 | 5/3/22 | <p>Topics:</p> <ul style="list-style-type: none"> ● History of life and random mutations <p>Readings:</p> <ul style="list-style-type: none"> ● <i>Introduction to the Science of Evolution</i> Ch. 9 |

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| | | <p>Lectures:</p> <ul style="list-style-type: none"> ● Lecture 22: Diversity of Multicellular Organisms ● Lecture 23: Primates and Human Origins ● Lecture 24: Random Mutations <p>Discussions:</p> <ul style="list-style-type: none"> ● Discussion Question 9 <p>Quizzes/Exams:</p> <ul style="list-style-type: none"> ● Assessments 27 to 30 ● Final Exam <p>Assignments:</p> <ul style="list-style-type: none"> ● Biodiversity assignment |
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Assignment Outline

Assignments

Assignments include labs and other work that you will submit on Canvas. Instructions for labs and other assignments are given in handouts on Canvas. All labs are in a digital format to allow you to complete them without the need for lab materials. Some labs require you to download free software; the handouts will provide links to the websites where you can download the software. For some labs, you may work with other students in groups to collect the data, but each student is responsible for submitting their own completed assignments as individuals. While you might be sharing data, your analyses, your graphs, and your answers to questions must be your own.

Discussion Questions

To help you understand the lecture material, you will be given some information to address a discussion question. Post your responses on the appropriate Discussion board on Canvas. You will also be able to see responses from your classmates. After the deadline, a key will be posted that you can use to evaluate your answers.

Quiz and Exam Policy

There will be 30 fully online quizzes, 8 fully online lab quizzes, and 4 fully online exams, including the final, in this course. Detailed information is provided in the week in which each exam is administered. Exams and quizzes must be submitted by their posted due date.

During all quizzes and examinations, students are permitted to use the following resources:

- Textbook(s) by specific title

- Handwritten or typed notes
- Notes on your computer
- Internet access or web sites of any kind other than the Canvas LMS system
- **No** use of mobile phones or other devices other than the device on which you will take the exam

IMPORTANT REMINDER: Each student is expected to work on this **individually** and within the confines of the University Academic Honesty Policy (see <http://www.rowanonline.com> for University Policies and details).

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Grading

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Final Grade Breakdown

| Grading Criteria/Assignment | Points/Percentage |
|-----------------------------------|-------------------|
| 3 lecture exams (100 points each) | 300 |
| Final exam | 100 |
| Online assessments (1 point each) | 30 |
| Lab quizzes | 40 |
| Other assignments | 15 |
| Preparation and participation | 15 |
| Total | 500 |

Grading Scale

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|-----------|-----------|-----------|--------------|
| A | 93 and Up | C | 74 – 76 |
| A- | 90 – 92 | C- | 70 – 73 |
| B+ | 87 – 89 | D+ | 67 – 69 |
| B | 84 – 86 | D | 64 – 66 |
| B- | 80 – 83 | D- | 60 – 63 |
| C+ | 77 - 79 | F | 59 and Below |

Rowan Global Standard Policies (addendum)

The current version of Rowan Global Standard Policies, which are an addendum to this syllabus, are found in the [Rowan Global Standard Policies Document](#).

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