BIOLOGY 101- EVOLUTION, ECOLOGY, AND BIODIVERSITY

Lecture/Laboratory Section C Fall 2022

Lecture: Tuesday/Thursday 8:30-9:50 am, Stager 110

Lab: Tuesday 12:45-4:35 pm, LSP 210

**Instructor**: Mark Olson

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**Office:** LSP 232A

**Office Hours:** Wednesday 10:00-11:30 am or by appointment

**Course Objectives**

Evolution and ecology are interesting and important topics that have widespread implications for our everyday lives. In this course, we will use both theory and case studies to examine fundamental evolutionary and ecological principles. Specifically, we will:

1. Learn the principles of Mendelian inheritance and how they relate to cellular reproduction
2. Explore the process of natural selection, beginning with Darwin’s theory of evolution
3. Investigate macroevolution and the diversity of life on earth
4. Examine the ecological processes that influence populations, communities, and ecosystems, and how human activities are affecting these processes

**Recommended Texts**

*Scitable* by Nature Publishing Group

Heredity: <http://www.nature.com/scitable/topic/genetics-5>

Evolution and Ecology: <https://www.nature.com/scitable/knowledge/ecology-102/>

*Biology* 2e. MA Clark, M Douglas, and J Choi, editors. Openstax. 2018.

<https://openstax.org/books/biology-2e/pages/1-introduction>.  
See terms and conditions here: <https://creativecommons.org/licenses/by/4.0/>

**Grading**

Your final grade in Biology 101 will be based on a maximum score of 600 points. Of that total, the lecture will account for 400 points and the laboratory portion will account for 200 points. The points allocated to lectures will be distributed as follows:

|  |  |  |
| --- | --- | --- |
| **Assessment** | **Points** | **Due Date** |
| Exam #1 (Heredity and Evolution) | 90 | Oct. 20 |
| Exam #2 (Phylogenetics and Diversity) | 70 | Nov. 15 |
| Final Exam (Ecology) | 120 | TBA (Exam Week) |
| Assignment 1: Genetics Problems | 40 | Oct. 4 |
| Assignment 2: Extinction | 40 | Nov. 3 |
| Assignment 3: Sea Turtle Conservation | 40 | Dec. 1 |
| **Total** | **400** |  |

**Exams**

There will be a total of three exams in this course. The first exam will cover principles of heredity and microevolution. The second exam will cover phylogenetics and the diversity of life. The final exam will focus on ecology, but some questions will integrate new material with evolutionary concepts presented earlier in the course. All exams will be short answer format. Practice problems (but not answers) will be provided before exams to provide examples and help reinforce important concepts in ecology and evolution.

**Assignments**

We will have 3 assignments associated with topics covered in class. The format of these assignments will vary depending on the topic. The first assignment will be a set of genetics problems. The second assignment will explore extinction, both in terms of individual species and mass extinction events. The third assignment will investigate demographics and conservation of endangered sea turtles. These assignments will be due by the start of class on the due date. Without an excused absence, any late assignment will automatically lose 10% per 24 hour delay, and result in a score of 0 after one week. However, each student has one **automatic extension** on an assignment that delays the due date until the start of the next class. These extensions do not need to be arranged beforehand. Excused absences (i.e., approved short term leaves or arrangements made with the instructor) will not count towards this automatic extension.

**Lab**

Points allocated to lab will be distributed as follows:

|  |  |  |
| --- | --- | --- |
| **Lab Assignment** | **Points** | **Due Date** |
| Graph and interpret seed shadow data | 5 | Sep. 13 |
| Graph and interpret trade-off data | 5 | Sep. 27 |
| Trade-off paper reading questions | 20 | Oct. 04 |
| Methods and Results of Samara Study | 40 | Oct. 18 |
| Graph and interpret Millport data | 5 | Oct. 25 |
| Vertebrate Phylogeny | 5 | Oct. 25 |
| Isopod experiment proposal | 5 | Nov. 08 |
| Isopod paper reading questions | 20 | Nov. 29 |
| Isopod Lab Report | 75 | Dec. 10 |
| Contributions to lab | 20 | - |
| **Total** | **200** |  |

The laboratory experience is a key component in Biology 101. In addition to demonstrating concepts covered in lectures, gain experience in experimental design, data analysis and interpretation, and written communication in the format of a scientific paper. Labs are organized around two multi-week modules. The first module will examine seed dispersal in maples. The second module will focus on the ecology of aquatic isopods. Instead of having a traditional lab manual, material for each lab will be available on Canvas. Some of this material will need to be read before lab so that you are prepared for the day’s activities.

In both modules, we will have labs with outdoor field work. As a reminder, washing and/or sanitizing hands at the conclusion of the field work and storing food/drink away from field samples are important safety practices. We will talk about safety in more detail prior to heading out in the field.

The teaching assistant for lab will be Jayda Cole. Jayda will be there to assist with logistics and answer questions about lab.

The laboratory grade will be based on a set of small activities, two sets of reading questions, and two lab reports. The first lab report will focus on the methods and results. The second lab report will be by complete, with introduction, methods, results, and discussion sections. There will also be a 20 point grade that reflects your contribution to lab. Students who are engaged in lab, actively participate in data collection and discussion, and work to solve problems that come up will be rewarded with a high grade for their contributions.

**Policies for Missed Labs and Exams**

Attendance in labs is mandatory. An unexcused absence from lab will result in an automatic lab contribution grade of 0 (with additional 20 point penalties for additional unexcused absences). Valid excuses for a missed lab must come from your College House Dean. Similarly, exams must be taken on the assigned date without an excused absence from you House Dean. Please see <http://www.fandm.edu/college-life-manual/student-rights-freedoms-and-responsibilities/health-leaves-and-policies> for more information about excused absences.

**Academic Dishonesty**

Cases of academic dishonesty (e.g. plagiarism, cheating) represent serious breaches in the code of student conduct. Punishment will be determined after consultation with the Dean of the College or designee, and can range from a failing grade on an assignment, the course, or academic suspension. In cases where two people turn in identical work, be advised that both parties will be punished (even if one person worked independently and then allowed the other to copy their work after the fact). Unless specifically stated, work is to be done independently and any questions should be directed to the instructor rather than a fellow student. The College’s official statement on academic honesty can be found at <https://www.fandm.edu/catalog/academic-honesty>. Please read this statement and understand your obligations of personal and academic integrity.

**Lecture Outlines and PowerPoint Presentations**

Outlines of each lecture, including brief summaries of important terms and concepts, will be posted online prior to each lecture as word documents. In addition, PowerPoint presentations will be posted (usually just) before each lecture. Please note that these materials are not a substitute for attending lecture. Indeed, many of the slides won’t make sense unless you first saw them in class.

**Mandated Reporters Policy**

As a mandated reporter at F&M, I have a duty to report any instances of sexual harassment, discrimination, dating violence, domestic violence, stalking, or sexual assault involving a student about which I am aware. This action is vital for supporting victims and preventing subsequent acts of sexual misconduct on and off campus. More information can be found at <https://www.fandm.edu/college-policies/background-checks-and-protection-of-minors/mandated-reporters-policy>.

**Communication**

Announcements will be made at the start of lectures and labs. Additional announcements may be made on Canvas. Therefore, you should check Canvas and e-mail regularly. E-mail is also an excellent way to communicate with me (to ask questions or make appointments).

**Additional Resources**

Any questions you have about material or assignments in either the lecture or laboratory portions of the course should be directed to me. If you are not able to meet during regular office hours, we can schedule a meeting at a mutually convenient time (either in person or on zoom). I also welcome questions at the end of lecture/lab (although I encourage questions during class as many people often have the same question).

Assistance is also available through the Quantitative and Science Center (Q&SC) in the Science Library (<http://www.fandm.edu/academics/quantitative-science-center>). The Q&SC supports Biology 101 students in two ways. First, there are tutors available to help with questions about material (although they are not available to help with assignments). In addition, the Q&SC offers quantitative extra study time (QuEST) sessions. These sessions will be scheduled at regular hours to provide opportunities to review material covered in the course. Each session will be organized by Emma Stronge. In consultation with me, Emma will organize activities to facilitate your learning of the material. I strongly encourage you to take advantage of this learning resource on a regular basis (and not just before exams).

**TENTATIVE LECTURE SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Day** | **Class** | **Topic** | **Assignment** |
| 1-Sep | Th | 1 | Overview |  |
| 6-Sep | Tu | 2 | Evolutionary Thought |  |
| 9-Aug | Th | 3 | *Evolution in Action Discussion* |  |
| 13-Sep | Tu | 4 | Mitosis and Meiosis |  |
| 15-Sep | Th | 5 | Mendelian I |  |
| 20-Sep | Tu | 6 | Mendelian II |  |
| 22-Sep | Th | 7 | *Genetics of Human Diseases Discussion* |  |
| 27-Sep | Tu | 8 | Population Genetics |  |
| 29-Sep | Th | 9 | Natural Selection |  |
| 4-Oct | Tu | 10 | Trade-offs | Genetics Problems |
| 6-Oct | Th | - | No Class |  |
| 11-Oct | Tu | - | Fall Break |  |
| 13-Oct | Th | 11 | Speciation |  |
| 18-Oct | Tu | 12 | Phylogenetics |  |
| 20-Oct | Th | 13 | **Exam 1** |  |
| 25-Oct | Tu | 14 | Origins and Prokaryotes |  |
| 27-Oct | Th | 15 | Evolution of Eukaryotes; Fungi |  |
| 1-Nov | Tu | 16 | Plants and the colonization of land |  |
| 3-Nov | Th | 17 | Invertebrates |  |
| 8-Nov | Tu | 18 | Vertebrates | Extinction |
| 10-Nov | Th | 19 | Behavioral Ecology |  |
| 15-Nov | Tu | 20 | **Exam 2** |  |
| 17-Nov | Th | 21 | Population Ecology |  |
| 22-Nov | Tu | 22 | Interactions |  |
| 24-Nov | Th | - | Thanksgiving Break |  |
| 29-Nov | Tu | 23 | *Isle Royale Discussion* |  |
| 1-Dec | Th | 24 | Community-Level Processes | Sea Turtle Conservation |
| 6-Dec | Tu | 25 | Ecosystem Ecology |  |
| 8-Dec | Th | 26 | Anthropocene |  |
| TBA | - | - | **Final Exam (During Finals)** |  |