Evolution, Form, and Function of Organisms
BIOL 112 – Fall, 2022
MW 3:25-4:40pm, RITA 154

Instructor: Lorenzo Menzel, Ph.D.
e-mail: menzell@cofc.edu
Office: RITA 216
Office hours: W2-3pm, R3-4pm, and by appointment

Textbook: Openstax: Biology 2e. This FREE Open Educational Resource (OER). There are numerous options for students to access this textbook (online, PDF, Kindle, print). The CofC Bookstore is selling/renting print versions of this textbook (cost ranges from $21-$45) for students who prefer a physical textbook. There are, however, advantages to using an electronic free version of the text, including embedded clickable links to online external content.

Course Description: This is a science majors’ course, which will provide a background for understanding and evaluating contemporary topics in biology and societal/environmental issues. The course emphasizes physiology and anatomy of organisms, ecological and evolutionary concepts, biodiversity, and conservation biology. An understanding of methods, history, and dynamic nature of science will also be emphasized. A case study based approach will be used to learn much of the material in this course. We will apply biological concepts to real-life problems.

Prerequisites/Corequisites: BIOL 111 and BIOL 111L are prerequisites for BIOL 112. BIOL 112L is a corequisite. Be sure to purchase the BIOL 112 Lab Manual from the bookstore prior to your first lab.

Learning Outcomes: Upon completing this course, students will demonstrate basic knowledge and understanding in each of the following content areas as is covered in class, as well as demonstrate the ability to apply this knowledge to real-life situations:
● Evolutionary Processes
● Origins of Life
● Biodiversity
  ▪ Viruses, Bacteria, and Archaea
  ▪ “Protist” Lineages
  ▪ Plants
  ▪ Fungi
  ▪ Animals
● Principles of Ecology

Contact: Students are encouraged to communicate with each other and myself using either the Discussion Board or in-person throughout the semester. While the Discussion Board and email are available 24 hours a day, 7 days a week, please allow me at least 24 hours to respond to questions. Personal questions should not be asked via the Discussion Board, but emailed instead – see above for my email address.

Office Hours: I will be available in person immediately before class from 2-3pm W, after class from 3-4pm R, and by appointment. I will try to accommodate requests for additional office hours.
**OAKS:** OAKS is the learning management system that is used by the College of Charleston. It is imperative that you learn to use OAKS, as OAKS will be used in all of your classes as a way to provide material, gives quizzes or tests, as a way to collect assignments, as a way to have class discussions, and as a way to communicate grades. I will be using OAKS extensively for this course: to provide the syllabus, class materials, worksheets and dropboxes, and record your grades for each assignment in the Gradebook. You can log in to OAKS through MyCharleston, and there are many tutorials if you have trouble familiarizing yourself on your own. Here is a link to the OAKS support page: http://blogs.cofc.edu/oaks/students/getting-started/

**Expectations:**

1) Students should make all reasonable attempts to attend lectures – the book will be used for supplemental materials.

2) In order to be successful in this class you should expect to spend 6+ hours outside of lecture times for class reading and studying.

3) To make this class interactive and engaging requires you to participate by having read the assignments and by answering or asking questions.

4) Do not procrastinate on the readings – there is much to cover and you will quickly fall behind.

5) Do ask questions, do ask for help, and do use our SI assistant (TBA), see below for more info.

**GENERAL EDUCATION LEARNING OUTCOMES** for *Introduction to Cell and Molecular Biology/Evolution, Form, and Function of Organisms (BIOL 111/L and BIOL 112/L)*

**Learning Outcomes:** This general education science sequence provides a background for understanding and evaluating contemporary topics in biology. Students develop a foundational understanding of core concepts to use and on which to expand in upper level courses. They also develop the critical competencies that form the bases for the practice of science and use of scientific knowledge.

**Core Concepts:** This 2-semester course sequence in general biology addresses fundamental principles in biology to prepare students for sophomore and upper level courses in biology:

**STRUCTURE AND FUNCTION:** Basic units of structure define the function of all living things. Structural complexity, together with the information it provides, is built upon combinations of subunits that drive increasingly diverse and dynamic physiological responses in living organisms. Fundamental structural units and molecular and cellular processes are conserved through evolution and yield the extraordinary diversity of biological systems seen today.

**PATHWAYS AND TRANSFORMATIONS OF ENERGY AND MATTER:** Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamic and will be explored to understand how living systems operate, how they maintain orderly structure and function, and how physical and chemical processes underlie processes at the cellular level (i.e. metabolic pathways, membrane dynamics), organismal level (i.e. homeostasis) and ecosystem level (i.e. nutrient cycling).
INFORMATION FLOW, EXCHANGE, AND STORAGE: The growth and behavior of organisms are activated through the expression of genetic information at different levels of biological organization and depend on specific interactions and information transfer.

EVOLUTION: The diversity of life evolved over time by processes of mutation, selection, and genetic change. The theory of evolution by natural selection allows scientists to understand patterns, processes, and relationships that characterize the diversity of life.

SYSTEMS: Living systems are interconnected and interacting and biological phenomena are the result of emergent properties at all levels of organization, from molecules to ecosystems to social systems. The course will explore the dynamic interactions of components at one level of biological organization to the functional properties that emerge at higher organizational levels.

Biology 112 & 112L
- Human Inheritance
- Population Genetics
- The development of evolutionary thinking
- Basic evolutionary processes
- Comparative plant form & function
- Comparative animal form & function

Core Competencies:

Nature of Scientific Knowledge
Understand the intellectual standards used by scientists to establish the validity of knowledge, evidence, and decisions about hypothesis & theory acceptance. These standards include:

1) Science relies on external and naturalistic observations, and not internal convictions;
2) Scientific knowledge is based on the testing of hypotheses and theories, which are under constant scrutiny and subject to revision based on new observations;
3) The validity of scientifically generated knowledge is established by the community of scientists through peer review and open publication of work.

Understand that new ideas in science are limited by the context in which they are conceived; are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly, through contributions from many investigators.

Understand that science operates in a world defined by the laws of chemistry and physics.

Understand the differences and relationships among scientific theories, hypotheses, facts, laws, & opinions.

Understand the differences between science and technology, but also their interrelations.

Understand the dynamic (tentative) nature of science.

Scientific Methods of Discovery

1Understand the methods scientists use to learn about the natural world (observing; questioning;
formulating testable deductive hypotheses; controlled experimentation when possible; observing a wide range of natural occurrences and discerning (inducing) patterns).

Apply physical/natural principles to analyze and solve problems.

**Develop a Scientific Attitude**

- Develop habits of mind that foster interdisciplinary and integrative thinking (within biology; between biology and other sciences; between science and other disciplines).
- Develop an appreciation for the scientific attitude - a basic curiosity about nature and how it works.

**Develop scientific analysis and communication skills**

Develop quantitative reasoning skills (quantitatively expressing the results of scientific investigations, or patterns in nature and using knowledge of biological concepts to explain quantitatively-expressed data or patterns).

Understand the probabilistic nature of science and the use/application of inferential statistics to test hypotheses.

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1 This learning goal will be measured as part of the general education assessment. The specific learning outcome to be measured is: Students can apply physical/natural principles to analyze and solve problems.

**COVID-19 Absence Policy:** Students who miss lecture or lab activities/assessments for illness, medical emergency, family emergency/tragedy should contact both the lecture and lab instructor to report the absence and coordinate accommodation for access to online materials or assessment. Failure to notify your lecture and lab instructors of your absence in a timely manner may result in no accommodations; i.e. zero points earned on those missed assessments. Failure to complete assessments on the (re)scheduled dates/times will result in zero points earned for that assessment(s), similar to an unexcused absence from lab or a missed quiz or exam in lecture.

Please adhere to CDC and SC DHEC Guidelines for quarantine and isolation due to COVID-19 close-contact exposure and/or infection. For close-contact exposure to somebody infected with COVID, vaccinated students may continue attending lecture and lab **while wearing a mask** (regardless of the status of the CofC mask mandate). Unvaccinated students who are exposed to somebody infected with COVID need to quarantine at home for 14 days, starting from the last date of exposure to the infected individual (at any time during their 10-day isolation period). Quarantine may be shortened to 10 days if no symptoms are experienced, or 7 days if no symptoms are experienced and a negative COVID result from a test completed on 5-7 days following last exposure. **For vaccinated and unvaccinated individuals who have been exposed to COVID, it is advised that you monitor for symptoms daily, and obtain COVID testing 5-7 days after last exposure, even if asymptomatic.**

Any student who tests positive for COVID needs to isolate for 10 days following the onset of symptoms, or 10 days following a positive-test result if they are asymptomatic. If, following 10 days of isolation, you are still presenting a fever and/or require medicine to reduce fever, please continue to isolate.

**For unvaccinated students who need to quarantine at home for 14 days due to COVID exposure, or students who need to isolate at home for 10 days due to COVID infection, please notify your lecture and lab instructors to inform them of your quarantine/isolation status.** Lecture materials are available
on OAKS and lectures are streamed on Zoom. Your lab instructor will need to coordinate access to online materials and assessments during your quarantine period, and you are expected to complete assessments online in a synchronous fashion. If any medical complication arises during COVID infection that prevents your synchronous participation in lecture or lab activities and assessments, please communicate those issues to your lecture and lab instructors as soon as possible in order to modify accommodations. Failure to complete assessments on the scheduled dates/times will result in zero points earned for that assessment(s), similar to an unexcused absence from lab. Failure to notify your lecture and lab instructors of your absence and/or medical hardship in a timely manner may result in no accommodations; i.e. zero points earned on those missed assessments.

Your lecture and lab instructors reserve the right to cancel in-person instruction and move class activities and/or assessments completely online if there is a concerning incidence of COVID infections and/or exposures among students in the class. This includes, but is not limited to: one or more students absent for an extended period of time due to COVID-19 (quarantine or isolation); single incidents of infection exposing multiple unvaccinated students and subsequent quarantine of those students; multiple incidents of infection (either simultaneously or within a short timeframe) exposing multiple vaccinated or unvaccinated students; large-scale incidents of infection on campus (such as associated with large lecture sizes, academic or campus events, dormitories, cafeterias, etc) that present a reasonable, broad risk of exposure to the CofC student body. For further information see: https://cofc.edu/back-on-the-bricks/

Timely notification of COVID exposure or infection impacts the ability of your instructors to provide accommodations for course materials and assessments, and may further impact the health of your fellow students and instructors, both in this course and across CofC.

**Your responsibilities:**

- If you have developed ANY of the following: respiratory symptoms, fever, loss of taste/smell or other symptoms associated with COVID; please do not attend class or lab in-person. Notify your instructors as soon as possible and seek COVID testing and/or medical consultation.
- If you have had close-contact with an individual who has tested positive for COVID, please follow the CDC/SC DHEC quarantine guidelines as summarized above. If you are unvaccinated and need to quarantine at home, notify your instructors as soon as possible.
- If you have tested positive for COVID, isolate at home for the 10-day period as summarized above. Do NOT attend lecture and/or lab during this 10-day period. Notify your instructors as soon as possible.

Please consider the following: if you are unvaccinated, the COVID-19 vaccine significantly reduces your chances of COVID infection, and reduces your chances of severe COVID-related symptoms or complications if infected. The current resurgence of COVID infections and hospitalizations due to the COVID delta variant is occurring in predominantly unvaccinated individuals (>90% of hospitalizations).

Furthermore, consider the risk of infection associated with attending indoor events where social distancing cannot be maintained and/or mask-use is not widespread. It is our hope that you remain healthy throughout the semester, and we will attempt to provide reasonable accommodations if quarantine or isolation is necessary. However, if repeated and/or extended accommodations are requested, you may be referred for a medical withdrawal from the course.
Mental & Physical Wellbeing: At the college, we take every students’ mental and physical wellbeing seriously. If you find yourself experiencing physical illnesses, please reach out to student health services (843.953.5520). And if you find yourself experiencing any mental health challenges (for example, anxiety, depression, stressful life events, sleep deprivation, and/or loneliness/homesickness) please consider contacting either the Counseling Center (professional counselors at http://counseling.cofc.edu or 843.953.5640 3rd Robert Scott Small Building) or the Students 4 Support (certified volunteers through texting "4support" to 839863, visit http://counseling.cofc.edu/cct/index.php, or meet with them in person 3rd Floor Stern Center). These services are there for you to help you cope with difficulties you may be experiencing and to maintain optimal physical and mental health.

Food & Housing Resources: Many CofC students report experiencing food and housing insecurity. If you are facing challenges in securing food (such as not being able to afford groceries or get sufficient food to eat every day) and housing (such as lacking a safe and stable place to live), please contact the Dean of Students for support (http://studentaffairs.cofc.edu/about/salt.php). Also, you can go to http://studentaffairs.cofc.edu/student-food-housing-insecurity/index.php to learn about food and housing assistance that is available to you. In addition, there are several resources on and off campus to help. You can visit the Cougar Pantry in the Stern Center (2nd floor), a student-run food pantry that provides dry-goods and hygiene products at no charge to any student in need. Please also consider reaching out to Professor ABC if you are comfortable in doing so.

Supplemental Instruction: Biology 111 sections have excellent resources in with SI Leaders. Supplemental Instruction is a collaborative learning approach lead by a trained peer to coach you in biology, chemistry, and other courses where studying skills are critical to your success. Supplemental Instruction is not remedial and is available free for everyone. I strongly encourage you to use this resource https://csl.cofc.edu/supplemental-instruction/

Extra help: The Center for Student Learning (CSL) has a walk-in science tutoring lab. You may use the walk-in lab during the scheduled times of operation which can be found at http://csl.cofc.edu/labs/

Inclement Weather: It has become tradition at the College of Charleston to cancel classes in observance of tropical storms and/or hurricanes that might make landfall within the neighboring coastal states. Please be considerate to the challenges faced by the Department and College to reschedule the missed course meeting times. If lectures are cancelled due to inclement weather, we reserve the option to reschedule missed lectures, modify the course content, or require students to learn course material outside the scheduled lecture times. Should this occur, a revised syllabus and schedule for the lectures will be distributed to all students.

Religious Accommodation for Students: The College of Charleston community is enriched by students of many faiths that have various religious observances, practices, and beliefs. We value student rights and freedoms, including the right of each student to adhere to individual systems of religion. The College prohibits discrimination against any student because of such student’s religious belief or any absence thereof.

The College acknowledges that religious practices differ from tradition to tradition and that the demands of religious observances in some traditions may cause conflicts with student schedules. In affirming this
diversity, like many other colleges and universities, the College supports the concept of “reasonable accommodation for religious observance” in regard to class attendance, and the scheduling of examinations and other academic work requirements, unless the accommodation would create an undue hardship on the College. Faculty are required, as part of their responsibility to students and the College, to ascribe to this policy and to ensure its fair and full implementation.

The accommodation request imposes responsibilities and obligations on both the individual requesting the accommodation and the College. Faculty members are expected to reasonably accommodate individual religious practices. Examples of reasonable accommodations for student absences might include: rescheduling of an exam or giving a make-up exam for the student in question; altering the time of a student’s presentation; allowing extra-credit assignments to substitute for missed class work or arranging for an increased flexibility in assignment dates. Regardless of any accommodation that may be granted, students are responsible for satisfying all academic objectives, requirements and prerequisites as defined by the instructor and by the College.

Student Conduct:

a. There is to be no talking during the instruction period. If you have a question, please raise your hand prior to asking the question. While answering a student’s question, please remain quiet so that the student and other class members can hear the question and the reply.

b. There is to be no talking during quizzes or exams. If you have a question, please raise your hand and remain quiet until the instructor can come to you.

c. Please turn off all cellular phones before entering the classroom. If you use your cell-phone during class you will be asked to leave the room.

d. Remember you are attending classes to learn and apply the material/principles covered in the lecture. Reading newspapers/magazine, sleeping, or distracting the instructor or the other students will not be tolerated.

e. Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged. Center for Disability Services/SNAP

The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me one week before accommodation is needed.

This College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services/SNAP, 843.953.1431 or me so that such accommodation may be arranged.

f. No College of Charleston employee or student should be subject to unwelcome verbal or physical conduct. It is expected that students, faculty and staff will treat one another with respect. Individuals who violate this policy are subject to disciplinary action up to, and including, termination and/or
expulsion from the College and the possibility of civil and criminal prosecution.

g. Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student’s actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed by both the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal), or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration—working together without permission—is a form of cheating. No collaboration during the completion of the quizzes, assignments, or exams is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information stored on a cell phone), copying from others’ exams, fabricating data, and giving unauthorized assistance.

Students can find the complete Honor Code and all related processes in the Student Handbook at http://www.cofc.edu/generaldocuments/handbook.pdf

Attendance: Your grade in this course relies heavily on your participation in class. Excessive absences are guaranteed to affect your grade. Attendance will not be taken in lecture; however, no make-ups will be allowed for missed assignments or quizzes. If you are late to class and miss the quiz, you will not be allowed to take it. Therefore, regular attendance is highly recommended. It is the student’s responsibility to find out what was missed in case of unavoidable absence. If you must miss a class due to illness, you may be allowed to complete the missed work or an alternate assignment, but you must obtain an absence memo from the Office of the Associate Dean of Students at 67 George Street. It must be a documented absence to be excused; you must talk to me about it, and it is at my discretion. You may access the required forms at the following address: http://studentaffairs.cofc.edu/services/absence.php

MISSING 4-5 CLASSES IN A ROW WILL RESULT IN A “WA” GRADE (WITHDRAWN FOR EXCESSIVE ABSENCE) AT MIDTERM AND/OR FINAL GRADE. A FINAL “WA” GRADE IS CALCULATED AS AN “F” IN YOUR GPA. It is the student’s responsibility to contact me immediately with any issues. If you have extenuating circumstances, then please speak to me on an individual basis.

GRADED ITEMS
Worksheets: We will be practicing the concepts covered in class with some example worksheets. You should complete these as best you can, on your own, outside of class. I will set aside some time to answer questions and help you through these worksheets, if needed. Each worksheet is worth 10 points.
**Weekly Quizzes:** We will have short quizzes at the beginning of each week (due Mondays) administered via OAKS. These quizzes will be multiple choice, or single word answers. Each quiz is worth 10 points.

**Exams:** We will take three hour-long exams worth 200 points each during this course. Exam questions will consist of a mix of multiple choice, short answer, or draw-out-your-answer questions. Please read the directions for the questions slowly and thoroughly before you answer.

**Grading Scale:** Generally, I use a Bell curve to adjust grades for student performances on exams. This means that the median grade usually will become a ‘C’ and the range for ‘C’s is a standard deviation above and below the median score. ‘B’ grades are generally two standard deviations above the median score, while three standard deviations above the median score are usually required for an ‘A’. Similarly, ‘D’ grades are scores generally two standard deviations below the median score. The number of ‘A’ and ‘B’ grades awarded are not limited, should the entire class score well I will revert to a ‘straight grading scale’.

A sample of a Bell curve grade scheme is:

![Sample grade curve](image)

Sample ‘Straight grading scale’ is:

- **A** 93-100 %
  - **B+** 87-89 %
  - **A-** 90-92 %
  - **B** 83-86 %
  - **B-** 80-82 %

- **C+** 77-79 %
  - **D+** 67-69 %
  - **C** 73-76 %
  - **D** 63-66 %
  - **C-** 70-72 %
  - **D-** 60-62 %

- **F** 0 –59 %
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<tr>
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<th>Dates</th>
<th>Topic</th>
<th>Read</th>
<th>Notes</th>
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<tr>
<td>1</td>
<td>Tue Aug 23</td>
<td><strong>Classes begin</strong></td>
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<td>Wed Aug 24</td>
<td>Review</td>
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<td>Mon Aug 29</td>
<td>Descent with Modification</td>
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<td>Wed Aug 31</td>
<td>Descent with Modification, Evolution of Populations</td>
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<td>Mon Sept 5</td>
<td>No Class</td>
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<td>Tue Sept 6</td>
<td><strong>Attendance Verification Starts</strong></td>
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<td>Wed Sept 7</td>
<td>Evolution of Populations</td>
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<td>3</td>
<td>Mon Sept 12</td>
<td>Origin of Species</td>
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<td>Tue Sept 13</td>
<td><strong>Attendance Verification Ends</strong></td>
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<td></td>
<td>Wed Sept 14</td>
<td>Origin of Species, Tree of Life</td>
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<td>Mon Sept 19</td>
<td>History of Life, Tree of Life</td>
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<td>Wed Sept 21</td>
<td><strong>Exam I</strong></td>
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<td>Thu Sept 22</td>
<td><strong>Withdrawal Deadline</strong></td>
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<td>Mon Sept 26</td>
<td>Bacteria and Archaea</td>
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<td>Wed Sept 28</td>
<td>Protists, Fungi</td>
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<td>Plants I – Colonization of Land</td>
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<td>Plants I &amp; II – Evolution of Seeds</td>
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<td><strong>Mid-term Grades Due</strong></td>
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<td>Overview of Animal Diversity, Intro Invertebrates</td>
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<td>Intro to Invertebrates</td>
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<td><strong>Exam II</strong></td>
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<td>Ecology and Biosphere</td>
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<td>Ecology and Biosphere, Population Ecology</td>
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<td>Community Ecology</td>
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<td>Ecosystems</td>
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<td>Conservation Biology and Biodiversity</td>
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