

BIOLOGICAL SCIENCES 150, SECTION 201 – Lecture will be online this Fall
FOUNDATIONS OF BIOLOGICAL SCIENCES I, Fall 2021
LECTURES MEET ONLINE VIA CANVAS, MWF 12:30-01:20 PM
LABORATORY MEETS IN PERSON IN LAPHAM S284

Foundations I (204-150) and Foundations II (204-152) form the introductory biology sequence for majors. Both courses are *required* for the Biological Sciences major and should be taken as soon as possible in your undergraduate career. Note that both 150 and 152 are prerequisites to many of our advanced courses. Credit for advanced courses is *not* possible without *first* taking both 150 and 152.

In light of the ongoing **Covid-19** pandemic crisis the lecture for this course is being held fully online. However all labs will be in person. Please click on the web link below for UWM's policies for courses this fall. <https://uwm.edu/cetl/wp-content/uploads/sites/128/2021/08/Syllabus-COVID-Statement.pdf>

INSTRUCTORS:

Dr. Selvakumar Ramakrishnan,

Office: Lapham N517,

Office Hours: Thurs 12:00 – 1:00 PM or by appointment via MS Teams (Please contact by email)

E-mail: selvam@uwm.edu

Dr. Jeffrey D Karron

Office: Lapham N585 (please contact via email)

Office Hours: By appointment on Microsoft Teams

E-mail: karron@uwm.edu

TEXT: Hillis, Sadava, Hill, and Price (2021) Principles of Life, 3rd edition, Sinauer Associates, Inc.
ISBN: 9781319017712

Lab Manual can be downloaded from your 150 lab section Canvas site. Also make sure to log into the UWM e-campus textbook website <https://uwm.ecampus.com/shop-by-course> and choose your respective lab section to order a **lab coat** for this course. You will need to use one when you are in the lab. You may use a lab coat you have purchased for another course, say chemistry

Learning objectives for this course

Scope and focus: This course provides an introduction to the fundamental principles of biology (molecular and cell biology, genetics, evolution, and ecology) integrated through an evolutionary framework. Lectures highlight key concepts and how they can be applied to the study of natural organisms. Laboratory exercises reinforce critical concepts from lecture and provide hands on learning of experimental methods for studying biological systems. Labs also teach students how to develop and test hypotheses, and how to analyze, graph and present their data.

This course addresses the following program objectives:

- 1) Describe and apply biological information and concepts to societal and ethical questions related to biology.
- 2) Apply the scientific method to questions, critically evaluate experimental design, and interpret numerical and graphical data used in professional research (for example, as published in peer reviewed journals).
- 3) Investigate scientific questions using diverse field and laboratory skills, including use of biological instrumentation and appropriate computer software.
- 4) Retrieve and process scientific information from library catalogs, literature search engines and computer databases.
- 5) Synthesize, integrate and effectively communicate scientific information both orally and in writing.
- 6) Demonstrate an understanding of molecular and cell biology, genetics, evolution, and ecology.

GRADING:

1. **Lecture scores** (60% of total grade) are based on five equally weighted, non-cumulative exams covering lecture material. Exams are multiple choice.
2. **Lab scores** (40% of total grade) will be based on attendance, written lab reports, lab manual question sheets and quizzes. See "Laboratory Schedule" and your TA's lab syllabus for further grading details.

Grades will be assigned following the scale below:

A	93-100%	B-	80-82%	D+	67-69%
A-	90-92%	C+	77-79%	D	63-66%
B+	87-89%	C	73-76%	D-	60-62%
B	83-86%	C-	70-72%	F	0-59%

This grade scale assumes a class average of no less than 75%. If necessary, exam averages that fall below 75% will be adjusted to 75%, as will final course grades. The average grade will be no less than C.

LECTURE EXAM DATES (% TOTAL GRADE)

EXAM I: 9/22	(covers lectures and readings from 9/03 through 9/20)	12%
EXAM II: 10/13	(covers lectures and readings from 9/24 through 10/11)	12%
EXAM III: 10/29	(covers lectures and readings from 10/15 through 10/27)	12%
EXAM IV: 11/22	(covers lectures and readings from 11/01 through 11/19)	12%
EXAM V: 12/18	(covers lectures and readings from 11/19 through 12/13)	12%

MISSED EXAMS AND LABS:

Make-up exams will only be given for **legitimate** reasons (illness, emergency, religious holiday), and must be documented. Except for extreme emergencies, notification of absence from an exam must be given *prior to* the exam date to avoid a grade of 0%. Make-up exams may not be the same as the ones taken by the rest of the class; they may be essay exams, oral exams or a combination of the two.

MISSED LABS CANNOT BE MADE UP.

TIME INVESTMENT:

On average, students should spend 48 hours per credit per semester on in-class activities and activities outside of the classroom (i.e., 192 hours for a 4-credit course). Class meets for 6 hours each week for a total of 90 hours over the 16-week semester. The exact breakdown of hours per week varies by week, but over the course of the semester we expect students to spend an additional 6-8 hours per week outside of class working on: reading assigned material (~2 hours per week), reviewing notes and protocols (~1 hour per week), maintaining a laboratory notebook (~1 hour per week), preparing lab reports (~1 hour per week), and studying for quizzes, exams and lab practicals (~2 hours per week).

UNIVERSITY AND DEPARTMENTAL POLICIES:

1. *Students with disabilities.* The Accessibility Resource Center at the University of Wisconsin Milwaukee is dedicated to providing equal access to students with disabilities in all academic, social, cultural and recreational programs. Please notify the Professors, and see this link: <http://uwm.edu/arc/>
2. *Religious observances.* Students who will miss class due to religious observances should make arrangements with the Professors or Lab TAs to make up missed work. https://www4.uwm.edu/secu/docs/other/S_1.5_ACCOMMODA_OUS_BELIEFS.pdf
3. *Students called to active military duty.* If you are called to active military duty, please contact the Professors to make arrangements for accommodations for absences. Students: <http://uwm.edu/active-duty-military/> Employees: <https://www.wisconsin.edu/ohrwd/download/policies/ops/bn9.pdf>

4. *Incompletes*. A notation of "incomplete" may be given in lieu of a final grade to a student who has carried a subject successfully until the end of a semester but who, because of illness or other unusual and substantiated cause beyond the student's control, has been unable to take or complete the final examination or to complete some limited amount of term work.

https://www4.uwm.edu/secu/docs/other/S_31_INCOMPLETE_GRADES.pdf

5. *Discriminatory conduct*. Discriminatory conduct will not be tolerated by the University. It poisons the work and learning environment of the University and threatens the careers, educational experience, and well-being of students, faculty, and staff.

https://www4.uwm.edu/secu/docs/other/S_47_Discriminatory_Conduct_Policy.pdf

6. *Title IX/Sexual Violence*. Title IX is a federal law that prohibits sex discrimination in education program or activities, and UWM policy prohibits such conduct (see Discriminatory Conduct, above). This includes sexual violence, which may include sexual harassment, sexual assault, relationship violence, and/or stalking in all educational programs and education-related areas. UWM strongly encourages its students to report any instance of sex discrimination to UWM's Title IX Coordinator (titleix@uwm.edu). Whether or not a student wishes to report an incident of sexual violence, the Title IX Coordinator can connect students to resources at UWM and/or in the community including, but not limited to, victim advocacy, medical and counseling services, and/or law enforcement. For more information, please visit: <https://uwm.edu/sexual-assault/>.

7. *Academic misconduct*. Cheating on exams or plagiarism are violations of the academic honor code and carry severe sanctions, including failing a course or even suspension or dismissal from the University. <http://uwm.edu/academicaffairs/facultystaff/policies/academic-misconduct/>

8. *Complaint procedures*. Students may direct complaints to the head of the academic unit or department in which the complaint occurs. If the complaint allegedly violates a specific university policy, it may be directed to the head of the department or academic unit in which the complaint occurred or to the appropriate university office responsible for enforcing the policy.

https://www4.uwm.edu/secu/docs/other/S_47_Discriminatory_Conduct_Policy.pdf

9. *Grade appeal procedures*. A student may appeal a grade on the grounds that it is based on a capricious or arbitrary decision of the course instructor. Such an appeal shall follow the established procedures adopted by the department, college, or school in which the course resides or in the case of graduate students, the Graduate School. These procedures are available in writing from the respective department chairperson or the Academic Dean of the College/School.

https://www4.uwm.edu/secu/docs/other/S_28_Grade_Appeal_by_Students.pdf

10. *LGBT+ resources*. Faculty and staff can find resources to support inclusivity of students who identify as LGBT+ in the learning environment. <http://uwm.edu/lgbtrc/>

11. *Smoke and Tobacco-Free campus*. UWM prohibits smoking and the use of tobacco on all campus property.

https://www4.uwm.edu/secu/docs/other/S_49_Smoke_Tobacco_Free_Policy.pdf

Official university policies for all UWM courses may be found at the Secretary of the University website: <http://uwm.edu/secu/syllabus-links/>. The department lists important policies at the top of the Biological Sciences section of the Schedule of Classes (e.g., for Spring 2020

https://www4.uwm.edu/schedule/index.cfm?a1=subject_details&subject=BIO%20SCI&strm=2189).

12. Navigate Student Success Platform and Mobile App

Students are encouraged to use a tool called Navigate. This tool can help you learn about academic resources, set up study groups in your courses, make appointments with your academic advisor, get reminders on important dates, and much more. In addition, Navigate allows instructors to send Progress Reports to students throughout the term, allowing for updates on your academic progress in a course in addition to your grade. You can log into the platform here: <https://uwmilwaukee.campus.eab.com/> or by finding the Navigate link under the Current Students tab on the UWM home page. More information on how you can use Navigate and the app, including tutorials, can be found on UWM's Navigate website.

13. Panther Community Health and Safety Standards: UWM has implemented reasonable health and safety protocols, taking into account recommendations by local, state and national public health authorities, in response to the COVID-19 pandemic. As a member of our campus community, you are expected to abide by the Panther Interim COVID-Related Health & Safety Rules, which were developed in accordance with public health guidelines. These standards apply to anyone who is physically present on campus, UWM grounds, or participating in a UWM-sponsored activity: • All individuals visiting UWM facilities must wear face coverings while indoors; • Unvaccinated students coming to campus are required to test weekly for COVID-19; and, • You should check daily for COVID-19 symptoms and not come to campus if you are feeling sick. Additional details about student and staff expectations can be found on the UWM COVID-19 webpage.

Department of Biological Sciences Majors Information

The Department of Biological Sciences offers an undergraduate major in the Biological Sciences, an interdisciplinary major in Conservation and Environmental Biology, and a Biological Sciences minor. The program provides coursework and laboratory opportunities in ecology and evolution, molecular and microbial biology and physiology. The Biological Sciences program at UWM can be tailored to fit the unique interests and professional goals of the student. The Department provides the basic requirements for entrance into a variety of fast-growing careers related to biology and health sciences, as well as preparation for graduate work in the discipline. Honors in Biology is also available for students who meet the criteria. Students must declare a major upon completing 45 degree credits and before 75 credits have been earned. A student's failure to initiate and complete this process before 75 credits have been earned may result in a delay of graduation. The student should also regularly consult with an advisor in the College of Letters and Sciences and within the Department of Biology. A detailed listing of the requirements and recommended courses for Biological Sciences Major and how to declare a Major in Biological Sciences can be obtained from the receptionist in the Department of Biological Sciences Office, Lapham Hall Rm. 181.

Extensive information about the Major, career and job opportunities and the Graduate School application process can be found on the Department of Biological Sciences homepage at <http://www.uwm.edu/Dept/Biology/>

Departmental undergraduate advisors can be located at: <http://www.uwm.edu/Dept/Biology/Docs/Ugrad.admins/advisors.html>

Please see next page for lecture schedule. The lab syllabus can be found in your lab Canvas site.

Please note that while the syllabus follows the material in your textbook, additional material to add or supplement the information given in your textbook will be added to lectures when necessary and will be posted in Canvas.

Date	Topic	Readings
Friday, September 3, 2021	Introduction <i>Scope of biology and why is it important to understand how life exists and proliferates on earth?</i>	Chapter 1
Monday, September 6, 2021	Labor day – No class today - Holiday	
Wednesday, September 8, 2021	Scientific method <i>Hypothesis, falsification, and statistical analysis as the basis of scientific enquiry</i>	Chapter 1
Friday, September 10, 2021	Chemistry and Energy <i>Why do all living systems follow the laws of thermodynamics and why is water an essential ingredient for life?</i>	Chapter 2
Monday, September 13, 2021	Organic molecules: Lipids, Carbohydrates <i>Why is carbon the essential element around which all macromolecules are built and the importance of lipids and carbohydrates?</i>	Chapter 3
Wednesday, September 15, 2021	Organic molecules: Nucleic acids, Proteins <i>What is the origin of nucleic acids and proteins?</i>	Chapter 3
Friday, September 17, 2021	Cell structure and function <i>Why is the cell considered as the fundamental unit of life?</i>	Chapter 4
Monday, September 20, 2021	Cells, continued <i>Origin of eukaryotes and how do organelles form?</i>	Chapter 4
Wednesday, September 22, 2021	Exam I (Posted at 12:30 PM. Available until 05:00 PM Thursday, Sept 23)	
Friday, September 24, 2021	Membranes and receptors <i>Why are structures important and how do cells communicate with each other?</i>	Chapter 4, 6
Monday, September 27, 2021	Membranes and receptors <i>How do pathogens such as SARV-COV2 enter our cells?</i>	Chapter 6
Wednesday, September 29, 2021	Cellular Respiration <i>How do cells obtain energy if they are incapable of photosynthesis?</i>	Chapter 5
Friday, October 1, 2021	Respiration and Fermentation (continued) <i>What role did glycolysis play in the early evolution of life and is the sun necessary for all life on earth?</i>	Chapter 5
Monday, October 4, 2021	Photosynthesis <i>How do photosynthetic organisms trap energy from the sun?</i>	Chapter 5
Wednesday, October 6, 2021	Photosynthesis (continued) <i>Why is understanding the molecular basis of photosynthesis needed to understand the current climate change?</i>	Chapter 5

Friday, October 8, 2021	Mendelian Genetics <i>How do organisms maintain variation and transmit genetic information from one generation to the next?</i>	Chapter 8
Monday, October 11, 2021	Mendelian Genetics (continued) <i>What is the genetic basis of discrete vs continuous variation?</i>	Chapter 8
Wednesday, October 13, 2021	Exam II (Posted at 12:30 PM. Available until 05:00 PM Thursday, Oct 14)	
Friday, October 15, 2021	Cell cycle, Mitosis and Meiosis <i>How do honey bees have morphologically distinct individuals within a colony?</i>	Chapter 7
Monday, October 18, 2021	Cell cycle and cancer <i>What is the role of cyclins, CDK, p53, p16 and other associated proteins in the cell cycle?</i>	Chapter 7
Wednesday, October 20, 2021	Structure of DNA and Replication <i>How does the structure of DNA render itself for replication?</i>	Chapter 9
Friday, October 22, 2021	DNA replication and Mutations <i>Why are mutations essential for variation and evolution?</i>	Chapter 9
Monday, October 25, 2021	Gene Expression, transcription and Regulation <i>Why are so few genes expressed in every cell of eukaryotes when all cells have the full complement of genes? Designing vaccines against SARS-CoV2.</i>	Chapter 10
Wednesday, October 27, 2021	Regulation of Gene Expression and Genomes <i>How can individuals have similar genotypes yet drastically differ in their phenotypes? How can comparing entire genomes of different species help us uncover how they function and how they evolved?</i>	Chapter 11,12, 15
Friday, October 29, 2021	Exam III (Posted at 12:30 PM Available until 05:00 PM Saturday, Oct 30)	
Monday November 1, 2021	Introduction to Darwin and Variation <i>Why is variation essential for evolution?</i>	Chapter 13
Wednesday, November 3, 2021	Mechanism of Evolution <i>Why is natural selection an essential but not the only mechanism to explain evolution?</i>	Chapter 13
Friday, November 5, 2021	Population genetics <i>How do we quantify evolutionary change in populations?</i>	Chapter 13
Monday, November 8, 2021	Population genetics <i>What conditions lead to evolutionary changes within and among populations?</i>	Chapter 13
Wednesday, November 10, 2021	Mating systems; sexual selection <i>What are the evolutionary implications of different mating strategies? Why can selection favor traits that enhance mating success even if they lower survival rate?</i>	Chapter 16

Friday, November 12, 2021	Reproductive isolation and Speciation <i>Why is reproductive isolation essential for speciation and can it occur if there is no geographical isolation?</i>	Chapter 16
Monday, November 15, 2021	Speciation (continued) <i>How and why did life essentially diverge into the numerous species we see today?</i>	Chapter 16
Wednesday, November 17, 2021	History of life on Earth <i>Why is understanding the fossil record essential to understand the origin of life?</i>	Chapter 17
Friday, November 19, 2021	History of life on earth continued <i>How have geological forces constrained the distribution of organisms in time and in geographical space?</i>	Chapter 17, 18
Monday, November 22, 2021	Exam IV (Posted at 12:30 PM. Available until 05:00 PM Tue, Nov 23)	
Wednesday, November 24, 2021 Friday, November 26, 2021	Happy Thanksgiving Break– No class Happy Thanksgiving Break– No class	
Monday, November 29	Population Ecology <i>How do populations grow exponentially until constrained by limiting factors? (Mathematical models)</i>	Chapter 39
Wednesday, December 1, 2021	Population Density and Spread of Epidemics <i>What factors lead to spread of pandemics such as covid-19?</i>	Chapter 39
Friday, December 3, 2021	Ecology, Evolution and modelling of Spreading Epidemics Continued. <i>Can models predict the severity of Epidemics?</i>	Chapter 39
Monday, December 6, 2021	Species Interactions <i>How do different species in an ecosystem interact and affect their population numbers?</i>	Chapter 40
Wednesday, December 8, 2021	Species and Community Ecology <i>Why are some species are considered keystone species and is there “balance of nature” in the natural world?</i>	Chapter 40, 41
Friday, December 10, 2021	Community Ecology and Succession <i>What is the importance of biodiversity?</i> <i>What is meant by stability in ecological communities?</i> <i>What kinds of plant communities are present in Wisconsin?</i>	Chapter 41
Monday, December 13, 2021	Climate change and Conservation biology <i>How does understanding “deep time” and biogeographical cycles explain current climate change patterns?</i>	Chapter 38. 42

Exam 5 is held during exam week. Please be sure to note the exam time on your calendar!

Monday, December 20, 2021 Exam V – Posted at 12:30 PM and available until midnight

All exams are multiple choice and will be online in Canvas and are due before the posted deadline. You will have an hour to complete each exam once you once them.