

General Biology (BIOL 101)

University of Wisconsin-Stevens Point at Wausau, Fall 2022, 5 Credits

Instructor: Dr. Kristine Prah
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Lecture: 12:00 p.m. – 12:50 p.m. Mondays, Wednesdays and Fridays in room 233.

Laboratory: 2:00 p.m. – 4:50 p.m. on Wednesdays in room 277.

Office Hours: 8:30-10:30 AM on Wednesdays and Fridays, and other times by appointment (in person in 285B in Wausau or by Zoom at <https://wisconsin-edu.zoom.us/j/9042747100>)

Textbook: The required textbook is *Concepts of Biology* by senior contributing authors Samantha Fowler, Rebecca Roush and James Wise. The ISBN is 9781938168116. The book is available for free rental at the university bookstore. It is also available for free online at www.openstax.org/details/concepts-biology. Additional readings which offer more information and additional perspectives will also be posted on Canvas.

Course Catalog Description

Introduces non-major students to the basic principles of biology and acquaints them with the diversity of life. Exploration of basic cellular-level processes, genetics and reproduction, evolution, biological diversity, physiology, and ecology, with emphasis on the applicability and relevance of biological concepts, scientific method, and technology to the general public.

Class Attributes: Lab Science (AD), Natural World (AD), and Natural Sciences (GEP)

Course Introduction and Learning Outcomes

This course is designed to help students appreciate biology and motivate students to keep on learning about biology after college. The course will focus on the following learning outcomes:

- 1) Describe the diversity of living organisms.
- 2) Describe the components of the living cell.
- 3) Explain the metabolic and genetic systems of organisms.
- 4) Discuss how the functions of cells are accomplished.
- 5) Discuss the growth and reproductive processes of living organisms.
- 6) Use vocabulary of biology.
- 7) Describe how organisms influence each other and their environments.
- 8) Discuss how organisms are affected by each other and by their environments.
- 9) Design and carry out experiments to answer specific scientific questions.
- 10) Communicate scientific information in a clear and concise manner.
- 11) Solve problems through application of the scientific method.
- 12) Discuss biological principles including:
 - cellular level functions that are necessary for life
 - inheritance and evolutionary change

- the diversity of animals and plants within an evolutionary context
 - the function of animal organ systems
 - the basic functioning of populations, communities, and ecosystems
- 13) Discuss the relevance of biological principles to their lives and society.
- 14) Meet the following General Education Program Learning Outcomes
- Explain major concepts, methods, or theories in the natural sciences to investigate the physical world.
 - Interpret information, solve problems, and make decisions by applying natural science concepts, methods, and quantitative techniques.
 - Describe the relevance of aspects of the natural sciences to their lives and society

Course Expectations and Attendance Policy

Students are expected to be present at all lecture and lab class meetings. Some discussion-based assignments will be done in some class sessions. So, unexcused class absences may negatively affect a student's course grade. Please discuss with your instructor the reason for any absences which you feel should be excused, so that you can be given the opportunity to make up any in-class work that you will miss. Students should not use ear buds or cell phones in class unless they have spoken with the instructor about this first. The instructor and students are expected to show respect for everyone in the class. Respect should be shown for property of the college. Textbook reading assignments should be completed before the designated class meeting time. Students should come to the labs prepared, having read the introductory material (if any) before the designated time. Laboratory safety guidelines will be given to students and must be followed completely. Students may work together on assignments unless notified otherwise. However, students may not copy answers from each other as each person's answers must be in his or her own words. Examinations should be completed independently without using any books or notes. The policies found in chapter UWS 14 of the Wisconsin Administrative Code will be used in the case of suspected academic misconduct. For effective communication, you are expected to type and spell-check your work on assignments unless notified otherwise. Students should daily check their student email account and Canvas as class announcements and handouts and reading assignments will be given using one or both of these technologies. Scores on assignments and examinations will be posted on Canvas, and an estimation of your course grade will be kept updated during the semester on Canvas.

Care Team

The University of Wisconsin-Stevens Point is committed to the safety and success of all students. The Office of the Dean of Students supports the campus community by reaching out and providing resources in areas where a student may be struggling or experiencing barriers to their success. Faculty and staff are asked to be proactive, supportive, and involved in facilitating the success of our students through early detection, reporting, and intervention. As your instructor, I may contact the Office of the Dean of Students if I sense you are in need of additional support which individually I may not be able to provide. You may also share a concern if you or another member of our campus community needs support, is distressed, or exhibits concerning behavior that is interfering with the academic or personal success or the safety of others, by reporting here:

<https://www.uwsp.edu/dos/Pages/Anonymous-Report.aspx>.

Title IX

UW-Stevens Point is committed to fostering a safe, productive learning environment. Title IX and institutional policy prohibit discrimination on the basis of sex, which includes harassment, domestic and dating violence, sexual assault, and stalking. In the event that you choose to disclose information about having survived sexual violence, including harassment, rape, sexual assault, dating violence, domestic violence, or stalking, and specify that this violence occurred while a student at UWSP, federal and state laws mandate that I, as your instructor, notify the Title IX Coordinator/Office of the Dean of Students.

Please see the information on the Dean of Students webpage for information on making confidential reports of misconduct or interpersonal violence, as well as campus and community resources available to students. Dean of Students: <https://www.uwsp.edu/DOS/sexualassault> Title IX page: <https://www.uwsp.edu/hr/Pages/Affirmative%20Action/Title-IX.aspx>

Equal Access for Students with Disabilities

The University has a legal responsibility to provide accommodations and program access as mandated by Section 54 and the Americans with Disabilities Act (ADA). The university's philosophy is to not only provide what is mandated but also convey its genuine concern for one's total well-being. If accommodations are needed, please contact the instructor as well as the Disability and Assistive Technology Center (DATC), located on the Stevens Point campus. Students can also pick up an application for accommodations packet in the Solution Center.

DATC contact information:

(715) 346-3365 (Voice)

(715) 346-3362 (TDD only)

or via email at datctr@uwsp.edu

Academic Integrity

Academic Integrity is an expectation of each UW-Stevens Point student. Campus community members are responsible for fostering and upholding an environment in which student learning is fair, just, and honest. Through your studies as a student, it is essential to exhibit the highest level of personal honesty and respect for the intellectual property of others. Academic misconduct is unacceptable. It compromises and disrespects the integrity of our university and those who study here. To maintain academic integrity, a student must only claim work which is the authentic work solely of their own, providing correct citations and credit to others as needed. Cheating, fabrication, plagiarism, unauthorized collaboration, and/or helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. Failure to understand what constitutes academic misconduct does not exempt responsibility from engaging in it. For more information on UWS chapter 14 visit: <https://www.uwsp.edu/dos/Pages/Student-Conduct.aspx>

Evaluation of Student Work

- 1) Lecture Examinations (400 points)** There will be three lecture exams scheduled on class days during the semester. There will also be a comprehensive final lecture exam on Tuesday, December 20 at 2:45PM. All four of these exams will be in person, closed-book and closed-notes. Point values for each of the exams will be as follows:

| | |
|-------------------|-------------------|
| Lecture Exam 1 | 100 points |
| Lecture Exam 2 | 100 points |
| Lecture Exam 3 | 100 points |
| <u>Final Exam</u> | <u>100 points</u> |
| Total | 400 points |

- 2) Assignments (500 points)** These assignments will be given and graded throughout the semester for a total of 500 points. These assignments will give you an opportunity to apply what you have learned in lecture and in lab. Two of these assignments will be essays, one about homeostasis and the other about genetics, and each of these essays will be worth 50 points. Before handing in lab assignments, you must complete the associated activity in lab.

Dates and Topics of Lecture Examinations

| | |
|--------------|---|
| September 30 | Lecture material covered September 7 through September 28 |
| October 26 | Lecture material covered October 3 through October 24 |
| November 30 | Lecture material covered October 28 through November 28 |
| December 20 | Comprehensive final examination (includes lecture topics covered from September 7 through December 14) Note the start time: 2:45PM |

Grading Scale

At the end of the semester, total points earned will be converted to letter grades using the following table:

| | | |
|-------------|-------------|-------------|
| ≥92% = A | 80-81%= B- | 68-69% = D+ |
| 90-91% = A- | 78-79% = C+ | 62-67% = D |
| 88-89% = B+ | 72-77% = C | 60-61% = D- |
| 82-87% = B | 70-71% = C- | <60 % = F |

Laboratory Safety

Closed-toe shoes that cover the top of the foot are required at all times when you are in the laboratory classroom. You must also wear long pants or other long leg coverings instead of shorts in the laboratory classroom. Goggles will be provided when needed. You will not be able to participate in the lab class without having appropriate shoes, functional clothing that completely covers legs and, when required, goggles.

Absences and Tardiness

You are responsible for material covered in all class sessions, including class sessions that you miss partially or entirely. If you miss a lecture or lab class session, please check with your instructor. Assignments must be handed in on time (this includes lecture and laboratory assignments that were given or due in your absence) unless your instructor has given you permission beforehand to hand in the assignment late.

Make-Up Labs and Exams

If you must miss a class session, please contact your instructor and also get notes from a classmate. Please notify your instructor in advance if you cannot attend a laboratory period. A make-up lab or alternate activity will be scheduled if an acceptable reason for rescheduling is given to the instructor prior to missing the class session.

Notify the instructor in advance if you need to reschedule an examination. An acceptable reason must be given for needing to reschedule the testing time. Your instructor will determine if the reason for rescheduling the examination is acceptable. Make-up examinations must be taken within 48 hours of the original test date unless unusual circumstances exist. If you have a reason to reschedule the final exam, please notify your instructor by December 10.

Late Assignments

Hand in assignments on time. If you are unable to hand in a lecture assignment or laboratory assignment on time, notify your instructor in advance of the due date. You must provide an acceptable reason for handing in an assignment late. Failure to hand in assignments on time may delay the grading of your work. You may lose some or all of the points from a late assignment if your instructor has not given you permission to hand in the assignment late. The late penalty will usually be a loss of 10% of the points per day.

Proper Use of Course Materials

Course materials for BIOL 101 are protected intellectual property at UW-Stevens Point. Students in this course may use the materials for their personal use related to participation in this class. Students may also take notes solely for their personal use. Students may not copy or share course materials outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Tutoring-Learning Center (TLC)

The Tutoring-Learning Center (TLC) offers a variety of free services to enhance your academic success. Boost your grades and lower your stress by working with a TLC staff member to prepare for exams, navigate writing assignments successfully, clarify course concepts, develop effective study habits and time-management strategies, and more. The

TLC also offers group and individual study space, computer and internet access, study partners, and assistance in accessing and using applications such as Canvas, Navigate, MFA, and Microsoft 365. Come visit us in the library starting on the 12th of September! Our hours this fall are as follows:

M - 10 am to noon

T - 9 am to 11 am

W - 2 pm to 3 pm

Th - 10 am to noon

F - 11:30 am - 1 pm

For more information, contact Dr. Lori at lorandal@uwsp.edu | 715-261-6148 | Library Room 256

International Module

BIOL 101 will include a course module written for the Midwest Institute for International and Intercultural Education. This module will be infused into the course throughout the semester, particularly during discussions of microbiology, virology, immunology, and epidemiology.

1. Module Title: The Global Nature of Bioterrorism (With a Focus on Anthrax, Plague, and Smallpox)
2. Description of Module: Bioterrorism has become an increasing concern worldwide in recent years. In this module, students will study the biological consequences of bioterrorism involving anthrax, plague and smallpox. Students will also consider the potential global impact of a bioterrorism event. The epidemiology and pathogenesis of anthrax, plague, and smallpox will be discussed. International research efforts (including vaccine development) related to these diseases will also be discussed in class.
3. Module Objectives:
 - 1) Understand the international nature of medical research.
 - 2) Describe how the World Health Organization (WHO) is preparing people for possible bioterrorist attacks.
 - 3) Describe the importance of global surveillance of unusual illnesses.
 - 4) Become familiar with the potential global consequences of a possible bioterrorist attack.
 - 5) Understand the differences between viral and bacterial diseases.
 - 6) Describe the epidemiology, pathogenesis, and treatment of anthrax, plague, and smallpox.
 - 7) Describe how smallpox was eradicated worldwide and how international cooperation was necessary to achieve such an accomplishment.
 - 8) Explain how vaccination can, in general, lead to immunity.
 - 9) Describe the pro and cons of vaccination against anthrax, plague and smallpox.
 - 10) Understand the nature of antibiotic resistance in bacteria.
 - 11) Understand the global implications of the existence of drug-resistant pathogens.

Tentative Lecture Schedule with Major Topics and Textbook References

- September 7 Course introduction; Homeostasis; Levels of biological organization; Urinary system and excretion (Chapter 16.1)
- September 9 Digestive system; Nutrition (Chapter 16.2)
- September 12 Respiratory system and gas exchange (Begin chapter 16.3)
- September 14 Circulatory system; Blood and cardiovascular disorders (Finish chapter 16.3 and References on Canvas)
- September 16 Endocrine system and hormones (Chapter 16.4 and endocrinology case study)
-Homeostasis essay will be assigned, due electronically on September 23
- September 19 Muscular system; Skeletal system (Chapter 16.5)
- September 21 Nervous system; Epilepsy (Chapter 16.6 and References on Canvas)
- September 23 Viruses; Vaccines (Chapter 17.1)
- September 26 Immune system and immune system diseases; Lymphatic system (Chapter 17.2 through 17.4)
- September 28 World-wide eradication of smallpox (References on Canvas)
- September 30 **Lecture examination 1**
- October 3 Reproduction (Begin Chapter 18)
- October 5 Finish reproduction; Human development (Finish Chapter 18)
- October 7 Characteristics of living things (Chapter 1.1); Biological chemistry and Biological molecules (Chapter 2)
- October 10 Cell structure; Cell types (Chapter 3.1 through 3.4)
- October 12 Movement of molecules (Chapter 3.5 and 3.6)
Enzymes; Metabolism; (Chapter 4.1)
- October 14 Cellular respiration (Chapter 4.2 and 4.3)
- October 17 Fermentation and other metabolic pathways (Chapter 4.4 and 4.5)

Tentative Lecture Schedule, Continued

- October 19 Photosynthesis: overview (Chapter 5.1)
- October 21 Photosynthesis continued: the light-dependent reactions (Chapter 5.2)
- October 24 Photosynthesis continued: the Calvin cycle (Chapter 5.3)
- October 26 **Lecture examination 2**
- October 28 The cell cycle; Mitosis; Cell division; Cancer (Chapter 6)
- October 31 Meiosis (Chapter 7.1 and 7.2)
- November 2 Chromosomal alterations; Crossing over; Nondisjunction (Chapter 7.3)
- November 4 Mendelian genetics; Pedigree analysis; Extensions of Mendel's laws (Chapter 8)
- November 7 Chromosome structure; DNA structure (Begin chapter 9.1)
- November 9 DNA replication; DNA mutations (Finish chapter 9.2)
- November 11 DNA function; RNA structure and function; Transcription (Chapter 9.3)
- November 14 Translation; Regulation of gene expression (Chapter 9.4 and 9.5)
- November 16 Molecular biology; Genetic engineering; Cloning of genes; Genetically modified organisms; DNA fingerprinting; Gene therapy (Begin chapter 10)
-Genetics essay will be assigned, due electronically on November 23
- November 18 Human Genome Project and applications (Finish chapter 10)
- November 21 Evolution – definitions, genetic variation, adaptation, population genetics, Hardy-Weinberg equation (Chapter 11.1 through 11.3)
- November 23 Types of selection (Chapter 11.4)
The diversity of life (Chapter 12)
- November 28 Evolution - antibiotic resistance in bacteria (References on Canvas)
- November 30 **Lecture Examination 3**

Tentative Lecture Schedule, Continued

- December 2 Bacteria, Anthrax; Plague; (Chapter 13.1; references on Canvas)
- December 5 Overview of protists; Overview of fungi (Chapter 13.2, 13.3 and 13.4)
- December 7 Overview and review of plants (Chapter 14)
- December 9 Population size, density and distribution; Survivorship curves; Exponential growth, Logistic growth, Carrying capacity, Factors affecting population growth (density-dependent and density independent) Age structure diagrams; Greenhouse gases; Defenses against predation; Niches; Symbiosis (Chapter 19)
- December 12 Communities; Ecosystems; Food chains; Food webs; Trophic levels; Productivity; Biological magnification; Water and other biogeochemical cycles; Dead zones; Acid rain; Terrestrial biomes, Aquatic biomes (Chapter 20)
- December 14 Biodiversity, threats to biodiversity and preserving biodiversity (Chapter 21); Discussion about ecological footprints
- December 20 **Comprehensive final exam** (includes lecture topics covered from September 7 through December 14)
Note the start time: 2:45PM

Tentative Laboratory Schedule

| | |
|--------------|---|
| September 7 | Scientific Method; Data Analysis and Graphing |
| September 14 | Circulation and Gas Exchange |
| September 21 | Introduction to Human Anatomy |
| September 28 | Macromolecules and Cells |
| October 5 | Diffusion and Osmosis |
| October 12 | Enzymatic Activity |
| October 19 | Photosynthesis |
| October 26 | The Cell Cycle and Mitosis |
| November 2 | Meiosis and Mendelian Inheritance |
| November 9 | Using Genome Databases |
| November 16 | Adaptations and Fitness |
| November 23 | Bacteria and Protists |
| November 30 | Plant Diversity |
| December 7 | Animal Diversity |
| December 14 | Ecology: Food Webs and Estimating Population Size |