

BIOLOGY 100

Fall 2022

COURSE DESCRIPTION:

Survey of biology emphasizing present and future relationships of humans to their environment.

LEARNING GOALS:

- Students will be exposed to the amazing and diverse world of life by exploring the major themes of biology. Each biological theme will begin with a relevant question or a current problem applicable to everyday life.
- Students will explore, synthesize, and evaluate biological concepts through inquiry-based laboratory experiments, a course undergraduate research experience, and exploration of dominant themes in biology. This investigation will begin by focusing on the structure and function of life at the chemical, subcellular and cellular levels, continuing with an examination of genetics and the mechanisms of cellular reproduction. Students will explore biodiversity including the evolutionary factors that have led to the form and function of life, and issues affecting biodiversity.
- Students will be able to critically analyze biological concepts in order to make scientifically literate decisions dealing with environmental and ethical issues related to biology and the human experience.
- Empower students with the necessary skills and knowledge to cultivate a diverse, inclusive, equitable and productive learning environment.

** All of these learning goals will be underscored with the scientific method and based on relevant, inquiry-based science.*

GENERAL EDUCATION COURSE:

This is a General Education Course which means that students will explore a broad survey of biological concepts. Specifically, students will:

- 1) Explain major concepts, methods, or theories in the natural sciences to investigate the physical world.
- 2) Interpret information, solve problems, and make decisions by applying natural science concepts, methods and quantitative techniques.
- 3) Describe the relevance of aspects of the natural science to their lives and society.



Dr. Krista Slemmons

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Office hours:

Tues 12:00-11:00

Wed 10:00-11:00

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Wed 11-12

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Biological Principles & the Human Environment

LECTURE

Tues & Thur 11-15:50

Zoom Meeting ID: 919 9152 2269

Passcode: 028586

LAB/RECITATION:

Sect. 1 Thur 8:00-10:50

Zoom Meeting ID: 992 1018 2036

passcode: 397573

Sect. 2 Wed 11:00-11:50

Zoom Meeting ID: 920 4939 5597

passcode: 093411

Sect. 3 Wed 2:00-2:50

Zoom Meeting ID 941 4198 8953

passcode: 632510

Sect. 4: Thur 12:00-2:50

Zoom Meeting ID: 936 8552 2969

Passcode 414819

Sect. 5: Wed 8:00-10:50

Zoom Meeting ID 916 8387 8467

Passcode 613703

Zoom links can be found in canvas under the zoom. You should have also received an invite via university email.

REQUIRED TEXTBOOK: *Biology for a Changing World*, fourth edition, Shuster, Vigna, Tontonoz, Sinha. Contact the bookstore to see ways to have the textbook shipped to you if you are off campus (see further instructions in canvas).

GEP & OVERALL COURSE STUDENT LEARNING OUTCOMES (C-SLO)

All learning outcomes will be assessed in a variety of ways throughout the semester.

Weekly course student learning outcomes (W-SLO) are listed in the weekly schedule at the end of the syllabus. Assessments for each W-SLO are listed in abbreviated form. These assessments include but are not limited to:

- SA Summative Assessment (exam)
- FA Formative Assessment (online quiz)
- P Presentation (poster / oral)
- PE Peer evaluation
- SP Scientific Paper
- CS Case Study
- ILQ Inquiry Post Lab Questions'
- TLQ Traditional Post Lab Questions
- D Debate

GEP & COURSE LEARNING OUTCOMES	EXAMPLE CLASS ASSIGNMENT(S):	ACTIVITY
Explain major concepts, methods, or theories in the natural sciences to investigate the physical world.	Conduct inquiry based, student designed experiments that examine major concepts in Biology related to enzymes, the scientific method, photosynthesis, cells and evolution.	Inquiry Lab Written scientific paper Scientific presentation
Interpret information, solve problems, and make decisions by applying natural science concepts, methods, and quantitative techniques.	Identify the basic principles of the scientific method in a case study involving childbed fever. Conduct self-designed, long-term experiments (photosynthesis) applying the principles of the scientific method.	Inquiry Lab Case Study Lecture Oral presentation Videos
Infer relationships, make predictions and solve problems by synthesizing content derived from biological principles including: <ol style="list-style-type: none"> 1. Cellular level functions necessary for life 2. Inheritance & evolutionary change 3. The diversity of life within an evolutionary context 4. The basic function of populations, communities and ecosystems. 	Infer relationships, make predictions and solve problems based on data dealing with bacterial inhibition and experimental treatments in self-designed experiment	Inquiry Lab Written scientific paper Scientific presentation
Describe the relevance of aspects of the natural sciences to their lives and society.	Evaluate the legitimacy of research in terms of the scientific method and solve problems involved in five different case studies throughout the semester. Case studies involve current, real-life problems and determining solutions to those problems based on course content.	Peer evaluation Case study Independent work Written work

CRITICAL THINKING (CT) AND HONORS (H) LEARNING OUTCOMES:

PARTICIPANTS	OUTCOME	ASSESSMENT
CT & H	Recognize critical thinking as a process of identifying, analyzing, evaluating, and constructing reasoning in deciding what conclusions to draw or actions to take	<ul style="list-style-type: none"> • Critical Thinking Lesson Module • Assessment Instrument (both found on CANVAS)
CT & H	Identify , analyze, evaluate or construct reasoning as it is applied to general or discipline-specific questions or issues	<ul style="list-style-type: none"> • Identify reasoning from a scientific paper • Creation of an argument for labs 1-8
H	Foster intellectually curiosity through engagement in a citizen science research project	<ul style="list-style-type: none"> • Participation in the project • Poster Presentation

INCLUSIVITY STATEMENT & POLICY

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups. If you have experienced a bias incident (an act of conduct, speech, or expression to which a bias motive is evident as a contributing factor regardless of whether the act is criminal) at UWSP, you have the right to report it using this [link](#). You may also contact the Dean of Students office directly at dos@uwsp.edu.

I commit to doing my part as well by keeping myself informed on the most recent research and practices that best support inclusive learning. I am dedicated to creating safe, inclusive classes where everyone can succeed. This course is a Safe Zone for LGBTQ+ issues and more. I will not condone disrespectful or discriminatory language or behavior. I extend an open-door invitation to all my students. If you feel unwelcome or unsafe in this course, or you have any concerns about your ability to succeed, please let me know. We can address the issue together, confidentially.

I last completed [UWSP's SafeZone training](#) on: 10/2020

As a teacher, I align my policies and choices with my university's guidance, including the [UWSP Community Bill of Rights and Responsibilities](#)

ASSESSMENTS/GRADING:

<u>LECTURE:</u>	POINTS
4 Lecture exams (3 @ 100 pts each, 1 @ 75 points)	375
25 Lecture Questions/Participation (25 @ 4 pts)	100
15 Preassessments	45
4 Intro Assignments ((5 pts each) critical thinking & syllabus quiz, intro video, graphing data)	20
Subtotal	540
LAB & RECITATION:	
9 Post-labs/simulations/recitation assignments (20 pts each)	180
2 Project Presentations (poster/oral 75 pts each; Plant Lab, Zooniverse Project)	150
1 Final Project (Draft (5 pts) & Final (100 pts); Envir Toxins Project)	100
3 Hypotheses & Abstracts (5 pts each)	15
3 Peer evaluations (5 pts each)	15
Subtotal	460
Total	1000

Final grades will be assigned based on the following percentages:

A	= ≥93%	B-	= 80-82%	D+	= 67-69%
A-	= 90-92%	C+	= 77-79%	D	= 60-66%
B+	= 87-89%	C	= 73-76%	F	= < 60%
B	= 83-86%	C-	= 70-72%		

EXAMS:

Exams are cumulative but will largely deal with topics covered since the previous exam (80%). Cumulative exams result in longer retention of material (Khanna et al. 2013; Lawrence 2013). Exams will cover assigned textbook readings as well as lecture and lab material. **Make-up exams will be provided only in the case of an acceptable excuse and the discretion of Dr. Slemmons.** The final exam must be taken during the week of finals unless you are graduating this semester. Graduating seniors must make arrangements with Dr. Slemmons for taking the exam early. You will be given a range of time (~3 days) to complete the exam. Once you start the test, you will be allotted 60 minutes to complete the exam. For the final exam you will be allotted 120 minutes. Exams are worth 100 points.

Exam 1	Sept 27
Exam 2	Oct 18
Exam 3	Nov 8
Final Exam	Dec 19-22

LECTURE:

Lectures will be held twice a week. I expect you to be prepared, engaged and attentive. Some lectures will involve group or independent work based on videos that you will watch outside of class. Quiz and exam questions will be based solely on content I present during that lecture/lab/recitation so your attendance in lecture is often highly correlated to your grade.

Partial lecture notes will be provided on CANVAS prior to class when deemed necessary (Cornelius and Owen 2008). Providing complete lecture notes decreases student success (Noppe, 2007).

VIDEOS & QUIZZES:

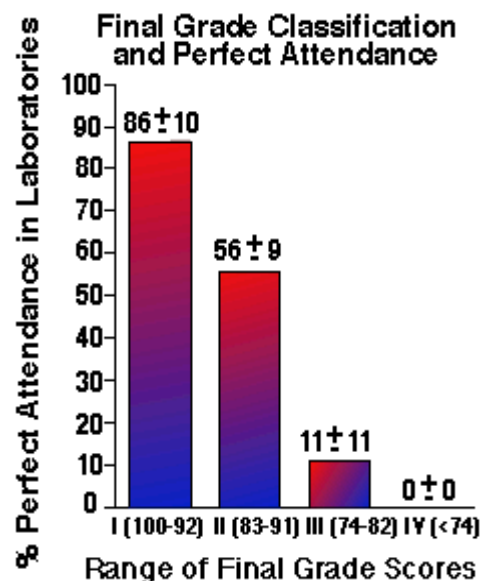
Throughout the semester, some material will be presented on CANVAS in a flipped classroom format. Students will be assessed on their understanding of the content provided in these videos in the form of a CANVAS quiz. If you fail to complete the quiz by the designated deadline, you will not be able to make up the quiz.

CASE STUDIES:

There will be several case studies throughout the semester. Case studies involve a real-world application of some topic that we are covering in class. Case studies may be presented through online videos, a reading or participating in class discussions. Students will answer questions based on these case studies and be assessed based on their ability to apply content knowledge to a real-life scenario. After each case study, students will complete a case study questions on CANVAS.

RECITATION

Regular attendance to recitation is imperative for success in this course. I also encourage you to regularly communicate with your lab partners and form a study group.



Daniloff 1994

POST LAB QUESTIONS: Each week a portion of the lab will be graded. Often this is composed of the post-lab questions, a graph, data collected and/or a claim/justification. Several labs require additional final products including the Photosynthesis plant Experiment (group presentation), Zooniverse Project (student choice), Worm and Environmental Toxins (student choice). The requirements and rubrics for this report are available in CANVAS.

PRESENTATIONS: Students will present in different formats throughout the semester: 1) a group PowerPoint (or other means of presenting) on lab results from **LAB 3: Photosynthesis**, and 2) a **RESEARCH PROJECT – ZOONIVERSE** poster presentation (or presentation type of the student's choice) on a citizen science project of your choosing and a final 3) environmental Toxins and Worms experimental design and data presentation. Each student will evaluate the projects of three different peers. You will be assessed on your depth and quality of peer evaluations. Requirements for these assignments are further detailed in canvas.

LATE ASSIGNMENTS: Post-lab questions and/or reports are due on the Tuesday @ 11:00 am following the week the lab was assigned. Post-labs are submitted to CANVAS. Late assignments will not be accepted and will receive a zero. Extensions for CANVAS quizzes will not be granted. If you foresee a problem completing a quiz, please contact Dr. Slemmons prior to the due date.

E-MAIL: UWSP students are expected to check their University e-mail regularly for information from the university and/or instructors. If you are using an e-mail account other than your campus account to contact Dr. Slemmons, be sure your full name is included in the message.

CAMPUS COMPUTERS: If you need access to a computer there are numerous labs on campus. The locations can be found here: <https://www.uwsp.edu/infotech/Pages/ComputerLabs/All-Labs.aspx>

ACADEMIC CONDUCT: All students are expected to follow ethical practices of neither giving nor receiving any unauthorized assistance on their work in this class. Additionally, all students are expected to not divulge the nature or content of any questions or answers on exams to any other student or groups of students. If there are suspected violations of academic misconduct, as defined by the UWSP Chapter 14.03(1) code, then the Chapter 14 policies and procedures will be invoked. See web page at http://www.uwsp.edu/admin/stuaffairs_rights/rightsChap14.pdf for details. Any student that removes an exam from the classroom may be given a failing grade for the course.

FACE COVERINGS: At all UW-Stevens Point campus locations, the wearing of face coverings is mandatory in all buildings, including classrooms, laboratories, studios, and other instructional spaces. Any student with a condition that impacts their use of a face covering should contact the [Disability and Assistive Technology Center](#) to discuss accommodations in classes. Please note that unless everyone is wearing a face covering, in-person classes cannot take place. This is university policy and not up to the discretion of individual instructors. Failure to adhere to this requirement could result in formal withdrawal from the course.

Other Guidance:

- Please monitor your own health each day using [this screening tool](#). If you are not feeling well or believe you have been exposed to COVID-19, do not come to class; email your instructor and contact Student Health Service (715-346-4646).

- As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.
- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom, lab, or meeting room.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

INCOMPLETE POLICY Under emergency/special circumstances, students may petition for an incomplete grade. An incomplete will only be assigned at the discretion of Dr. Slemmons. All incomplete course assignments must be completed within one month of the completion of the course.

NETIQUETTE GUIDELINES:

Netiquette is a set of rules for behaving properly online. Your instructor and fellow students wish to foster a safe online learning environment. All opinions and experiences, no matter how different or controversial they may be perceived, must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea but you are not to attack an individual. Working as a community of learners, we can build a polite and respectful course community.

The following netiquette tips will enhance the learning experience for everyone in the course:

- Do not dominate any discussion.
- Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Popular emoticons such as 😊 or / can be helpful to convey your tone but do not overdo or overuse them.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Never make fun of someone’s ability to read or write.
- Share tips with other students.
- Keep an “open-mind” and be willing to express even your minority opinion. Minority opinions have to be respected.
- Think and edit before you push the “Send” button.
- Do not hesitate to ask for feedback.
- Using humor is acceptable
(Mintu-Wimsatt et al., 2010 & Shea 1994).

ADDRESSING AND COMMUNICATING WITH YOUR PROFESSOR

How should I address you, the professor?

Students should address the instructor of this course as Professor or Dr. Slemmons. If you have visited my office hours at least 5 times or once the class is completed, you can call me Krista. 😊

How shall I contact you, the professor?

Email is the most effective way to contact me. Students can also talk to me before or after class or during lab. Students should feel free to schedule an appointment outside office hours if they have additional question or need help with anything.

EMAILING PROFESSOR

When sending emails to the professor, it is important to use appropriate email etiquette. Both when you are trying to obtain a job and after you receive one, you will need to write formal and professional emails to colleagues, clients, and supervisors. It is important to craft

this practice while you are in college. Please view the links below for tips on sending an email to any of your professors.

TIPS FOR HOW TO WRITE AN EMAIL TO YOUR PROFESSOR:

1. <https://www.insidehighered.com/views/2015/04/16/advice-students-so-they-dontsound-silly-emails-essay>
2. <https://medium.com/@lportwoodstacer/how-to-email-your-professor-without-beingannoying-af-cf64ae0e4087>

BUILD RAPPORT:

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let me know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing me when difficulties arise during the semester so that we can help you find a solution.

UNDERSTAND WHEN YOU MAY DROP THIS COURSE:

It is the student's responsibility to understand when they need to consider unenrolling from a course. Refer to the UWSP [Academic Calendar](#) for dates and deadlines for registration. After this period, a serious and compelling reason is required to drop from the course. Serious and compelling reasons includes: (1) documented and significant change in work hours, leaving student unable to attend class, or (2) documented and severe physical/mental illness/injury to the student or student's family.

INCOMPLETE POLICY:

Under emergency/special circumstances, students may petition for an incomplete grade. An incomplete will only be assigned at the discretion of Dr. Slemmons All incomplete course assignments must be completed within one month of the completion of the course.

INFORM YOUR INSTRUCTOR OF ANY ACCOMMODATIONS NEEDED:

UWSP is committed to providing reasonable and appropriate accommodations to students with disabilities and temporary impairments. If you have a disability or acquire a condition during the semester where you need assistance, please contact the Disability and Assistive Technology Center on the 6th floor of Albertson Hall (library) as soon as possible. DATC can be reached at 715-346-3365 or DATC@uwsp.edu.

STATEMENT OF POLICY:

UW-Stevens Point will modify academic program requirements as necessary to ensure that they do not discriminate against qualified applicants or students with disabilities. The modifications should not affect the substance of educational programs or compromise academic standards; nor should they intrude upon academic freedom. Examinations or other procedures used for evaluating students' academic achievements may be adapted. The results of such evaluation must demonstrate the student's achievement in the academic activity, rather than describe his/her disability.

If modifications are required due to a disability, please inform the instructor and contact the Disability and Assistive Technology Center in 609 LRC, or (715) 346-3365.

COMMIT TO INTEGRITY:

As a student in this course (and at this university), you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

UWSP ACADEMIC HONESTY POLICY & PROCEDURES

STUDENT ACADEMIC DISCIPLINARY PROCEDURES:

UWSP 14.01 Statement of principles

The board of regents, administrators, faculty, academic staff and students of the university of Wisconsin system believe that academic honesty and integrity are fundamental to the mission of higher education and of the university of Wisconsin system. The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards must be confronted and must accept the consequences of their actions.

UWSP 14.03 Academic misconduct subject to disciplinary action.

(1) Academic misconduct is an act in which a student:

- (a) Seeks to claim credit for the work or efforts of another without authorization or citation;
- (b) Uses unauthorized materials or fabricated data in any academic exercise;
- (c) Forges or falsifies academic documents or records;
- (d) Intentionally impedes or damages the academic work of others;
- (e) Engages in conduct aimed at making false representation of a student's academic performance; or
- (f) Assists other students in any of these acts.

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

LECTURE RECORDINGS

Lecture materials and recordings for BIOL 100 are protected intellectual property at UW-Stevens Point. Students in this course may use the materials and recording for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodations. [Regent Policy Document 4-1]. Students may not copy or share lecture materials and recordings 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 copy righted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

Extra Help Resources

Make an appointment with me

Come see Dr. Slemmons during scheduled office hours or make an appointment for extra help.

Form study groups

Find fellow classmates or Biology majors that you form a regular group with and review material and study for exams

TUTORING

The Tutoring-Learning Center (TLC) offers **FREE** virtual tutoring to support you in your biology classes. The tutors are UWSP students who have done well in their classes and who are here to share their successful study habits and biology content knowledge to help others succeed. Discussing biological concepts and processes together clarifies and solidifies knowledge, and the tutors are eager to study with you. The TLC will offer two main forms of biology tutoring during Spring 2021:

- **Drop-In Tutoring.** Tutors are waiting in a Zoom room where students can “drop-in” for assistance. No appointment or registration is required and attendance is flexible. The schedule and Zoom links can be found here: <http://www.uwsp.edu/tlc/Pages/droplnTutoring.aspx>.
- **One-on-One Tutoring.** Tutors are available for weekly, recurring appointments. Weekly attendance is required, as this service is designed for long-term assistance. To sign up, students can submit a request form through the TLC webpage: <https://www.uwsp.edu/tlc/Pages/Mathandscischedules.aspx>. Appointments are made based upon tutor availability – we cannot guarantee that every student will be matched with a tutor. One-on-One Tutoring is **FREE** for all UWSP students during Spring 2021!

Math and Science Tutoring – Fall 2022

What	Details	Schedule	Cost
Drop-In Tutoring	Flexible attendance	https://www.uwsp.edu/tlc/Pages/droplnTutoring.aspx	Free
One-on-One Tutoring	Weekly attendance required	Complete online request form here: https://www.uwsp.edu/tlc/Pages/request-math-science-tutoring.aspx	Free

SEVEN PRINCIPLES OF LEARNING (AMBROSE ET AL. 2012)

1. Students' *prior knowledge* can serve to help or hinder learning.
2. Students' *organization of knowledge* impacts how students learn and apply what they know.
3. *Motivation* determines, directs, and sustains what students learn.

4. To develop *mastery*, students must develop the skills, practice integrating them, and know when to apply them.
5. Goal-directed *practice* coupled with targeted *feedback* enhances learning.
6. Level of learner *development* interacts with “course” *climate* to impact learning.
7. To become self-directed, learners must be able to monitor and adjust their approaches to learning.

TEN THINGS PROFESSORS LOVE:

1. Students
2. Students who come to class with an open mind
3. Students who come to class to fulfill a requirement but decide to make the most of the experience
4. Students who give eye contact during lecture (and maybe even smile)
5. Students who aren't afraid to ask questions
6. Students who come to me when they need help
7. Students who tell me not just that they enjoyed my course, but why
8. Students who have their own ideas
9. Students who give me unique and powerful things to say in a letter of recommendation
10. Students who are fully engaged in the learning process

**adapted from Jane E Dmochowski, University of Pennsylvania*

REFERENCES:

- Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norma MK (2010) How Learning Works: Seven Research-based principles for smart teaching. Jossey-Bass
- Cornelius TL, Owen-DeSchryver J (2008) Differential Effects of Full and Partial Notes on Learning Outcomes and Attendance. *Teaching of Psychology* 35: 6–12
- Fried C (2008) In-class laptop use and its effects on student learning (2008) *Computers & Education* 50 (3): 906–914
- Khanna MM, Badura Brack AS, Finken L (2013) Short- and Long-Term effects of cumulative finals on Student learning. *Society for the Teaching of Psychology* 40(3) 175-182.
- Lawrence, N. K. (2013). Cumulative exams in the introductory psychology course. *Teaching Psychology* 40 (1), 15–19.
- Mueller PA and Oppenheimer DM (2014) The Pen Is Mightier Than the Keyboard Advantages of Longhand Over Laptop Note Taking *Psychological Science*. DOI: 10.1177/0956797614524581
- Noppe IC (2007) PowerPoint Presentation Handouts and College Student Learning Outcomes. *International Journal for the Scholarship of Teaching and Learning* 1(1), Article 9.

NOTE: This is a tentative syllabus. I reserve the right to make amendments to this document. Also, course materials may not be distributed or posted in any online format without permission from Dr. Slemmons.

Tentative Course Schedule *See Canvas for day-to-day schedule of assignments and activities. Reading assignments assigned for each lecture.

WEEK 1: NATURE OF SCIENCE

Weekly Student Learning Outcomes

- Identify the main components of the scientific method and apply it to novel situations (C-SLO: #1; ILQ)
- Compare and contrast theory vs. hypothesis (C-SLO: #1; SA, FA)
- Construct testable and falsifiable hypotheses (C-SLO: #1; ILQ, FA, CS)
- Differentiate between scientific processes and other ways of knowing (C-SLO: #3; CS)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments DUE 9/13 @ 11:00 AM
U1 Nature of Science	Sept 6-8	LECTURE 1 Intro to Biology & Nature of Science Case Study	LECTURE 2 Nature of Science	RECITATION 1 Nature of Science & Writing a Scientific Conclusion: Seabutterfly Example	LAB 1 The Nature of Scientific Investigation	QUIZ Syllabus & Critical Thinking Quiz ASSIGNMENT Self-introduction Video Graphing using Excel (Due before 1st Lab) POST LAB 1 The Nature of Scientific Investigation
		READING Graphing Assignment	READING Chapter 1: Process of Science (1-14)			

WEEK 2: CHARACTERISTICS & CHEMISTRY OF LIFE

Weekly Student Learning Outcomes

- Describe the basic characteristics of life (C-SLO: #2; SA, FA)
- Evaluate the characteristics of an "organism" and determine whether it is living or non-living by assessing each characteristic of life (C-SLO: #2; SA, FA)
- Identify the basic chemical components of life

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments DUE 9/20 @ 11:00 AM
U2 Chemistry & Characteristics of Life	Sept 13-15	LECTURE 3 Characteristics & Chemistry of Life	LECTURE 4 Biomolecules & Enzymes - Case Study	RECITATION 2 Experimental Design: LAB 3 Plant Growth & Photosynthesis	LAB 2 Chemistry of Life	POST LAB 2 Chemistry of Life ASSIGNMENT Lab 3 Hypothesis
		READING Chapter 2: Chemistry and Molecules of Life (25-38)	READING Chapter 4: Nutrition, Metabolism Enzymes (77-90)			

WEEK 3: BUILDING BLOCKS OF LIFE - BIOMOLECULES, CELL STRUCTURE & FUNCTION

Weekly Student Learning Outcomes

- Distinguish between the main biomolecules (C-SLO: #2; CS, SA, FA)
- Define essential nutrients (C-SLO: #2; CS, SA, FA)
- Define enzymes and explain how they work and importance in the cell (C-SLO: #2; ILQ; CS, SA, FA)
- Distinguish between catabolic and anabolic reactions (C-SLO: #2; CS, SA, FA)
- Evaluate the importance of biomolecules to human health (C-SLO: #3; CS, SA, FA)
- Differentiate between plant and animal cells (C-SLO: #2, ILQ, FA, SA)
- Describe the basic structure and function of bacterial, animal and plant cells (C-SLO: #2; TLQ, FA, SA)
- Differentiate between prokaryotic and eukaryotic cells (C-SLO: #2; FA, SA, TLQ)
- Describe a disease that results from a cellular organelle mutation/malfunction (C-SLO: #2; SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 9:30 (In-Person – short lab)		Assignments DUE 9/27 @ 11:00 AM
U3 Cell Structure & Function	Sept 20-22	LECTURE 5 Cell Structure & Function	LECTURE 5 (cont.) Cell Structure & Function	RECITATION 3 Graph interpretation	LAB 3 Photosynthesis and Plant Growth - Set up & Plant Seeds	ASSIGNMENT Graph Interpretation EXAM 1 Units 1-3
		READING Chapter 3: Cell Structure and Function (44-58)	READING Chapter 3: Cell Structure and Function (66-70)			

WEEK 4: ENERGY OF LIFE – CELLULAR RESPIRATION & PHOTOSYNTHESIS

Weekly Student Learning Outcomes

- Summarize the main steps of cellular respiration and photosynthesis (C-SLO: #2; CS, SA, FA, P, PE, ILQ)
- Demonstrate practical application for understanding cellular respiration and photosynthesis (C-SLO: #2, 3; CS, ILQ)
- Draw connections between cellular respiration and photosynthesis (C-SLO: #2; P, CS, SA, FA)
- Explain the connect between photosynthesis and global climate change (C-SLO: #2, 3; SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments DUE 10/4 @ 11:00 AM
U4 Photosynthesis & Intro to DNA	Sept 27-29	LECTURE 6 Cellular Respiration Case Study	LECTURE 7 Photosynthesis Case Study	RECITATION 4 Scientific Presentation & Photosynthesis	LAB 4 Cells and Cellular Respiration LAB 3 Observations	POST LAB 4 Cells and Cellular Respiration
		READING Chapter 6: Dietary Energy and Cellular Respiration (114-129)	READING Chapter 5: Energy and Photosynthesis (94-108)			

WEEK 5: CONSTRUCTING LIFE – DNA REPLICATION & PROTEIN SYNTHESIS

Weekly Student Learning Outcomes

- Identify the major players in the discovery of the structure of DNA and describe the experiments that supported their assertions (C-SLO: #2; FA, SA)
- Describe the structure of DNA and explain how it is organized and replicated in cells (C-SLO: #2; SA, FA)
- Explain how DNA can be used in genetic profiling/forensics studies and compare the benefits of using DNA to other forensics means (C-SLO: #3; CS, FA)
- Evaluate the benefits of DNA techniques to society (C-SLO: #3; FA, SA, CS)
- Describe the steps of protein synthesis (C-SLO: #2; FA, SA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 10/11 @ 11:00 AM
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U5 DNA Replication and Protein Synthesis	Oct 4-6	LECTURE 8 DNA Structure/Replication Case Study	LECTURE 9 Protein Synthesis	RECITATION 5 Forensic Tools Simulation and Summary	LAB 5 Forensic Tools Exploration	ASSIGNMENT Forensic summary
		READING Chapter 7 DNA Structure & Replication (136-159)	READING Chapter 8 Genes to Proteins (162-176)			

WEEK 6: REPRODUCTION OF LIFE – MITOSIS, STEM CELLS & CANCER

Weekly Student Learning Outcomes

- Describe the process of mitosis and explain how it fits into the cell cycle (C-SLO: #2; ILQ, FA, SA)
- Explain how cell division is related to growth and reproduction (C-SLO: #2; ILQ, FA, SA)
- Identify the connection between mitosis and cancer (C-SLO: #; 2; ILQ, FA, SA, CS)
- Explain the different types of stem cells and how they can be used to cure disease (C-SLO: #2; FA, SA, CS)
- Explain how basic research is important to the discovery of treatments and cures for different cancers (C-SLO: #3; FA, SA, CS, D)
- Evaluate social decision making in light of biological principles, particularly pertaining to aspects of your daily life and societal issues (C-SLO: #2, 3 D)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 10/18@ 11:00 AM
U6 Mitosis, Stem Cells & Cancer	Oct 11-13	LECTURE 10 Mitosis	LECTURE 11 Stem Cells & Cancer	RECITATION 6 Peer Review - Forensics Summary	LAB 6 Conduct Mitosis Simulation	POST LAB 6 Mitosis Simulation EXAM 2 Units 4-6
		READING Chapter 9 Cell Division & Mitosis (192-207)	READING Chapter 10 Mutations & Cancer (212-224) Chapter 13 Stem Cells & Cell Differentiation (282-295)	Data Analysis & Scientific Presentation	LAB 3 Observations	

WEEK 7: REPRODUCTION OF LIFE – MEIOSIS & MUTATIONS

Weekly Student Learning Outcomes

- Describe the steps of meiosis and compare these to mitosis (C-SLO: #2; FA, SA)
- Explain how meiosis increases genetic diversity (C-SLO: #2; FA, SA, CS)
- Compare and contrast the process of gamete formation in oogenesis and spermatogenesis (C-SLO: #2; FA, SA)
- Identify different ways in which sex can be determined in humans and compare this to other organisms (C-SLO: #2; FA, SA, CS)
- Explain how crossing over of sex chromosomes can lead to variability in sex determination (C-SLO: #2; FA, SA, CS)
- Identify consequences of mutations can occur through errors in transcription (C-SLO: #2; FA, SA)
- Distinguish between point mutations and chromosomal abnormalities (C-SLO: #2; FA, SA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In Person)		Assignments DUE 10/25 @ 11:00 AM
U7 Meiosis & Mutations	Oct 18-20	LECTURE 13 Meiosis & Mutations	LECTURE 12 Sex Determination Case Study	RECITATION 7 Scientific Presentations	LAB 7 Meiosis Concept Drawings & Simulation	POST LAB 7 Meiosis Drawings and Concept Maps ASSIGNMENT Photosynthesis Presentations

		READING Chapter 11 Single-gene Inheritances and Meiosis (228-235)	READING None		LAB 3 Final observations, gather data, work on presentations	
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WEEK 8: INHERITING LIFE – GENETICS

Weekly Student Learning Outcomes

- Summarize Mendel's Laws of segregation and independent assortment (C-SLO: #2; TLQ; FA, SA, CS)
- Explain how Mendel's laws relate to meiosis (C-SLO: #2; TLQ; FA, SA)
- Predict the phenotypes and genotypes of offspring from crosses involving one or two genes (C-SLO: #2; TLQ; SA, FA)
- Determine the phenotypic and genotypic probabilities in sex-linked and codominant alleles (C-SLO: #2)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 11/1 @ 11:00 AM
U8 Mendelian & Non-Mendelian Genetics	Oct 25-27	LECTURE 14 Mendelian Genetics	LECTURE 15 Non-Mendelian Genetics	RECITATION 8 Photosynthesis Presentations Peer Review	LAB 8 Mendel's Experiments & Toe Length with Group	ASSIGNMENT Pedigree (Extra credit) POST LAB 8 Mendel's Experiments & Toe Length EXTRA CREDIT: Pedigree
		READING Chapter 11 Single-gene Inheritances and Meiosis (236-254)	READING Chapter 12 Complex Inheritance (256-277)			

WEEK 9: ENGINEERING LIFE - BIOTECHNOLOGY

Weekly Student Learning Outcomes

- Describe basic tools of biotechnology and how they are applied to society
- Evaluate the pros and cons of GMOs and biotechnology

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 11/8 @ 11:00 AM
U9 Biotechnology	Nov 1-3	LECTURE 16 Biotechnology	LECTURE 17 Genetic Engineering	RECITATION 9 BEING A SCIENTIST - Zooniverse Exploration/Idea, Hypothesis & Data analysis, Poster template	LAB 9 Biotechnology	LAB 9 Hypothesis EXAM 3 Units 7-9
		READING Chapter - none	READING Chapter - none			

WEEK 10: THE EVOLUTION OF LIFE – NATURAL SELECTION & EVOLUTION

Weekly Student Learning Outcomes

- Describe the historical importance of Darwin's journey and how these experiences lead to the formation of Natural Selection (C-SLO: #2; SA, FA)
- Explain how the four postulates of natural selection can give rise to evolution (C-SLO: #2; TLQ, SA, FA)
- Explain the four mechanisms of evolution (natural selection, mutation, genetic drift, migration) (C-SLO: #2)
- Explain and provide an example of sexual selection and explain how it fits in with ideas of natural selection (C-SLO: #2; FA, SA)
- Be able to explain how populations evolve through natural selection (C-SLO: #2; TLQ, SA, FA)
- Be able to explain the evidence for the occurrence of evolution (C-SLO: #2; TLQ, SA, FA)
- Compare and contrast the differences in the rates of evolution (punctuated equilibrium vs. gradual evolution) (C-SLO: #2; TLQ, SA, FA)
- Describe an example of evolution in action (C-SLO: #2; TLQ, SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 11/15 @ 11:00 AM
U10 Natural Selection & Mechanisms of Evolution	Nov 8-10	LECTURE 18 Natural Selection	LECTURE 19 Mechanisms of Evolution	RECITATION 10 BEING A SCIENTIST Zooniverse Data Collection	LAB 10 Natural Selection Simulation	POST LAB: Natural Selection DISCUSSION POST: Discussion Darwin's Dangerous Idea LAB 9 Zooniverse Poster
		READING Chapter 14 Natural Selection & Adaptation (302-328) Watch Darwin's Dangerous Idea	READING Chapter 16 Evidence for Evolution (352-367)			

WEEK 11: THE DIVERSITY OF LIFE – BIODIVERSITY & LIFE ON EARTH

Weekly Student Learning Outcomes

- Describe the main characteristics and provide examples of the 9 phyla of organisms (C-SLO: #2; TLQ, SA, FA)
- Define biodiversity and distinguish between the three types of biodiversity (species, genetic and ecosystem) (C-SLO: #2; TLQ, SA, FA)
- Describe general patterns in biodiversity (C-SLO: #2; TLQ, SA, FA)
- Explain the Theory of Island Biogeography and apply these concepts to conservation management strategies (C-SLO: #2; SA, FA)
- Explain threats to biodiversity and evaluate the influence of humans on variation in biodiversity (C-SLO: #2, 3; TLQ, SA, FA)
- Draw connections between evolution and biodiversity (C-SLO: #2; TLQ, SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments DUE 11/22 @ 11:00 AM
U11 Biodiversity	Nov 15-17	LECTURE 20 Life on Early Earth & Biodiversity Definitions	LECTURE 21 Biodiversity Definitions and Issues	RECITATION 11 Zooniverse Poster Session	LAB 11 Effects of Environmental Toxins on Worms – Introduction & Practice procedures, Methods & Experimental Design	LAB 11 Hypothesis, lab supply list
		READING Chapter 17 Life on Earth (372-386)	READING Chapter 23 Ecosystem Ecology (486-515)			

WEEK 12: THE DIVERSITY OF LIFE – PROKARYOTIC DIVERSITY

Weekly Student Learning Outcomes

- Describe the main characteristics and provide examples of the 9 phyla of organisms (C-SLO: #2; TLQ, SA, FA)
- Define biodiversity and distinguish between the three types of biodiversity (species, genetic and ecosystem) (C-SLO: #2; TLQ, SA, FA)
- Describe general patterns in biodiversity (C-SLO: #2; TLQ, SA, FA)
- Explain threats to biodiversity and evaluate the influence of humans on variation in biodiversity (C-SLO: #2, 3; TLQ, SA, FA)
- Draw connections between evolution and biodiversity (C-SLO: #2; TLQ, SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 11/22 @ 11:00 AM
U12 Prokaryotic Diversity	Nov 22-23	LECTURE 22 Bacteria LECTURE 23 Protists & Fungi	LECTURE – no lecture: Thanksgiving	NO RECITATION due to Thanksgiving	NO LAB meeting due to Thanksgiving	ASSIGNMENT: None
		READING Chapter 18 Prokaryotic Diversity (390-404)				
		READING Chapter 19 Eukaryotic Diversity (410-413, 422- 423)				

WEEK 13: THE DIVERSITY OF LIFE – PLANTS & ANIMAL DIVERSITY

Weekly Student Learning Outcomes

- Describe the main characteristics and provide examples of the 9 phyla of organisms (C-SLO: #2; TLQ, SA, FA)
- Define biodiversity and distinguish between the three types of biodiversity (species, genetic and ecosystem) (C-SLO: #2; TLQ, SA, FA)
- Describe general patterns in biodiversity (C-SLO: #2; TLQ, SA, FA)
- Explain threats to biodiversity and evaluate the influence of humans on variation in biodiversity (C-SLO: #2, 3; TLQ, SA, FA)
- Draw connections between evolution and biodiversity (C-SLO: #2; TLQ, SA, FA)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments DUE 12/6 @ 11:00 AM
U13 Eukaryotic Diversity	Nov 29-Dec 1	LECTURE 24 Plant Diversity	LECTURE 25 Animal Diversity	RECITATION none	LAB 11 Effects of Environmental Toxins on Worms – Gather Data	LAB 12: Survey of Eukaryotic Organisms
		READING Chapter 19 Eukaryotic Diversity (414-417)	READING Chapter 19 Eukaryotic Diversity (417-421)			
					LAB 12 Survey of Eukaryotic Organisms	

WEEK 14: THE GROWTH & INTERACTIONS OF LIFE – POPULATION & COMMUNITY

Weekly Student Learning Outcomes

- Describe the trends and causes of exponential and logistic growth models for populations (C-SLO: #2; SA, FA, TLQ)
- List factors limiting population growth (C-SLO: #2; SA, FA, TLQ)
- Describe human population growth and the implications of this growth (C-SLO: #2; SA, FA)
- Explain sustainability as it relates to resource management and ecological footprints (C-SLO: #2; SA, FA)
- Describe how food web interactions can alter biodiversity (C-SLO: #2; SA, FA, TLQ)
- Explain how energy is transferred from one trophic level to another (C-SLO: #2; SA, FA, TLQ)
- Define niche and compare and contrast fundamental and realized niche (C-SLO: #2; SA, FA, TLQ)
- Evaluate social decision making in light of biological principles, particularly pertaining to aspects of your daily life and societal issues (C-SLO: #2, 3 P)

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (Virtual)		Assignments DUE 12/13 @ 11:00 AM
U14 Population & Community Ecology	Dec 6-8	LECTURE 25 Population Ecology	LECTURE 26 Community Ecology	RECITATION Writing a Scientific Paper	LAB 11 Effects of Environmental Toxins on Worms – Data Analysis & Paper Writing	LAB 11 Effects of Environmental Toxins on Worms – Rough Draft
		READING Chapter 21 Population Ecology (448-462)	READING Chapter 21 Community Ecology (466-480)			

WEEK 15: THE GROWTH & INTERACTIONS OF LIFE – POPULATION & COMMUNITY

Weekly Student Learning Outcomes

- Recognize the multiple levels of complexity at which biological systems operate, from molecules to organisms, and explain the emergent properties and processes characteristic for each level.
- Describe mechanisms for continuity of life, including the processes of inheritance, development and evolution.
- Articulate the application of biological science to meeting the needs of society, including basic research, stewardship of biodiversity, human health, and entrepreneurial innovation.

UNIT	Date	Lecture 1 TUESDAY @ 11:00	Lecture 2 THURSDAY @ 11:00	Recitation & Lab WED @ 8, 11, 2 or THUR @ 8 (In-Person)		Assignments END OF FINAL EXAM WEEK
U15 Population & Community Ecology	Dec 13-15	LECTURE 27 Missing Seals Case Study	LECTURE 28 Review	RECITATION LAB 11 Effects of Environmental Toxins on Worms – Summary Presentation & Peer feedback	LAB 12 Population Ecology	ASSIGNMENT LAB 11 Effects of Environmental Toxins on Worms Paper LAB 12 Population Ecology EXAM 4: Units 10-14
		READING None	READING None			

WEEK 17: EVALUATING LIFE

Weekly Student Learning Outcomes

- Recognize the multiple levels of complexity at which biological systems operate, from molecules to organisms, and explain the emergent properties and processes characteristic for each level.
- Describe mechanisms for continuity of life, including the processes of inheritance, development and evolution.
- Articulate the application of biological science to meeting the needs of society, including basic research, stewardship of biodiversity, human health, and entrepreneurial innovation.

U16
Final Exam

Dec
19-22

Finals Week Take the exam during this week. You will have 2 hours to complete the exam

EXAM 4: Units 10-14