

# BIOLOGY 100

Fall 2020

## 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.

*\* 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.



## Biological Principles & the Human Environment

**Dr. Krista Slemmons**

CBB 347

kslemmon@uwsp.edu

<http://paleodiatom.com>

715-346-2453

*Office hours:*

Tues & Thur 12:00-1:00

[Zoom Link](#)

Meeting ID: 953 7230 1423

Passcode: 760004

## LECTURE

Tues & Thur 11-11:50

**Online**

## LAB (CBB 130):

Sect. 1A Thur 8-8:50

1B Thur 9-9:50

1C Thur 10-10:50

Sect. 2A Wed 11-11:50

2B Wed 12-12:50

2C Wed 1-1:50

Sect. 3A Wed 2-2:50

3B Wed 3-3:50

3C Wed 4-4:50

Sect 4A Fri 8-8:50

4B Fri 9-9:50

4C Fri 10-10:50

**REQUIRED TEXTBOOK:** *Biology for a Changing World*, Second edition, Shuster, Vigna, Tontono, Sinha

**REQUIRED LAB MANUAL:** *Biology 100 Laboratory Manual* – Available on 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
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
Interpret information, solve problems, and make decisions by applying natural science concepts, methods and quantitative techniques.  Infer relationships, make predictions and solve problems by <b>synthesizing</b> content derived from biological principles including: <ol style="list-style-type: none"> <li>1. Cellular level functions necessary for life</li> <li>2. Inheritance &amp; evolutionary change</li> <li>3. The diversity of life within an evolutionary context</li> <li>4. The basic function of populations, communities and ecosystems.</li> </ol>	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"> <li>• Critical Thinking Lesson Module</li> <li>• Assessment Instrument (both found on CANVAS)</li> </ul>
CT & H	<b>Identify</b> , analyze, evaluate or <b>construct</b> reasoning as it is applied to general or discipline-specific questions or issues	<ul style="list-style-type: none"> <li>• Identify reasoning from a scientific paper</li> <li>• Creation of an argument for labs 1-8</li> </ul>
H	Foster intellectually curiosity through engagement in a citizen science research project	<ul style="list-style-type: none"> <li>• Participation in the project</li> <li>• Poster Presentation</li> </ul>

**ASSESSMENTS/GRADING:**

**LECTURE:**

4 Lecture exams (400 points each)	= 400 points
20 Online Quizzes (5 points)	= 100 points
<b>Subtotal</b>	<b>= 500 points</b>

**LAB:**

12 Post-labs (15 points each)	= 180 points
2 Presentations (one poster, one oral, 50 points each)	= 100 points
4 Peer evaluations (5 points each)	= 20 points
1 Scientific Paper, Bacteria	= 50 points
<b>Subtotal</b>	<b>= 350 points</b>

**RECITATION:**

15 Recitation Assignments/Discussions (10 points)	=150 points
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<b>Total</b>	<b>= 1000 points</b>
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**CRITICAL THINKING ADDITIONAL GRADES (INCLUDED IN ABOVE TOTALS)**

Critical Thinking Module/Quiz	=5 points
Scientific Reasoning Paper	=10 points

<b>Total additional points</b>	<b>= 15 points</b>
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**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.

**Exam 1**        **Sept 17-20**  
**Exam 2**        **Oct 8-11**  
**Exam 3**        **Oct 29- Nov 1**  
**Final Exam**   **Dec 14-18**

**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. While lecture is not mandatory, quiz questions will be based solely on content I present during that lecture.

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:**

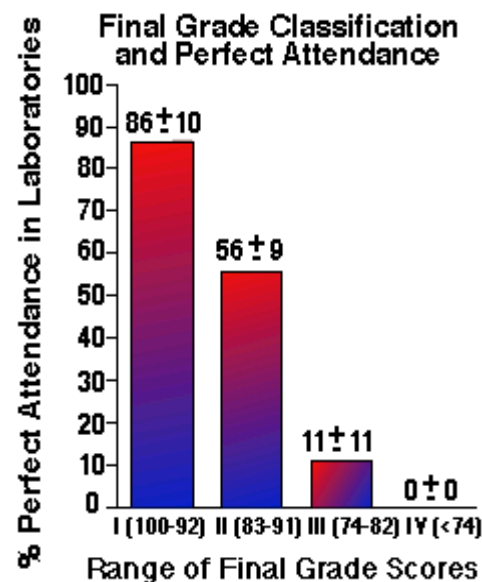
There will be seven case studies throughout the semester. Case studies involve a real-world application of some topic that we are covering in class. Case studies may be presented through online videos, a reading or participating in class discussions. Students will answer questions based on these case 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 exit slip on CANVAS.

**RECITATION:**

Regular attendance to recitation (either in-person or virtually) is imperative for success in this course. I would encourage you to attend synchronously if you can. If not a recording of the recitation will be provided for you. I also encourage you to regularly communicate with your lab partners and form a virtual study group.

**LAB REPORT:**

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. However, some portions of the lab will be solely graded based on completion. There is one formal lab report due based on the Laboratory 12: Bacteria. The requirements and rubrics for this report are available in CANVAS.



*Daniloff 1994*

**PRESENTATIONS:** Students will present in two different formats throughout the semester: 1) a group PowerPoint (or other means of presenting) on lab results from **LAB 2: Photosynthesis**, and 2) a **LAB 15 – Independent Research** poster presentation on a biological topic of your choosing. Those students that are **elementary education majors** will be required to create a lesson plan on a biological topic and illustrate an activity that demonstrates those learning objectives. Students that are not education majors are encouraged to create a poster that merges their discipline with that of Biology. Students will be constructing a rubric that will be used to evaluate posters. Each student will evaluate the posters 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 Sunday 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](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.

**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 6<sup>th</sup> floor of Albertson Hall (library) as soon as possible. DATC can be reached at 715-346-3365 or [DATC@uwsp.edu](mailto: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.

# Need Help?

## 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.

### Attend the review sessions at TLC.

Tutors are available to help students with lecture and lab material. Interested students are encouraged to contact the Tutoring-Learning Center.

### Contact Disability Services

Students with a disability requiring accommodations should register with the Disability and Assistive Technology Center in the Learning Resource Center (the Library) and contact me at the beginning of the course.

### Contact Counseling Center

The counseling center is located on the 3<sup>rd</sup> floor of Delzell Hall. These counselors can assist you with test anxiety, time management and personal struggles.

## TUTORING

The Tutoring-Learning Center (TLC) offers free group, drop-in, and individual 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. If you have questions about the schedules or would like to make an appointment, please visit the TLC in ALB 018 (library basement), email ([tlctutor@uwsp.edu](mailto:tlctutor@uwsp.edu)), or call (715) 346-3568 for information.

## Math and Science Tutoring – Fall 2020



What	Details	Schedule	Cost
Drop-In Tutoring	Via Zoom	<a href="https://www.uwsp.edu/tlc/Pages/dropInTutoring.aspx">https://www.uwsp.edu/tlc/Pages/dropInTutoring.aspx</a>	Free
Group Tutoring	Via Zoom, based on course section	<a href="https://www.uwsp.edu/tlc/Pages/schedules.aspx">https://www.uwsp.edu/tlc/Pages/schedules.aspx</a>	Free
One-on-One Tutoring	By appointment, via GoBoard. Weekly attendance required.	Complete online request form here: <a href="https://www.uwsp.edu/tlc/Pages/request-math-science-tutoring.aspx">https://www.uwsp.edu/tlc/Pages/request-math-science-tutoring.aspx</a>	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.

**Course Schedule** \*See Canvas for day-to-day schedule of assignments and activities.

**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	Lecture 2 THURSDAY	Lab ANYTIME DURING THE WEEK	Recitation ASSIGNED 50 MIN SECTION ON WED, THUR, FRI	Chapter Readings (PAGES)	Assignments DUE AT END OF THE WEEK ON SUNDAY AT 11:30 PM
U1 Nature of Science	Sept 2-4	No Class *Syllabus quiz *Self-Introduction Video	<b>LECTURE 1</b> Review Syllabus Intro to Biology Nature of Science Childbed Fever Case Study	None	<b>RECITATION:</b> Meet Lab Cohort How to Write a Scientific Conclusion (Sea butterfly example)	Chapter 1 (1-14) & Guided Questions	<b>QUIZ:</b> Syllabus Quiz <b>QUIZ:</b> Semmelweis Case Questions <b>QUIZ:</b> Intro to Critical Thinking <b>ASSIGNMENT:</b> Sea butterfly - Excel Graph <b>ASSIGNMENT:</b> Self-introduction Video

**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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U2 Chemistry & Characteristics of Life	Sept 8-11	<b>LECTURE 2</b> Nature of Science	<b>LECTURE 3</b> Characteristics & Chemistry of Life	<b>LAB 1:</b> Scientific Investigation	<b>RECITATION: LAB 2:</b> Plant Growth – experimental design & set up	Chapter 2 (20-38) & Guided Questions	<b>QUIZ:</b> Anatomy of an Experiment Video <b>QUIZ:</b> Nature of Science <b>QUIZ:</b> Characteristics of Life <b>ASSIGNMENT:</b> Lab 2 Hypothesis <b>LAB:</b> Scientific Investigation

**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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U3 Biomolecules & Cell Structure & Function	Sept 15-17	<b>LECTURE 4</b> Biomolecules & Enzymes - Peanut Butter Project Case Study	<b>LECTURE 5</b> Cell Structure & Function	<b>LAB 3:</b> Exploring the Chemistry of Life	<b>RECITATION:</b> Scientific Reasoning Start plant experiment	Chapter 4 (74-90) Chapter 3 (44-58 & 66-70) & Guided Questions	<b>QUIZ:</b> Biomolecules <b>QUIZ:</b> Cell structure & Function <b>ASSIGNMENT:</b> Scientific Reasoning <b>LAB:</b> Chemistry of Life  <b>EXAM 1:</b> Units 1-3

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U4 Cellular Respiration & Photosynthesis	Sept 22-24	<b>LECTURE 6</b> Cellular Respiration & Flea Dip Case Study	<b>LECTURE 7</b> Photosynthesis	<b>LAB 4:</b> Anaerobic respiration in Yeast	<b>RECITATION:</b> Scientific presentation Data analysis Lab 2	Chapter 6 (114-129) Chapter 5 (94-108) & Guided Questions	<b>QUIZ:</b> Life from Light & Photosynthesis <b>QUIZ:</b> Cellular Respiration <b>LAB:</b> Anaerobic respiration in Yeast

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U5 DNA Replication and Protein Synthesis	Sept 29- Oct 1	<b>LECTURE 8</b> Vampire Case Study	<b>LECTURE 9</b> Protein Synthesis	<b>LAB 5:</b> DNA Extraction	<b>Virtual Recitation Begins</b>  <b>RECITATION:</b> Forensics summary	Chapter 7 (136-159) Chapter 7 (162-176) & Guided Questions	<b>QUIZ:</b> DNA Structure History and Replication <b>QUIZ:</b> DNA structure, replication & protein synthesis <b>ASSIGNMENT:</b> Forensic summary

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U6 Mitosis, Stem Cells & Cancer	Oct 6-8	LECTURE 10 Mitosis	LECTURE 11 Stem Cells & Cancer	LAB 6: Mitosis Simulation	RECITATION: Stem Cell Debate	Chapter 9 (192-207) Chapter 10 (212-224) Chapter 13 (282-295) & Guided Questions	QUIZ: Mitosis, Cancer and Stem Cells ASSIGNMENT: Stem Cell Debate LAB: Mitosis Simulation  EXAM 2: Units 4-6

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U7 Meiosis & Mutations	Oct 13-15	LECTURE 12 Meiosis & Mutations	LECTURE 13 Sex Determination in Female Athletes Case Study	LAB:7: Meiosis Simulation	RECITATION: Data Analysis & Presentation Prep	Chapter 11 (228-254) & Guided Questions	QUIZ: Meiosis & Mutation ASSIGNMENT: Mutation mini research LAB: Meiosis

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U8 Mendelian & Non-Mendelian Genetics	Oct 20-22	LECTURE 14 Mendelian Genetics	LECTURE 15 Non-Mendelian Genetics	LAB 8: Genetics Simulation - Mendel's Experiments & Toe Length	RECITATION: Pedigree  Finalize Presentations	Chapter 12 (256-277) & Guided Questions	QUIZ: Mendel's Experiments Video QUIZ: Non-Mendelian Video ASSIGNMENT: Pedigree ASSIGNMENT: Photosynthesis Presentations LAB: Genetics Simulation

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U9 Biotechnology	Oct 27-29	LECTURE 16 Biotechnology	LECTURE 17 Genetic Engineering	LAB 9: Biotechnology	RECITATION: Peer Review Presentations		QUIZ: Biotechnology ASSIGNMENT: Peer review presentations LAB: Biotechnology  EXAM 3: Units 7-9

**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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U10 Natural Selection & Mechanisms of	10 Nov 3-5	LECTURE 18 Natural Selection	LECTURE 19 Mechanisms of Evolution	LAB 10: Natural Selection Simulation	RECITATION: Darwin’s Dangerous Idea	Chapter 14 (302-328) Chapters 15 (330-347) Chapter 16 (352-367) & Guided Questions	QUIZ: Natural Selection QUIZ: Evolution LAB: Natural Selection

**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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U11 Biodiversity	Nov 10-12	LECTURE 20 Life on Earth & Biodiversity Definitions	LECTURE 21 Biodiversity Issues	LAB 11: Island Biogeography simulation & Snapshot Serengeti Project	RECITATION: Data analysis of Wildlife – Snapshot Serengeti	Chapter 17 (372-386) & Guided Questions	QUIZ: Protist, Bacteria, Fungus Diversity QUIZ: Animal & Plant Diversity LAB: Island Biodiversity ASSIGNMENT: Hypothesis Wildlife occurrence

## WEEK 12: THE DIVERSITY OF LIFE – BACTERIA, ARCHAEA, PROTISTS & FUNGI 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U12 Bacteria, Protist & Fungi Diversity	Nov 17-19	LECTURE 22 Bacteria	LECTURE 23 Protists & Fungi	Lab 12: Bacterial growth lab set-up	RECITATION: Writing a scientific paper  Independent Research Project, Poster template	Chapter 18 (390-404) & Guided Questions	QUIZ: Isle Royal Video ASSIGNMENT: Wildlife Data Analysis Due ASSIGNMENT Poster abstract

## 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U13 Plant & Animal Diversity	Nov 24-26	LECTURE 24 Plant and Animal Diversity	No Class	Lab 13: Virtual Tour	RECITATION: Data analysis – Lab 12  Independent Research Project	Chapter 19 (410-423) & Guided Questions	QUIZ: Plant and Animal Diversity ASSIGNMENT: Reflection on virtual tour

## WEEK 14: THE GROWTH OF LIFE – POPULATION ECOLOGY

### 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)

UNIT	Date	Lecture 1	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U14 Population & Community Ecology	Dec 1-3	LECTURE 25 Population Ecology	LECTURE 26 Community Ecology & Missing Seals Case Study	Lab 14: Moose Wolf Simulation – Isle Royale	RECITATION: Independent Research Project	Chapter 21 (448-465) Chapter 22 (466-477) & Guided Questions	QUIZ: Population and Community Ecology LAB: Bacteria Paper Due LAB: Population Ecology

## WEEK 15: THE INTERACTIONS OF LIFE – ECOSYSTEMS & BIOGEOCHEMICAL CYCLES

**Weekly Student Learning Outcomes:**

- 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	Lecture 2	Lab	Recitation	Chapter Readings	Assignments
U15 Ecosystems & Biogeochemi	Dec 8-10	LECTURE 27 Ecosystems	LECTURE 28 Biogeochemical Cycles	Lab 15: Poster Presentations	RECITATION: Poster Presentation Peer Review	Chapter 23 (pages 486-515) & Guided Questions	QUIZ: Ecology QUIZ: Biogeochemical ASSIGNMENT: Posters Due

**WEEK 16: EVALUATING LIFE – FINAL EXAM**

**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 15-17	FINAL EXAM					ASSIGNMENT: Peer review posters (due by end of finals week)  EXAM 4: Units 10-15
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