NEW JERSEY CENTER
FOR TEACHING & LEARNING

Progressive Science Initiative® (PSI®)
BIOL6854: Learning and Teaching AP PSI Biology II

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Course Credit: 3.0 NJCTL credits

Dates & Times:
This is a 3-credit, self-paced course, covering 7 modules of content. The exact number of hours that you can expect to spend on each module will vary based upon the module coursework, as well as your study style and preferences. You should plan to spend approximately 15 hours per credit working online, and up to 30 hours per credit working offline.

Graduate Student Handbook: www.njctl.org/graduate-handbook/

COURSE DESCRIPTION:
This is the second in a four-course series which, together, are designed for those who are learning to teach AP Biology. This is a rigorous course that builds upon foundational topics in physics and chemistry, pulling them together to show how these fuel biological processes. Topics include membranes, water potential, enzymes, photosynthesis, cellular respiration, and cell signaling, as well as the methods used in sound scientific investigations.

STUDENT LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

1. Demonstrate an understanding of advanced biology topics, detailed in the module learning outcomes below.
2. Integrate PSI materials (including presentations, labs, practice problems, etc.) to support student learning and deliver effective instruction.
3. Create a social constructivist learning environment through the use of formative assessment questions, interpreting the results of this assessment to effectively facilitate student-led discussions that support deeper understanding of the content.

4. Integrate multiple attempts to demonstrate student mastery of content knowledge, as encouraged/fostered by the PSI pedagogy.
5. Implement learning plans that are aligned to College Board standards that allow for differentiation.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:
Required Texts:

PSI AP Biology uses a free digital textbook accessible at:
https://njctl.org/materials/courses/ap-biology-update-for-2022/

COURSE REQUIREMENTS:
In order to receive a Passing grade, the participant must complete the following course requirements:

1. Activities: A number of different learning activities will ensure participant engagement and learning in the course. These include:
   - Engage in video module lessons which demonstrate minimized direct instruction followed by frequent formative assessment
   - Completion of formative assessments aligned to learning objectives which include detailed analysis when answered incorrectly.
   - Interaction with module discussion boards that allow conversation with peers and course instructors about the module's content, delivering that content to students. Discussion boards also serve as a place to ask and answer questions related to the module's content.
2. Short Answer Assignment: Each module requires one (1) original response to a given prompt. These prompts are typically based upon course lessons and require teachers to analyze, reflect, and make connections between the module's content and their own classroom practice.
3. Mastery Exercises: For each module, these multiple-choice question quizzes assess the content knowledge gained in a module. Participants have the opportunity to retake; random questions are pulled from a larger question bank on each attempt ensuring varied questions.
4. Virtual Labs: For two modules, a virtual lab write-up will be submitted. Virtual Labs prepare you to teach hands-on labs that promote a deeper understanding of the content knowledge being learned through real-world applications and analysis.
5. Module Exam: One is completed at the end of each (or every other) module. These are culminating exams consisting of multiple choice and free response questions aligned to the standards and objectives of the module.
6. Reflection Paper: At the end of the course, participants are required to reflect on the knowledge taught in the course, make connections, and compare/contrast their current pedagogy with new strategies gained in this assignment.
7. Final Exam: At the end of the course, a comprehensive exam consisting of Multiple Choice and Free Response questions assesses the content knowledge learned throughout the course.

GRADE DISTRIBUTION AND SCALE:
Grade Distribution:

Module Exams	70%
Final Exam Labs Short Answer Assignments	10% 6% 6%
Mastery Exercises	6%
Reflection Paper	2%

Grade Scale:

A	93 – 100
A-	90 – 92
B+	86 – 89
B	83 – 86
B-	80 – 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D	60.0 – 69.9
F	59.9 or below

GRADING RUBRIC:
The following rubric is used to score:

- Short Answer Assignment – 6% of grade
- Reflection Paper – 2% of grade

The minimum possible score for this rubric is 4 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score 25 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

	Meets Expectation	**Approaches Expectation**	**Below Expectation**	**Limited Evidence**
	7 points	***5 points***	***3 points***	***1 point***
Content	• Demonstrates excellent knowledge of concepts, skills, and theories relevant to topic.	• Demonstrates fair knowledge of concepts, skills, and theories.	• Demonstrates incomplete or insubstantial knowledge of concepts, skills, and theories.	• Demonstrates little or no knowledge of concepts, skills, and theories.

Depth of Reflection	• Content is well supported and addresses all required components of the assignment.	• Content is partially supported; addresses most of the required components of the assignment.	• Content contains major deficiencies; addresses some of the required components of the assignment.	• Content is not supported and/or includes few of the required components of the assignment.
Evidence and Practice	• Response shows strong evidence of synthesis of ideas presented and insights gained throughout the entire course. The implications of these insights for the respondent's overall teaching practice are thoroughly detailed, as applicable.	• Writing is mostly clear, concise, and well organized with good sentence/paragraph construction. Thoughts are expressed in a coherent and logical manner. There are no more than five spelling, grammar, or syntax errors per page of writing.	• Response is missing some components and/or does not fully meet the requirements indicated in the instructions. Some questions or parts of the assignment are not addressed. Some attachments and additional documents, if required, are missing or unsuitable for the purpose of the assignment.	• Response excludes essential components and/or does not address the requirements indicated in the instructions. Many parts of the assignment are addressed minimally, inadequately, and/or not at all.
	4 points	***3 points***	***2 points***	***1 point***
Writing Quality	• Writing is well-organized, clear, concise, and focused; no errors.	• Some minor errors or omissions in writing organization, focus, and clarity.	• Some significant errors or omissions in writing organization, focus, and clarity.	• Numerous errors in writing organization, focus, and/or clarity.

The following rubric is used to score:

- Labs – 6% of grade

The minimum possible score for this rubric is 2 points, and the score will be converted to the minimum grade available in this module (which is zero unless the scale is used). The maximum score 14 points will be converted to the maximum grade.

Intermediate scores will be converted respectively and rounded to the nearest available grade. If a scale is used instead of a grade, the score will be converted to the scale elements as if they were consecutive integers.

	Meets Expectation	**Approaches Expectation**	**Below Expectation**	**Limited Evidence**
	7 points	***5 points***	***3 points***	***1 point***

Completeness	• Lab write-up is complete with no missing fields.	• Lab write-up has 1-2 missing fields.	• Lab write up has 3-5 missing fields.	• There are more than 5 missing fields on the lab write-up.
Calculations	• All answers are calculated correctly.	• Most answers are calculated correctly, but there are 1-2 minor calculation errors.	• Most answers are calculated correctly, but there are multiple minor calculation errors, or 1-2 gross miscalculations.	• There are calculation errors throughout the lab.

The remaining types of assignments are not scored using a rubric. These assignments are scored using percentage correct to assign a letter grade. The assignments in this manner are as follows:

- Mastery Exercises – 6% of grade
- Module Exams – 70% of grade
- Final Exam – 10% of grade

Mastery Exercises can be retaken as many times as desired to ensure a high score. Due to the nature of these assignments, each time they are taken, they will be composed of ten unique questions pulled randomly from a larger question bank.

Module and Final Exams are scored using a curve, which allows us to keep content exams rigorous. Module Exams can be retaken one time. Final Exams cannot be retaken.

ACADEMIC STANDING:
NJCTL has established standards for academic good standing within a student's academic program. Students enrolled in any NJCTL online course must receive an 80 or higher to successfully complete a course and receive credit for that course. An 80 is equivalent to a GPA of 2.7 or B-. Additionally, students in an endorsement program must receive a cumulative GPA of 3.0 for all courses combined in order to successfully complete the program.

ACADEMIC INTEGRITY:
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /repurposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

CITING SOURCES WITH APA STYLE:
All students are expected to follow proper writing and APA requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments.

DISABILITY SERVICES STATEMENT:
We are committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Dean of Students, Melissa Axelsson, for additional information to coordinate reasonable accommodations for students with documented disabilities (melissa@njctl.org).

NETIQUETTE:
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

Module	Required Readings	Assignments
1 - Scientific Methods	• Discuss the scientific methods used in reliable experiments.	• Mastery Exercises
2 – Membranes	• Describe the roles of each of the components of the cell membrane in maintaining the internal environment of the cell. • Describe the Fluid Mosaic Model of cell membranes. • Explain how the structure of biological membranes influences selective permeability. • Explain how the structure of a molecule affects its ability to pass through the plasma membrane. • Describe the mechanisms that organisms use to maintain solute and water balance. • Membrane proteins are required for facilitated diffusion of charged and/or large polar molecules through a membrane. • Describe the processes that cells use to transport large objects into and out of the cell, including exocytosis and endocytosis (and pinocytosis and receptor-mediated endocytosis). • The Na+/K+ ATPase (pump) contributes to the maintenance of the membrane potential, (a source of potential energy). • Explain the role of ATP in the maintenance of concentration gradients and the movement of ions against their concentration gradients.	• Short Answer Assignment • Mastery Exercises • Lab

3 – Water Potential	• Explain the effect of surface area to volume ratios on the exchange of materials between cells or organisms in the environment. • Calculate surface area: volume ratios of cubes, spheres and rectangular solids using appropriate formulas. • Explain why the rate of exchange of materials is influenced by plasma membrane surface area, and how limitations on exchange influence cell size and shape. • Explain how more complex cell membrane structures, such as folds or villi, allow higher rates of exchange. • Explain how specialized structures and strategies are used for the efficient exchange of molecules between the cell and the environment. • Describe the role of the cell wall in maintaining cell structure and function. • Explain how concentration gradients affect the movement of molecules across membranes. • Explain how osmoregulatory mechanisms contribute to the health and survival of organisms. • Calculate the solute potential of a solution and use it to explain the way water moves in a living system to control internal solute composition/water potential.	• Short Answer Assignment • Mastery Exercises • Lab • Module Exam
4 – Enzymes	• Describe the role of energy in living organisms. • Explain how positive feedback affects homeostasis. • Explain how negative feedback helps to maintain homeostasis. • Describe positive and/ or negative feedback mechanisms. • Explain how changes to the structure of an enzyme may affect its function. • Explain how enzymes affect the rate of biological reactions. • Describe the properties of enzymes. • Describe the relationship between the functions of endosymbiotic organelles and their free-living ancestral counterparts.	• Short Answer Assignment • Mastery Exercises • Lab • Module Exam
5 – Photosynthesis	• Describe the role of energy in living organisms. • Explain how cells capture energy from light and transfer it to biological molecules for storage and use. • Describe the photosynthetic processes that allow organisms to capture and store energy.	• Short Answer Assignment • Mastery Exercises • Lab • Module Exam
6 - Cellular Respiration	• Describe the role of energy in living organisms. • Explain how cells obtain energy from biological macromolecules in order to power cellular functions. • Describe the processes that allow organisms to use energy stored in biological macromolecules.	• Short Answer Assignment • Mastery Exercises • Lab • Module Exam

7 - Cell Signaling	● Describe the ways that cells can communicate with one another. ● Explain how cells communicate with one another over short and long distances. ● Describe the components of the signal transduction pathway. ● Describe the role of the components of a signal transduction pathway in producing a cellular response. ● Describe the role of the environment in eliciting a cellular response. ● Describe the different types of cellular responses elicited by a signal transduction pathway. ● Explain how a change in the structure of any signaling molecule affects the activity of the signaling pathway.	● Short Answer Assignment ● Mastery Exercises ● Module Exam
8 - Reflection & Final Exam	● Review topics as desired ● Zoom meeting with instructor to review prior to final exam ● Discussion Board	● Reflection Paper ● Module Exam