Advanced Biology
Text: Miller & Levine Biology

Available as a concurrent course with UMPI: Bio 112

Course Description: This course introduces students to the concepts of organization of life forms, scientific theory, data collection, designing controlled experiments, and the chemistry of life. An in-depth study of topics include: the cell: structure and function, energy transformations, diffusion and osmosis; genetics and inheritance; evolution; ecology: population dynamics, cycles of matter, and biodiversity; and taxonomy. Throughout the course, students will develop/use models and analyze evidence from investigations to construct explanations of topic-related phenomena. Students may also be required to engineer a solution to a problem connected with a phenomenon. Material is covered in more depth and detail than in the standard sophomore biology class with higher expectations for student performance and products.

UMPI Drop/Withdrawal dates
Fall 2024 - Drop Date: ? Withdraw Date: ?
Spring 2025 - Drop Date: ? Withdraw Date: ?

Objectives: By the end of the year, you should be able to (this is not all inclusive):

- Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
- Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
- Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
- Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.
- Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
- Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
- Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
- Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Required Materials:

- Textbook: Miller & Levine Biology
- Notebook to take notes in
- Three Ring Binder or Folder to hold handouts/papers

Safety: Biology lab work can sometimes involve potentially hazardous substances and objects. For that reason, safety is a top priority. I will review any hazards associated with a lab with the class. There is no margin for error, so failure to prepare for a lab, improper use of safety equipment, or disregarding safety instructions will result in removing the student from the lab area and a **zero** for the lab. Repeat offenses will result in detention. Eating/Drinking is **NEVER** allowed on or near a lab table. There is no food or drink allowed in the lab area of the classroom – **EVER**.

Grading: This course is graded on a weighted system. Homework (5%), classwork (10%), and quizzes/minor labs (15%) are worth 30% of your grade as they are formative assessments. Tests (35%) and major labs/projects (35%) are worth 70% of the grade as they are summative assessments. **Do know that there are no retakes and no late work is accepted. NEW THIS YEAR: If your name ISN'T on your paper, it's a zero. I'm NOT chasing work.** It is YOUR responsibility to put your name on your paper. If work is illegible, it's a zero.

Throughout each quarter, grades are uploaded at least twice a week onto the school's online grading program, Web2School. I strongly suggest that you keep track of your grade there.

UMPI Letter Grade Conversion Scale

A + (97-100)	B+ (87-89)	C+ (77-79)
A (93-96)	B (83-86)	C (73-76)
A- (90-92)	B- (80-82)	C- (70-72)

***Anything below a letter grade of C- or a number grade of 70 is equivalent to a grade of F. The University of Maine at Presque Isle does not have a letter grade of D.**

Homework - Homework will be assigned nightly and checked routinely for completion and/or effort. The purpose of homework is to supplement and reinforce classroom activities. You will need to read at home to prepare for the next class. There will be activities from your online textbook. These will be assigned several days in advance. Homework will also include problem solving, worksheets, and scientific observations. Unless specifically told otherwise, homework must be handed in before the start of class in order to receive full credit. Homework will not be accepted once it has been reviewed in class. I do not expect perfection on homework, but I expect you to try to answer every question. If you do not understand an assignment, you are probably not alone, **so ask questions!!**

Labs/Projects – All lab write-ups must be neat, complete and written according to the lab format, which will be given to you. Do not lose the directions for writing lab reports; you will be using them all year. You will be expected to make up any missed labs due to absences.

Quizzes - These will never be "pop" quizzes. You will always have advanced notice.

Tests - Tests consist of a variety of multiple choice, matching, fill-in the blanks, true/false, short answer, labeling of diagrams, and essays. To do well on my tests, you must study your notes. Any missed quizzes or tests must be made up no longer than 1 week after the original testing day. A zero will be entered in the grade book until the test is made up. If the test is not made up within 1 week, the zero will stand. All tests will be

scheduled **at least two days** in advance and I will give you a guideline for material that will be covered on the test.

Absences: If you are absent, it is **your** responsibility to find out what you missed and to obtain notes, handouts, and assignments **from the website**, a fellow student, or as a LAST resort, the teacher. Generally, you will have 1 week to make-up work missed during an absence. It may be necessary for you to meet with me after school or in a free period to cover the material. If you are absent on the day of a test or quiz, you are expected to make it up the **NEXT DAY YOU RETURN**.

Late Work: Any assignment not turned in **by 2:30 PM the day it is due** is considered late and will receive a zero. If you are absent the day an assignment is collected, test or quiz is taken, a **ZERO** is put in the grade book. Once you hand in the missing work from an absence, the zero is removed. There are no late deadlines.

Extra Help, Office Hours, and Contact Information: I will be available for extra help Mondays and Wednesdays until 2:45 PM, learning lab every day, and other times by appointment. Make use of this time. I am more than happy to help you if you have questions or problems with anything we are working on.

I am available by phone at the school's phone number: (207) 425-2811
A better way to contact me is through e-mail at: smossy@sad42.us

I have a website where you can find all assignments, worksheets, review sheets, etc:

www.mossyscience.com

It is STRONGLY recommended that you check out the website to keep on top of missed assignments, etc.

Syllabus Overview (subject to change at any time). The major labs/projects are not a complete listing of all labs/activities completed by students.
These are only the topics and **some** of the labs. Links to some of the labs are provided. Each topic will have several activities and hands-on labs that are associated with them. Notes/Lecture are kept to a minimum, but there will be days we do take notes.

We will most likely **NOT** be going in the order of the book, so pay attention to the page numbers from the book for any readings.

NOTE: Blue-linked items go to labs/activities. Red-linked items go to biology/life science NGSS standards.

Quarter 1:

Introduction to Science and Biology: Reviews scientific method and discusses characteristics of life, communication of results; planning and carrying out experiments

Helicopter Lab - reviews scientific method

Pond Water Microscope Lab - gets students used to working with some of the tools of a scientist; accurate reading of equipment

Chemistry: Discusses importance and characteristics of water, pH of fluids, homeostasis, carbon compounds (proteins, nucleic acids, carbohydrates, lipids), reviews atomic structure

Apple Sauce Enzyme Lab - students work with plant enzymes

Cells: Reviews cell organelles and their functions, cell transportation (passive vs. active transport methods), plasma membrane, plant cells vs. animal cells, prokaryotes vs. eukaryotes, cell cycle/mitosis, energy transformation with respect to glucose, the details of the steps of photosynthesis and cell respiration (light dependent rxn, calvin cycle; glycolysis, krebs cycle, electron transport chain), carbon cycle, fermentation

Microscope Lab

Cell Parts Videos (students make these)

Osmosis Lab

Photosynthesis and Cellular Respiration - factors affecting photosynthesis, carbon dioxide cycling, plant pigment

Cell Cycle RSA Video Project (students make this video - includes steps/parts of cell cycle/mitosis)

Quarter 2:

Mendelian Genetics: Discusses Mendelian genetics, monohybrid and dihybrid crosses, probability/statistics and ratios, genotypes vs phenotypes

Punnett Square Practice

Human Genetics: Discusses pedigrees, sex-linked traits, incomplete dominance, codominance, polygenic traits, karotyping, meiosis, nondisjunction, feedback loops (lac operon)

Pedigrees - includes a case study where students have to create a pedigree from medical records, figure out the pattern of inheritance, figure out which family members are carriers, and include genotypes

Colorblindness Lab

Karyotyping Lab

DNA/RNA: Compares/Contrasts DNA and RNA, DNA replication, DNA Transcription, DNA Translation, role of DNA in protein synthesis, genetic variations/mutations, biotechnology processes (gel electrophoresis, PCR technique)

DNA Facts Model - students use information to figure out 3D model of DNA

DNA Database Informal Debate

Evolution: Discusses the process of evolution (genetic variation sources, competition for resources, survival of fittest), advantageous adaptations, natural selection, several pieces of evidence to support evolution

Finch Modeling - includes analyzing data from the Grants' records, using that information to explain why the average beak size increased

Beak Lab

HHMI Rock Pocket Mouse Camouflage Lab

Model Application - students use what they learned from the finches and apply that to two other scenarios

Fossil Mapping and fossil interpretation

Quarter 3:

Ecology: Discusses factors that affect carrying capacity, use graphs to support explanations about factors affecting populations, role of group behavior on survival, human population/demographics, matter cycling (water cycle, nitrogen cycle, carbon cycle), human impact on the biosphere, ways to reduce that impact

Isle Royale Moose vs. Wolves
Oh Deer! Activity
Human Demography
Population Graphing/Analyzing
Matter Cycling
Racing Extinction Project - after researching issues humans have caused for different organisms, and watching a video, students select one way they can reduce their own impact on the biosphere

Classification: Discusses classification system, cladograms, dichotomy keys, kingdoms, several activities/projects/labs for each kingdom to supplement students' project

Dichotomy Keys - students use dichotomy keys to identify unknown organisms
Kingdom Presentation Project - students create an interactive presentation using Nearpod to teach their peers about the different kingdoms
Bacterial Growth Lab - students design an experiment to answer a question of their choosing and collect bacterial samples, innoculate petri dishes, and analyze their results
Mold & Fungus (video)
Protist Microscope Lab

Quarter 4:

Earthworm Behavior Lab - students put earthworms into different environments and observe what the earthworms select
Frog Dissection Lab
Plants (video)

Human Body: Discusses body systems, homeostasis and feedback mechanisms, structure and function

Human Body System Commercials - students create videos for each body system
Skin Lab
Fatigue Lab - demonstrates a feedback mechanism (heart rate and response to exercise)
Virus Research
Digestion WebQuest
Heart Diagram

Plants (if time allows): Discusses plant tissues, gymnosperms vs angiosperms, vascular vs. nonvascular plants

Academic Integrity Policy

"Academic integrity violations strike at the heart of the educational mission of the University of Maine System. The academic community of the University of Maine System recognizes that adherence to high principles of academic integrity is vital to the academic function of the University. Academic integrity is based upon honesty. All students of the University are expected to be honest in their academic endeavors. All academic work should be performed in a manner that will provide an honest reflection of the knowledge and abilities of each student. All members of the academic community should regard any breach of academic honesty as a serious offense.

Academic integrity means not lying, cheating, or stealing. To cheat on an examination, to steal words or ideas of another, or to falsify the results of one's research corrupts the essential process by which knowledge is advanced. Cheating, plagiarism, fabrication of data, giving or receiving unauthorized help on examinations, and other acts of academic dishonesty are contrary to the academic purposes for which the University exists.

Violations of academic integrity include any actions that attempt to promote or enhance the academic standing of any student by dishonest means. Academic integrity means that one's work is the product of one's own effort, and that one neither receives nor gives unauthorized assistance in any assignment. Because advanced academic work depends on the sharing of information and ideas, academic integrity at the college level includes rigorous adherence to the conventions for acknowledging one's use of the words and ideas of other people.

Put plainly: academic honesty is very important. It is dishonest to cheat on exams, to copy term papers or to submit papers written by another person, to fabricate experimental results, or to copy parts of books, articles, or websites into your own papers without putting the copied material in quotation marks and clearly indicating its source." (Policy Manual - Academic Integrity - University of Maine System, 2020) Note: the full UMS Academic Integrity Policy can be accessed at:
https://www.maine.edu/board-of-trustees/policy-manual/section-314/

Sexual Discrimination Reporting

The University of Maine System is committed to creating a safe place for students. Because of this commitment, if you tell a teacher about an experience of sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct or any form of gender discrimination, your teacher is required to report this information to the Office of Equal Opportunity.

Advanced Biology – 2024-2025

STUDENT'S NAME: _____ (please print)

PARENT or GUARDIAN NAME: _____ (please print)

HOME PHONE: _____

PARENT or GUARDIAN E-MAIL (for monthly newsletter):

_____

I prefer to be contacted by (please circle one): HOME PHONE E-MAIL

My student has access to the following at home (please circle all that apply):

PRINTER COMPUTER INTERNET CELL PHONE

I have read and understand the course expectations and guidelines. Safety is essential. I understand that a failure to follow safe practices in the laboratory may lead to a grade of **zero** on the lab and/or detention for multiple violations.

If there are any questions about an assignment, project, or lab, I understand that I can call, check the website, or e-mail and expect a prompt response from the teacher.

Student's Signature: _____

Parent/Guardian's Signature: _____

Date: _____