

Sundown High School

Dual Credit Biology 1408 & 1409

Course Overview

In Dual Credit Biology (DC BIO) students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include: structures and functions of cells and viruses; growth and development of organisms; cells, tissues, and organs; nucleic acids and genetics; biological evolution; taxonomy; metabolism and energy transfers in living organisms; living systems; homeostasis; and ecosystems and the environment.

It is my hope that in my DC BIO class, students will develop a better grasp of biology and have a strong foundation in introductory college-level biology. I have structured the course around the four big ideas, enduring understandings, and science practices to encourage students with their understanding and appreciation for the study of life.

I believe that in order to become better humans, we must ask questions and seek answers to questions we did not even know existed. We advance ourselves through inquiry and investigation and this course will be no different.

Textbook Resource

- Zedalis, Eggebrecht. *Biology for AP Courses*. OpenStax and Rice University, 2024
- Campbell, et al. *BIOLOGY In Focus - 2nd Edition*. New York, NY: Benjamin Cummings, 2015

Teaching Strategies

As stated above, this DC BIO course is structured around the AP Biology four big ideas and enduring understandings identified in the AP Curriculum Framework to engage students. Along with in-class instruction, the students will conduct scientific investigations that are student-led and encourage their growth in the field.

At the end of this syllabus, you will find listed the outline of the DC BIO Curriculum Framework. Please use this as a reference for this course.

Social and Ethical Connections

Students will engage in discussions and activities that will allow them to connect their classroom knowledge to socially important issues. These issues will be discussed in a class setting, electronically and through research and reports. As new and more relevant topics appear, the following list is tentative.

- Cloning Research
- COVID and Viral Research
- Global Climate Changes
- Antibiotic Resistance
- CRISPR CAS9 Research

Laboratory Investigations

Science is all about inquiry, and this DC BIO course will be no different. Along with teacher-led, guided lessons, at least 25 percent of instructional time will be dedicated to laboratory investigations which will emphasize the major points within the DC BIO curriculum framework. These activities will be assessed through short homework summaries or through the Brain Catalyst (bell ringers) assignments, group projects and presentations.

As with the majority of this course, the open, student-led lab investigations will help spur scientific thinking and readiness for a college-level biology course. We will perform a minimum of ten inquiry based investigations from the laboratory text or other appropriate DC BIO based investigation. All levels of inquiry will be used and all seven science practice skills will be used by students on a regular basis in formal labs as well as activities outside of the lab experience. The investigations generally follow the format of a guided section, followed by a student designed, open section which allows the students to expand on their understanding of the topic within the curriculum framework. Assessments of these investigations include, but are not limited to: short pre-lab questions, embedded activity questions, lab notebook documentation, and written lab reports.

Technology Use

We will use a great deal of technology in and out of the classroom. While technology is an amazing tool in science, it can also be an inconvenience or could lead to trouble if used incorrectly. When using any form of technology for this course, we will observe the district's responsible use policy. When interacting with the teacher, other students, or community members outside of the district, we will conduct ourselves in a manner respectful to all parties.

Students are expected to become proficient using the Google Suite for education apps including Docs, Sheets, Slides, Sites and Classroom. We will be using these tools to communicate lab findings, analyze sample data and research and present concepts that fit within the framework. You will need your Chromebook every period. Other online tools such as EdPuzzle and Wayground may be used to supplement classroom instruction.

Grading

60% Major Grade (tests, quizzes, and projects), 40% Minor Grade (daily grades, homework, and labs). Late work will only be accepted following the Sundown Student Policy.

Major Grades: Tests and Retests

There will be eight (8) exams (see framework below). At the end of each semester, a semester exam will be given which can replace a lower test grade. If the student has an A (as per grading scale), the student can exempt the final exam. Each test may contain some cumulative material from previous topics. Each unit exam will be scheduled at least one class period after the completion of that unit. The exams may contain both new material and material from previous units. Tests will be a combination of multiple choice (MCQ) and free-response questions (FRQ). Each exam will be time limited.

After each Chapter exam (not the finals), students will have the opportunity to take a re-test covering the same material. The re-test will be optional for students, however it will be required for students earning below a 50% passing threshold. Students wishing to take a re-test must complete a re-test

form and attend at least one before-school tutorial period. Students will need to sign up for a re-test date within a 5 class day period of the original exam being returned, but must be taken within the same 6-weeks grading period as the original exam. The higher of the two test grades will be recorded.

Major Grades: Projects and Quizzes

Major projects, such as but not limited to posters or written lab reports, will typically be graded as a gallery walk or may be peer graded. Quizzes will be used to break up larger Units or after major topics within a unit. Quizzes will be open notes, but also time limited. There will be no corrections or re-takes for quizzes.

Minor Grades: Classwork and Homework

As this is a college level course, assume that there will be homework every night. The assignments will range from EdPuzzle notes over a topic, to written lab reports, to a FRQ to be discussed the next class period. As many of the homework assignments will be discussed in class the next period, late work will strictly follow the Sundown Student Handbook policy.

If you need help with any homework, I strongly encourage you to form a study group or work with a partner. Before you ask for help, make an attempt to complete the work on your own, but remember the following: 1) when necessary, all work must be shown and 2) directly copying someone else's work is considered plagiarism and will be graded as such. If you do copy work from another student, you are only hurting yourself because you will not have the same opportunity during quizzes and exams in which you will be required to know the same type of material as found on the homework.

Late work will follow the Sundown Student Handbook. Late work will receive a 30% reduction in final grade. After two class periods, there will be a 50% reduction in final grade. The assignment will not be accepted after three class periods have passed.

Minor Grades: Daily Grades

Daily grades may include, but are not limited to participation in classroom discussion, note taking, worksheets and labs. Brain Catalyst assignments are daily mini-quizzes given at the beginning of the class period. These Brain Catalysts will consist of a few rigorous questions based on the previous class's material or an assignment given the day before.

Laboratory Investigations

Laboratory investigations will include student inquiry labs that follow the major topics of the course. Students will work in groups of 4 or fewer and are responsible for reading the lab material before the lab and responsible for answering any follow-up questions. Students may be asked to present their lab findings either individually or as a lab group.

Tentative Lab Investigation Outline

Listed below are the tentative unit outlines, which may need to be adjusted due to time. Described in the unit outlines are brief summaries and how each unit engages in the curriculum framework. Also listed are any major AP biology investigation(s) and how it/they fit into the curriculum framework. Keep in mind however, the investigations listed are not the only activities the student will conduct in each unit. As stated above, over 25% of the class time will be devoted to student-led inquiry.

Unit 1 - The Chemistry of Life [Big Ideas 2, 3, and 4]			
Unit Summary	- Unit one will review the students on topics seen in their freshman year biology course. Topics include an introduction to AP Biology, a general biology refresh, and a physical and biological chemistry review.		
Major Investigation	AP Lab #11 - Macromolecules in Common Food	Essential Knowledge	1.A.1, 1.A.2, 1.B.1, 1.B.2, 1.C.1
		Learning Objectives	1.A, 1.B, 1.C
		Science Practices	1.A-C, 2.A-D, 3.A-E, 4.B, 5.D, 6A-E

Unit 2 - Cell Structure and Function [Big Idea 1, 3, and 4]			
Unit Summary	- In unit two, the students will discuss the topics of general cell structure, the importance of cell size, plasma membrane structure and function as well as cellular transport mechanisms and tonicity.		
Major Investigations	AP Lab #4 - Osmosis and Diffusion	Essential Knowledge	2.B.1, 2.B.2, 2.C.2, 2.D.3, 3.E.2
		Learning Objectives	2.9, 2.12, 2.16, 2.18, 3.44, 3.49
		Science Practices	1.4, 2.2, 3.1, 4.2, 4.3, 5.1, 5.3, 6.1, 6.2, 6.4, 7.2

Unit 3 - Cellular Energetics [Big Idea 3, and 4]

Unit Summary	- In unit three, the students will discuss the topics of cellular energy, including enzyme activity, photosynthesis and cellular respiration		
Major Investigations	AP Lab #13 - Enzyme Activity	Essential Knowledge	1.B.1, 2.D.1, 4.A.1, 4.B.1
		Learning Objectives	1.9, 1.16, 2.24, 4.3, 4.17
		Science Practices	4.2, 5.1, 6.1, 7.2
	AP Lab #6 - Cellular Respiration	Essential Knowledge	1.B.1, 2.A.1, 2.A.2, 2.B.3, 4.A.2, 4.A.6
		Learning Objectives	1.14, 1.15, 2.1, 2.2, 2.4, 2.13, 4.5, 4.14
		Science Practices	1.4, 2.2, 3.1, 6.1, 7.2
	AP Lab #5 - Plant Pigments and Photosynthesis	Essential Knowledge	2.A.2, 2.D.1, 4.A.6
		Learning Objectives	2.5, 2.8, 2.9, 2.24, 4.14
		Science Practices	2.2, 3.1-3, 4.2, 4.3, 5.1, 6.1, 6.2, 7.2

Unit 4 - Cell Communication and the Cell Cycle [Big Idea 2, and 3]

Unit Summary	- In unit four, the students will discuss the topics of cellular communication, feedback mechanisms, signal transduction, and the steps and regulation of the cell cycle.		
Major Investigations	AP Lab #7 - Mitosis and Meiosis, part 1	Essential Knowledge	3.A.1-3, 3.C.2
		Learning Objectives	2.37, 3.3, 3.8, 3.9-15
		Science Practices	2.1, 2.2, 3.1, 4.1-3, 5.1, 6.1, 6.2, 7.1, 7.2

Unit 5 - Heredity [Big Idea 1, 2, and 4]

Unit Summary	- Unit five will cover the pathway of meiosis as well as the topics of Mendelian genetics, inheritance, gene expression, DNA Technology, and a comparison of eukaryotic and prokaryotic genome.		
Major Investigations	AP Lab #7 - Mitosis and Meiosis, part 2	Essential Knowledge	3.A.1-3, 3.C.2
		Learning Objectives	2.37, 3.3, 3.8, 3.9-15
		Science Practices	2.1, 2.2, 3.1, 4.1-3, 5.1, 6.1, 6.2, 7.1, 7.2

Unit 6 - Gene Expression and Regulation [Big Idea 2]

Unit Summary	- Unit six examines the structural properties of DNA and RNA alongside the central dogma of molecular biology, exploring how these mechanisms govern gene expression and suppression. Furthermore, students will investigate the impact of mutations and the role of genetic technologies in modulating the expression of specific genes.		
Major Investigations	AP Lab #8 - Biotechnology: Bacterial Transformation	Essential Knowledge	3.A.1, 3.B.2, 3.C.1, 3.C.2
		Learning Objectives	3.3-5, 3.19, 3.21, 3.23, 3.27
		Science Practices	1.4, 2.2, 4.3, 5.1, 5.3, 6.2
	AP Lab #9 - Biotechnology: Restriction Enzymes Analysis of DNA	Essential Knowledge	3.A.1, 3.A.3, 4.A.1
		Learning Objectives	3.1, 3.4, 3.6, 4.1, 4.2, 4.3
		Science Practices	1.4, 4.1, 4.3, 5.1, 6.1, 6.2, 7.2

Unit 7 - Natural Selection [Big Idea 1 and 3]

Unit Summary	- Students will explore aspects of evolution and natural selection, taxonomy and nomenclature, cellular evolution, evolution of plants and animals, as well as how to create cladograms to show speciation. Students will also cover topics of population biology and Hardy-Weinberg.		
Major Investigations	AP Lab #1 - Artificial Selection	Essential Knowledge	1.A.1, 1.A.2, 1.C.3
		Learning Objectives	1.1-5
		Science Practices	1.5, 2.2, 5.3, 7.1
	AP Lab #2 - Mathematical Modeling: Hardy-Weinberg	Essential Knowledge	1.A.1-3, 1.C.3
		Learning Objectives	1.1, 1.25, 1.26, 1.3, 1.4, 1.6, 1.7
		Science Practices	1.2, 1.4, 2.1, 2.2, 5.3
	AP Lab #3 - Comparing DNA with BLAST	Essential Knowledge	1.A.3, 1.A.4, 1.B.2, 1.C.3
		Learning Objectives	1.9, 1.11-13, 1.15, 1.17-19
		Science Practices	1.1-3, 3.1, 3.3, 4.1-3, 5.1, 5.3, 6.1, 6.2, 7.2

Unit 8 - Ecology [Big Idea 1, 2, and 4]

Unit Summary	- In unit eight, students will study the movement of free energy within organisms and their environments. The students will also analyze biomes and ecosystems, interaction of species and populations, as well as primary and secondary succession.		
Major Investigations	AP Lab #10 - Energy Dynamics	Essential Knowledge	2.A.1-3, 4.A.6
		Learning objectives	2.1-3, 2.22, 2.23, 4.14, 4.16
		Science Practices	2.1, 2.2, 3.2, 4.1-3, 5.1-3
	AP Lab #12 - Animal Behavior	Essential Knowledge	2.D.1, 2.E.3, 4.A.6, 4.B.4
		Learning objectives	2.22-24, 2.38-40, 4.14-16, 4.19
		Science Practices	1.3, 2.2, 3.2, 4.2, 5.1, 6.1, 7.2

Advanced Science Contract

Dual Credit courses are designed to challenge students with a more rigorous curriculum. It is assumed that participants in these courses have acquired a level of proficiency beyond basic reading, writing, computation, and study skills; therefore, the instructional emphasis in these courses is on higher-level thinking skills as well as on more complex levels of structure and style in composition. Students are expected to attend class and be an active participant in classroom discussions.

In order to preserve the integrity of college-ready and honors courses, the following guidelines will be used:

- Acceptance into courses will be based on prior grades, STAAR mastery, teacher recommendation, and attendance.
- Students who have more than five non-school related absences in one semester (except in cases of extenuating circumstances as determined by the teacher) will be encouraged to withdraw from the course. Each class period will cover a large amount of material and more than 5 absences may be difficult to recover.
- Students who make below a six weeks average of 70% (without the added points) the first six weeks grading period will be encouraged to withdraw from the course as the course rigor or structure may be too difficult at the present time.
 - Students that make below a six weeks average of 70% (without the added points) for a second time during the same semester will be asked to withdraw. As this is a dual credit course, the student may be at risk of failing the semester which will greatly affect their future college courses.
- Any student who falls below 70% (without the added points) at the end of the first semester will be allowed to take the second semester of dual credit biology.
- Any student who makes below 55% (without the added points) any six weeks during a semester will be asked to withdraw from the course.
- If the student is removed or withdraws from the first semester of Dual Credit Biology, they will not be allowed to take the second semester.
- If needed, students are expected to seek assistance outside of normal classroom hours in the form of morning tutorials or other school provided study hours. Online help is also encouraged.
- Dual Credit courses are actual college courses. You will receive a high school credit and a college credit. Realize that this course **WILL AFFECT YOUR PERMANENT COLLEGE TRANSCRIPT.**

Learning Outcomes

BIOL 1308 - Biology for Non-Science Majors I (lecture)

1. Distinguish between prokaryotic, eukaryotic, plant and animal cells, and identify major cell structures;
2. Identify stages of the cell cycle, mitosis (plant and animal), and meiosis;
3. Interpret results from cell physiology experiments involving movement across membranes, enzymes, photosynthesis, and cellular respiration;
4. Apply genetic principles to predict the outcome of genetic crosses and statistically analyze results.
5. Describe karyotyping, pedigrees, and biotechnology and provide an example of each.
6. Identify parts of a DNA molecule, and describe replication, transcription, and translation.
7. Analyze evidence for evolution and natural selection.

BIOL 1108 - Biology for Non-Science Majors I (lab)

1. Apply scientific reasoning to investigate questions, and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.
2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory.
3. Communicate effectively the results of scientific investigations.

BIOL 1309 - Biology for Non-Science Majors II (lecture)

1. Describe modern evolutionary synthesis, natural selection, population genetics, micro and macroevolution, and speciation.
2. Describe phylogenetic relationships and classification schemes.
3. Identify the major phyla of life with an emphasis on plants and animals, including the basis for classification, structural and physiological adaptations, evolutionary history, and ecological significance.
4. Describe basic animal physiology and homeostasis is maintained by organ systems.
5. Compare different sexual and asexual life cycles noting their adaptive advantages.
6. Illustrate the relationship between major geologic change, extinctions, and evolutionary trends.

BIOL 1109 - Biology for Non-Science Majors II (lab)

1. Apply scientific reasoning to investigate questions and utilize scientific tools such as microscopes and laboratory equipment to collect and analyze data.
2. Use critical thinking and scientific problem-solving to make informed decisions in the laboratory.
3. Communicate effectively the results of scientific investigations.

Course Syllabi Statements are located on the South Plains College website. Use the QR code below or go to <https://southplainscollege.edu/syllabusstatements/> to access the statements.



Important Exam Dates*

Fall Semester 2026		Spring Semester 2027	
SPC First Day	August 24th	SPC First Day	January 19th
Exam One	Week of Aug 24	Exam Six	Week of Jan 18
Exam Two	Week of Sept 21	Exam Seven	Week of Mar 1
Exam Three	Week of Oct 12	Spring Break	Mar 15-19
Exam Four	Week of Nov 2	Exam Eight	Week of Apr 8
Exam Five	Week of Nov 30	Final Exam	Week of May 3
SPC Grades Due	December 11th	SPC Grades Due	May 17th

*Students will be notified immediately of any changes to exam dates

Tentative Unit Schedule

Fall Semester 2026 - BIOL 1408	
Unit One	The Chemistry of Life
Unit Two	Cell Structure and Function
Unit Three	Cellular Energetics
Unit Four	Cell Communication and Cell Cycle
Spring Semester 2027 - BIOL 1409	
Unit Five	Heredity
Unit Six	Gene Expression and Regulation
Unit Seven	Natural Selection
Unit Eight	Ecology