**COURSE DESCRIPTION:** This course follows the guidelines created by the College Board. It is designed to be equivalent to a college level introductory course. Successful completion of the AP Biology exam can lead to either introductory biology credit or elective credit depending on the requirements of the college a student is attending.

**COURSE OBJECTIVE:** AP biology students will demonstrate the ability to use scientific skills and processes, appropriate scientific terminology, and major biological concepts to explain the uniqueness and interdependence of living organisms, their interactions with the environment, and the continuation of life on Earth.

**STUDY SUGGESTIONS:**
- Focus in class – paying attention in class can save you hours of studying outside of class.
- This is a college level course and the class will be handled as such, you will be graded primarily on tests and labs and you will be expected to monitor and analyze your own learning.
- Biology is different from other introductory courses in terms of the amount of vocabulary involved to get a basic understanding of the science. You **must** study some every day. Waiting to review your notes until just before the exam is a **bad** idea. Staying on top of the material will help you develop a deeper understanding and keep the material from seeming overwhelming and confusing. I recommend that you plan on studying or working on AP Biology an hour outside of class each day.
- There are guided reading sheets, review sheets, and tutorial activities (online) for each topic – these are **highly useful**; be sure you make use of them bring any questions you have to class.
- Come in for help or get help from a classmate as soon as you have trouble with a concept. You need to be an advocate for your own learning. Consider forming a study group, even if it’s only with one other person.
- Keep an organized lab notebook and organized notes.
- Your syllabus is your best friend in this class – check it frequently and use it to plan your studying – you always have homework in AP Bio, if nothing else, start reading ahead.
- After a quiz or test, take time to figure out why you missed questions – think about whether you misread the question or needed to study more. If you needed to study more, do it right away – the concepts build on each other. Of course, remember you are always working toward your AP exam on Monday, May 14, 2018.
- Make sure you do your labs carefully and completely and that you understand what you’re doing and why you’re doing it. Labs are an important part of your preparation for the AP exam, especially for the essay questions.
- Make up labs immediately – biology lab materials usually have a short shelf life – you can’t do a lab if the organisms are no longer fresh, no longer alive, or are no longer in the right stage of their life.

You will each have a textbook checked out to you. Everyone is responsible for your own book’s care. In addition to the text, supplemental reading materials will be given periodically.

**LOGISTICS:**  This class meets for one period every day for the entire school year. We will be using the “flipped classroom” model in AP Biology. This means that all lectures will be presented on videos posted through Google Classroom. These are either created by Mrs. Green and cover material in the textbook or have been located on the internet and previewed by Mrs. Green. Therefore, homework will mainly be made up of video assignments or reading assignments, as well as studying for exams. Class periods will be composed of class discussions, case studies, labs, quizzes, and exams, all of which reinforce material learned in the videos and assigned reading. A premium will be put on both labs and essay composition. Each exam will have at least one detailed essay, and many quizzes will be in-class essays.

You can access Google Classroom by logging into Google with their AISD credentials.

User Name:  studentID#@abileneisd.org (Ex. 123456@abileneisd.org)
Password:  student created password (This is the same password your student uses to log into a school computer.)

There is a free Google Classroom app available for both Apple and Android devices. All information and assignments at Google Classroom can be accessed and completed by any mobile device or computer with internet access. The AP Biology class has a group at Google Classroom. All notes videos or links to these videos are located at this site as well as electronic copies of all class handouts and online quizzes and class discussion boards. There is a calendar here as well, which will include all assignment due dates, quiz dates, and exam dates. Please check here as your first source for class information.

For text message reminders of upcoming due dates, quizzes, tests, and assignments, sign up with Remind. Instructions for enrolling with Remind and Google Classroom will be given on a separate handout as they are specific to each class period.

This class will move at a very fast pace, and between labs, class assignments and reviews, **there is really no way to make up a missed class or most of the labs.** It is, therefore, essential you attend every class and lab and **be prepared to participate.**

I expect all of those who enroll in AP Biology to prepare for and take the exam. If you choose not to take the AP Biology exam in May, you will take a final assessment in class that will be a released AP Biology exam from a previous year. This class has a very special dynamic when we are all working towards the same goal. If you are not looking for an academic challenge at the highest level, you should consider taking a different course.
ASSESSMENT AND EVALUATION

| 50% Homework and Classwork Assignments | Individual assignments include quizzes, guided reading sheets or chapter outlines, supplemental readings and essays. Students will be required to turn in guided reading sheets or chapter outlines on a regular basis; this will insure they are keeping up with required textbook reading. Other reading assignments and essays will be assigned periodically throughout the year. |
| Laboratory assignments and reports | Part of the college board requirements for AP Biology is a series of inquiry-based laboratory activities; students will complete these labs along with the worksheets/lab reports that will be assigned along with them. Depending on the depth of the lab report required for the laboratory activity, labs could be weighted as an exam grade or a classwork grade. Students will be informed of the grade weight with each laboratory activity. |
| 50% Tests | Exams will follow after every unit and at the semester. |

Grading, Grades, Cheating, Exams, Homework....

As per district policy, students are allowed to hand in lab reports, projects, and other assignments up to three days after the due date. However, as per district policy, no late work can receive a grade higher than 70. After three school days, the late assignment will no longer be accepted and recorded as a zero. If extenuating circumstances arise, please discuss this with Mrs. Green. Decisions for emergency situations will be made on a case-by-case basis.

As per AISD AP/pre-AP grading policy, students are allowed to redo daily assignments, classwork, homework, and lab reports/assignments if the grade earned on that assignment is failing (below 70). Ample time will be given for students to complete these assignments. The redone assignment must be completed within three days of when the original assignment was returned to the student. Also, as per district policy, if a student fails one of these daily assignments, an alternative assignment will be given to be redone, and the highest grade available for the redone assignment is a 70. If the redone assignment is also a failing grade, the higher of the two grades will be recorded in the online gradebook. Typically, the redo assignment is more difficult than the original assignment. Do your best the first time, and ask questions! Mrs. Green’s tutorial times are listed below. Please take advantage of this time to ask questions if you are not sure of an assignment.

Again, as per the AISD AP/pre-AP grading policy, if a student earns a grade on an exam that is failing (below 70), then that exam can be retaken or corrected. A different version of the exam will be administered for a retake. However, exams must be retaken before school, during Mega Lunch or after school. If a student chooses to correct an exam, each incorrect answer must be written out with an explanation as to why that answer is incorrect. Next, the correct answer must be written out with an explanation as to why that answer is correct. If an exam is corrected, only 75% of the original credit can be earned. The 75% credited points will be added to the original exam grade up to a 70. No retaken exam or corrected exam can earn a grade higher than 70. The exam must also be retaken or corrected within three days of when the original exam grade is posted. It will be the responsibility of the student to sign up for a day and time, report to class at the
appropriate time, and take the exam. **I will not remind any student of her/his impending retake.** Remember, the student must take responsibility for retakes. This policy is a privilege, not a right.

Up to date grades will be posted in the online gradebook. Typically, assignment grades are due on Friday, and I do my best to have assignments graded and entered the following Monday. Students are responsible for checking his/her grade. I am not perfect, and I have been known to make mistakes. If a student finds a mistake in her/his grade, she/he is expected to see me in a professional, respectful manner and point out my mistake. I will correct the mistake and the correction will be posted with the new grades.

Cheating will not be tolerated in my class. If a student cheats, she/he will be caught. If students copy each other, everyone involved will receive a zero. If I feel that the assignments are copied, all parties will have to civilly defend themselves. I hope that I will not have to deal with cheaters.

There will be a time when students are allowed to use a “legal cheat sheet”. Throughout each unit, students will be expected to make a Biology Smart Card for that unit. This Smart Card should be no larger than 8.5” x 11”. It should contain a summary of the important points of the unit and may include any diagrams the student finds helpful. Students are expected to complete his/her own card. Smart Cards may be used on quizzes and exams. Changes may be made to the Smart Cards up to the day of the unit exam. On the day of exams, students are to turn in their cards for two bonus points on the student’s exam grade. I will laminate all Smart Cards and will provide rings to the students to make a Biology Smart Book. I hope this will be a useful resource for reviewing for the AP Biology Exam in May.

Due dates for assignments are recorded on the classroom calendar, which is located on the class web site, at Google Classroom, and at the front of the room. Students need to make sure that their calendar matches my calendar. Nothing is ever written in stone, and assignments are moved from time to time. I try to keep my website up to date, however, the best source of due dates is the classroom calendar.

Homework and other work to be graded **must** be placed in the basket on my desk or turned in electronically through Google classroom by the due date and time. It is the responsibility of the student to hand in the homework before due dates and times.

If a student needs help, I will be available and happy to help during tutorials as well as during Mega Lunch. It is my dream that every student in all of my classes earn an A. **In my class, student motivation is the only limiting factor in student success.** If you have any questions please feel free to call me at Cooper High School (325-691-1000, Ext., 8762). Please ask for my voice mail. If possible, please e-mail me (beth.green@abileneisd.org). It is easier to reach me by e-mail as I am able to check my e-mail frequently during the day. I am only able to check voice mail once a day. For notes, book reading assignments, and due dates, please visit my website at Google Classroom.

**ACADEMIC AND BEHAVIORAL EXPECTATIONS:**

AP Biology provides students with an experience equivalent to a college level biology course. There are extensive reading assignments that the student must complete in order to be successful. Supplementary readings in the form of journal articles, and supplementary texts are also required. In addition students are expected to complete assigned laboratory activities and any other supplementary assignments given throughout the course. At all times students are expected to follow classroom and school rules, behave in a
responsible and mature manner, and conduct themselves with honor and integrity. Students are expected to do their own work. Plagiarism and cheating will not be tolerated.

**ATTENDANCE AND CLASS PARTICIPATION:**
Because class sessions will introduce new material, allow time for questions, and include special instructions, there is really no way to make up a missed class. It is, therefore, essential that the student make a conscientious effort to attend every class and be prepared to participate.

**Video Homework:**
Occasionally I will assign videos for you to watch at home on the internet, which will take the place of lectures in class. You will be expected to take notes while watching these videos. Your notes will be an important resource as you study for exams. All videos will be uploaded to Google Classroom. If you do not have a computer, smart phone, or internet access at home, I have DVD’s available for check out so you can see the videos and take notes.

**PROVISIONS FOR EXTRA HELP AND MAKEUP:**
Students who are absent from class are responsible to pick up make-up work or stay after school or during flex period to finish missed assignments. Students should schedule make-up work immediately upon their return from an absence. It also may be helpful to form a student study group. Students should find a group of friends in class and exchange phone numbers and/or e-mail. This way on the occasion they miss a class they can contact them and find out what was missed in class that day.

**Supplies Needed:**
One 3-ring binder, notebook paper, sharpened pencils, one small bound composition book. (See Mrs. Green’s example in class.)

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<table>
<thead>
<tr>
<th>Curricular Requirements</th>
<th>Page(s)</th>
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<tbody>
<tr>
<td>CR1 Students and teachers use a recently published (within the last 10 years) college-level biology textbook.</td>
<td>1</td>
</tr>
<tr>
<td>CR2 The course is structured around the enduring understandings within the big ideas as described in the AP® Biology Curriculum Framework.</td>
<td>1,3,5,6,7,8,10, 11,13</td>
</tr>
<tr>
<td>CR3a Students connect the enduring understandings within Big Idea 1 (the process of evolution drives the diversity and unity of life) to at least one other big idea.</td>
<td>5</td>
</tr>
<tr>
<td>CR3b Students connect the enduring understandings within Big Idea 2 (biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis) to at least one other big idea.</td>
<td>4,5</td>
</tr>
<tr>
<td>CR3c Students connect the enduring understandings within Big Idea 3 (living systems store, retrieve, transmit, and respond to information essential to life processes) to at least one other big idea.</td>
<td>11</td>
</tr>
<tr>
<td>CR3d Students connect the enduring understandings within Big Idea 4 (biological systems interact and these systems and their interactions possess complex properties) to at least one other big idea.</td>
<td>14</td>
</tr>
<tr>
<td>CR4a The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 1.</td>
<td>11,12,13</td>
</tr>
<tr>
<td>CR4b The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2.</td>
<td>4,5,7</td>
</tr>
<tr>
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<td>7,8,9,13</td>
</tr>
<tr>
<td>CR4d The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 4.</td>
<td>12,14,15</td>
</tr>
<tr>
<td>CR5 The course provides students with opportunities to connect their biological and scientific knowledge to major social issues (e.g., concerns, technological advances, innovations) to help them become scientifically literate citizens.</td>
<td>8,9,11,13,14</td>
</tr>
<tr>
<td>CR6 The student-directed laboratory investigations used throughout the course allow students to apply the seven science practices defined in the AP Biology Curriculum Framework and include at least two lab experiences in each of the four big ideas.</td>
<td>2,4,6,7,9,10,11, 14</td>
</tr>
<tr>
<td>CR7 Students are provided the opportunity to engage in investigative laboratory work integrated throughout the course for a minimum of 25 percent of instructional time.</td>
<td>2</td>
</tr>
<tr>
<td>CR8 The course provides opportunities for students to develop and record evidence of their verbal, written and graphic communication skills through laboratory reports, summaries of literature or scientific investigations, and oral, written, or graphic presentations.</td>
<td>4,6,7,9,10,11, 14</td>
</tr>
</tbody>
</table>
Course Overview

My AP Biology course is designed to offer students a solid foundation in introductory college-level biology. By structuring the course around the four big ideas, enduring understandings, and science practices I assist students in developing an appreciation for the study of life and help them identify and understand unifying principles within a diversified biological world.

What we know today about biology is a result of inquiry. Science is a way of knowing. Therefore, the process of inquiry in science and developing critical thinking skills is the most important part of this course.

At the end of the course, students will have an awareness of the integration of other sciences in the study of biology, understand how the species to which we belong is similar to, yet different from, other species, and be knowledgeable and responsible citizens in understanding biological issues that could potentially impact their lives.

Instructional Context

AP Biology is taught to juniors and seniors on a traditional 47-minute class schedule. Each class meets 45 minutes daily, Monday through Friday.

Instructional Resources


Released AP Biology multiple choice and free response questions.

Teaching Strategy

The AP Biology course is structured around four Big Ideas.

**Big Idea 1**: The process of evolution drives the diversity and unity of life.

**Big Idea 2**: Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.
Big Idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes.

Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties.

The course will consist of class discussions, classroom assignments, out of class assignments and laboratory experiences to ensure that students get maximum exposure to various aspects of Biological topics. The lab component of the course will consist of at least 25% of instructional time with two or more labs accompanying each of the Big Ideas in the AP Biology curriculum. The students will be responsible for recording work in lab notebooks and reports kept and updated throughout the year.

Science Practices will be major components of each unit within the course as students will demonstrate each Science Practice multiple times throughout the course.

Science Practices (SP)
1. The student can use representations and models to communicate scientific phenomena and solve scientific problems.
2. The student can use mathematics appropriately.
3. The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
4. The student can plan and implement data collection strategies appropriate to a particular scientific question.
5. The student can perform data analysis and evaluation of evidence.
6. The student can work with scientific explanations and theories.
7. The student is able to connect and relate knowledge across various scales, concepts and representations in and across domains.

Units of Instruction

Unit 1: First Week, Introduction, and Biochemistry

Big Ideas 1, 2, 3, 4

Connected to Enduring Understandings:
1. A Change in the genetic makeup of a population over time is evolution.
2. D The origin of living systems is explained by natural processes.
3. A Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
4. A Heritable information provides for continuity of life.
5. A Interactions within biological systems lead to complex properties.
6. B Competition and cooperation are important aspects of biological systems.
7. C Naturally occurring diversity among and between components within biological systems affects interaction with the environment.

Chapters:
Ch. 1 “Introduction: Evolution and the Foundations of Biology”
Ch. 2 “The Chemical Context of Life”
Ch. 3 “Carbon and the Molecular diversity of Life”
Ch. 6 “An Introduction to Metabolism”

Unit 1 Overview of Lecture and Discussion Topics:
1. Darwin and the Theory of Natural Selection.
2. Inquiry as a way to learn science.
5. The impact of carbon as the “backbone of life”.
6. The Structure and Function of Large Biological Molecules.

Activities:
1. Students will analyze different scientific experiments, data, and conclusions and will critique these experiments in group and class discussions. (SP 3)
2. Students will compare and contrast different types of bond properties and intermolecular bonds. (SP 1)
3. Students will construct models of the different classes of macromolecules and use these models to simulate dehydration synthesis and hydrolysis as well as compare and contrast the different types of macromolecules. (SP 1, 7)
4. Students will perform AP Biology Laboratory Investigation #13 “Enzyme Activity”. (SP 3, 4, 5, 6, 7)
5. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 1, 2, 3, and 6 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

Unit 2: Cell Structures and Membrane Transport [CR2]
Big Ideas 1, 2, 3, 4
Connected to Enduring Understandings:
1. D The origin of living systems is explained by natural processes.
2. A Growth, reproduction and maintenance of the organization of living systems requires free energy and matter.
2. B Growth, reproduction and dynamic homeostasis require that cells create and maintain internal environments that are different from their external environments.
3. D Cells communicate by generating, transmitting, and receiving chemical signals.
4. A Interactions within biological systems lead to complex properties.
4. B Competition and cooperation are important aspects of biological systems.
4. C Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

Chapters:
Ch. 4 “A Tour of the Cell”
Ch. 5 “Membrane Transport and Cell Signaling”

Unit 2 Overview of Lecture and Discussion Topics:
1. Examples of organelles that are membrane bound to compartmentalize their functions.
2. Membrane structure and function.
3. Evolution of cell signaling.
4. Reception, transduction, and response.
5. Apoptosis.

Activities:
1. Students will build a model of a prokaryotic cell. (SP 1)
2. Students will complete a table comparing and contrasting eukaryotic cell organelles. (SP 6)
3. Students will model the steps of cellular communication, including signal reception, transduction, and cellular response. (SP1, 6)
4. Students will complete a water potential problem practice sheet. (SP 2)
5. Students will conduct AP Laboratory Investigation 4: “Diffusion and Osmosis”. (SP 1, 2, 3, 4, 5, 7)
6. Students will complete AP Biology free response question #4 from 2002. (SP 7)
7. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 4 and 5 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

**Unit 3: Cell Energy and Related Processes [CR2]**

**Big Ideas 1, 2, 4**

**Connected to Enduring Understandings:**

1. A Change in the genetic makeup of a population over time is evolution.
2. D The origin of living systems is explained by natural processes.
3. B Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
4. A Interactions within biological systems lead to complex properties.
4. B Competition and cooperation are important biological systems.

**Chapters:**

Ch. 6 An Introduction to Metabolism
Ch. 7 Cellular Respiration and Fermentation
Ch. 8 Photosynthesis

**Unit 3 Overview of Lecture and Discussion Topics:**

1. Metabolic pathways
2. Laws of Energy Transformation
3. How ATP powers cellular work.
5. Light reactions and the Calvin cycle.

**Activities:**

1. Students will complete Gibbs Free Energy practice sheets. (SP 2)
2. Students will complete AP Lab #6 “Cellular Respiration”. (Big Idea 2; SP 2, 3, 4, 5) [CR6] & [CR8]
3. Students will complete AP Lab #5 “Photosynthesis”. (Big Idea 2; SP 2, 3, 4) [CR6] & [CR8]
4. Students will complete AP Biology released free response questions related to cell energy transformations. (SP 7)
5. Students will model oxidative phosphorylation as it takes place during the electron transport chain portion of cellular respiration. (SP 1)
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 6, 7, and 8 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)
Unit 4: Cell Communication, Cell Cycle, and Meiosis [CR2]

Big Ideas: 1, 2, 3

Connected to Enduring Understandings:

2.E Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.
3.A Heritable information provides for continuity of life.
3.D Cells communicate by generating, transmitting, and receiving chemical signals.

Chapters:

Ch. 5 Membrane Transport and Cell Signaling
Ch. 9 The Cell Cycle
Ch. 10 Meiosis and Sexual Life Cycles

Unit 4 Overview of Lecture and Discussion Topics:

1. Evolution of cell signaling.
2. Reception, transduction, and response.
3. Apoptosis.
4. How mitosis produces genetically identical daughter cells.
5. Evolution of mitosis.
6. How the eukaryotic cell cycle is regulated by a molecular control system.
7. Origin of cell communication.
8. How meiosis reduces the number of chromosomes (diploid to haploid).

Activities:

1. Students will model cell communication using hands-on manipulatives. (SP1)
2. Students will complete a Cell Communication lab utilizing yeast cells. (Big Ideas 2, 3; SP 2, 3, 4, 5)
3. Students will complete AP Lab #7 “Mitosis and Meiosis”. (Big Idea 3; SP 2, 3, 4, 5) [CR6] & [CR8]
4. Pathways with Friends: http://learn.genetics.utah.edu Directed by instructional cards, students kinesthetically model cell communication by acting as components in cell signaling. Whole class discussion follows, assessing student understanding of cell communication, The Fight or Flight Response, How cell Communicate during the Fight or Flight Response. (These animals provide students with a model example of the concepts involved in cell signaling.) (SP1) [CR4c]
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7 )
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 5, 9, and 10 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

Unit 5: Mendelian Genetics[CR2]

Big Ideas: 1, 3, 4

Connected to enduring understandings:

1.A Change in the genetic makeup of a population over time is evolution.
3.A Heritable information provides for continuity of life.
3.C The processing of genetic information is imperfect and is a source of genetic variation.
4.C Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

Chapters:
Ch. 11 Mendel and the Gene Idea
Ch. 12 The Chromosomal Basis of Inheritance
Ch. 13 The Molecular Basis of Inheritance
Ch. 14 Gene Expression: From Gene to Protein

Unit 5 Overview of Lecture and Discussion Topics
1. Genes are passed from parents to offspring by the inheritance of chromosomes.
2. Evolutionary significance of genetic variation that results from sexual life cycles.
4. Genes are located along chromosomes (concepts of gene linkage, mapping distance between genes, causes of genetic disorders). [CR5]

Activities:
1. Knowing the percentage of each color in packages of M&M’s as published by the packaging company, students will count the colors in packages and apply the null hypothesis concept and Chi Square calculations on the data. (SP 2) [CR4c]
2. Students will complete a “Fly Genetics” online lab. As part of this online simulation, students will develop null hypotheses as to the mode of inheritance based on the data, and they will use the Chi Square statistical analysis to determine whether to accept or reject the hypothesis. (SP 2, 5)
3. Students will complete genetics practice problems. (SP 2)
4. Students will complete the “Exploring Mendelian Genetics” using Wisconsin Fast Plants. (SP 2, 3, 4, 5)
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 11, 12, 13, and 14 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

Unit 6: Gene Expression and Biotechnology [CR2]
Big Ideas: 1, 2, 3, 4
Connected to Enduring Understandings:
1. Change in the genetic makeup of a population over time is evolution.
2. Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.
2. Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.
3. Heritable information provides for continuity of life.
3. Expression of genetic information involves cellular and molecular mechanisms.
3. The processing of genetic information is imperfect and is a source of genetic variation.
4. Interactions within biological systems lead to complex properties.

Chapters:
Ch. 15 Regulation of Gene Expression
Unit 6 Overview of Lecture and Discussion Topics:
1. DNA is the genetic material (historical experiments, DNA structure and function, DNA replication)
2. Flow of genetic information (genetic code, role of other polymers, transcription, translation)
3. Mutations
4. Gene Expression (operon systems in prokaryotes, eukaryotic gene expression
5. Virus structure and activity
6. Restriction enzymes, plasmids, transformation
7. DNA technology (how gel electrophoresis works and applications of this technology) [CR5]

Activities:
1. Model of an operon: Following lecture and discussion of structure and function of an operon system, materials are made available for students to create a model of an operon and demonstrate to their classmates. (SP 1,6)
2. DNA and Histone Model [http://learn.genetics.utah.edu](http://learn.genetics.utah.edu) A 3-D cut-and-paste model depicting how histone, acetyl and methyl molecules control access to DNA and affect gene expression. (Connection of Big Idea 3 to enduring understanding 4.A; SP 1,6)
3. AP Biology lab #8: Biotechnology: Bacterial Transformation (Supports Big Idea 3; SP 2, 3, 4, 5, 6) [CR6] & [CR8]
4. AP Biology lab #9: Biotechnology: Restriction Enzyme Analysis of DNA (Supports Big Idea #3; SP 2, 3, 4, 5, 6)
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
6. Students will complete online assignments at [www.masteringbiology.com](http://www.masteringbiology.com) which correspond with chapters 15, 16, 17, and 18 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

Unit 7: Evolution and Phylogeny [CR2]

Big Ideas 1, 3, 4

Connected to Enduring Understandings:
1.A Change in the genetic makeup of a population over time is evolution.
1.B Organisms are linked by lines of descent from common ancestry.
1.C Life continues to evolve within a changing environment.
1.D The origin of living systems is explained by natural processes.
2.A Heritable information provides for continuity of life.
3.C The processing of genetic information is imperfect and is a source of genetic variation.
4.C Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

Chapters:
Ch. 19 Descent with Modification
Ch. 20 Phylogeny
Ch. 21 The Evolution of Populations
Unit 7 Overview of Lecture and Discussion Topics:
1. How natural selection serves as a mechanism for evolution.
3. Hardy-Weinberg concept.
4. How allele frequencies can be altered in a population.
5. Concepts of speciation.
6. Origin of Life; Fossil Records.
7. Events in the “history of life” (origin of single-celled and multicellular organisms; mass extinctions; adaptive radiations).

Activities:
1. Students will play the “Natural Selection Game”, which models the mechanism of natural selection. (SP 1, 4, 5, 6)
2. Students will model situations affecting Hardy-Weinberg equilibrium and complete Hardy-Weinberg practice problems. (SP 1, 2, 4, 5, 6)
3. Students will complete AP Biology lab #2: Mathematical Modeling: Hardy-Weinberg. (Supports Big Idea 1; SP 1, 2, 3, 4, 5, 6) [CR4a]
4. Students will complete AP Biology lab #3: Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST. (Supports Big Idea 1; SP 1, 3, 4, 5) [CR6] & [CR8]
5. Students will build a “Phylogeny Mobile” which will summarize and model the currently understanding of the phylogeny of the phyla of Kingdom Animalia. (Supports Big Idea 1; SP1)
6. Students will complete the HHMI online lab “Evolution of Stickleback Fish”. (Supports Big Idea; SP 1, 2, 3, 4, 5, 6)
7. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
8. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 19, 20, 21, 22, 23, 24, 25, 26 and 27 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)

Unit 8: Animal Form and Function [CR2]
Big Ideas: 1, 2, 3, 4
Connected to Enduring Understandings:
1.A Change in the genetic makeup of a population over time is evolution.
1.B Organisms are linked by lines of descent from common ancestry.
2.A Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
2.C Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.
2.D Growth and dynamic homeostasis of a biological system are influenced by changes in the system’s
Many biological processes are involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.

Transmission of information results in changes within and between biological systems.

Interactions within biological systems lead to complex properties.

Competition and cooperation are important aspects of biological systems.

Chapters:
Ch.32 Homeostasis and Endocrine Signaling
Ch.33 Animal Nutrition
Ch.34 Circulation and Gas Exchange
Ch.35 The Immune System
Ch.36 Reproduction and Development
Ch.37 Neurons, Synapses, and Signaling
Ch.38 Nervous and Sensory Systems
Ch.39 Motor Mechanisms and Behavior

Unit 8 Overview of Lecture and Discussion Topics: This section covers a broad survey of the diversity of life; specific topics will connect big ideas and enduring understandings.

1. Evolutionary trends (endosymbiosis, animal body plans, progressively complex derived characters in animal groups)
2. Signal transduction pathways (animal hormones)
3. Feedback control loops in animals.
4. Thermoregulation in animals.
5. Energy allocation and use in animals.
6. Examples of functioning units in mammal systems (alveoli in lungs, villi of small intestines, nephrons in kidneys).
7. Structure and function in immune systems.
8. Structure and function in nervous systems (neurons, resting potential, action potential, synapses)

Activities:
1. Students will use manipulatives to model endocrine signaling in animal systems. (Big Idea #3; SP1, 5)
2. Students will keep a Seven Day Food Journal of their own diet. They will then analyze their food intake and compare it to recommended nutritional guidelines. (SP 4, 5)
3. “Changes in Respiration Rate in an Ectotherm” lab. Students will monitor changes in respiration rates of goldfish exposed to varying temperatures. (SP 1, 3, 4, 5, 6)
4. Jumpin’ the Gap: http://learan.genetics.utah.edu Students act out communication at the neural level by behaving as vesicles, neurotransmitters, receptors, secondary messengers, and transporters. (SP 1, 7) [CR4d]
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 32, 33, 34, 35, 36, 37, 38, and 39 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)
Unit 9: Plants [CR2]
Big Ideas: 1, 2, 3, 4

Connected to Enduring Understandings:

1. A Change in genetic makeup of a population over time is evolution.
2. B Organisms are linked by lines of descent from common ancestry.
2. A Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
2. C Organisms use feedback mechanisms to regulate growth and reproduction, and to maintain dynamic homeostasis.
2. D Growth and dynamic homeostasis of a biological system are influenced by changes in the system’s environment.
2. E Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.
3. E Transmission of information results in changes within and between biological systems.
4. A Interactions within biological systems lead to complex properties.
4. B Competition and cooperation are important aspects of biological systems.

Chapters:

Ch.28 Plant Structure and Growth
Ch.29 Resource Acquisition, Nutrition, and Transport in Plants
Ch.30 Reproduction and Domestication of Flowering Plants
Ch.31 Plant Responses to Internal and External Signals

Unit 9 Overview of Lecture and Discussion Topics: This section covers a broad survey of the diversity of life; specific topics will connect Big Ideas and Enduring Understandings.

1. Evolutionary trends. (endosymbiosis, adaptations that allowed plants to move from water to land, reproductive adaptations of angiosperms, environmental roles of fungi)
2. Unique features of the angiosperm life cycles.
3. Signal transduction pathways. (plant hormones)
4. Photoperiodism in plants.
5. Transport of materials in plants.

Activities:

1. Students will research and present an aspect of fungi to their classmates. (SP7) [CR8]
2. Students will research and write an essay discussing the obstacles land plants had to overcome in order to move from aquatic to terrestrial environments. (SP 7) [CR8]
3. Students will complete a “Plant Structures Scavenger Hunt”. (SP 7) [CR8]
4. Students will complete AP Biology lab #11: Transpiration and will present their findings to classmates by means of miniposters. (SP 1, 2, 3, 4, 5, 6)
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 28, 29, 30, and 31 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)
Unit 10: Animal Behavior and Ecology [CR2]

Big Ideas: 1, 2, 3, 4

Connected to Enduring Understandings:

1. A Change in genetic makeup of a population over time is evolution.
2. C Life continues to evolve within a changing environment.
3. A Growth, reproduction and maintenance of the organization of living systems require free energy and matter.
4. C Organisms use feedback mechanisms to regulate growth, reproduction and dynamic homeostasis.
5. D Growth and dynamic homeostasis of a biological system are influenced by changes in the system’s environment.
6. E Many biological processes involved in growth, reproduction and dynamic homeostasis include temporal regulation and coordination.
7. E Transmission of information results in changes within and between biological systems.
8. A Interactions within biological systems lead to complex properties.
9. B Competition and cooperation are important aspects of biological systems.
10. C Naturally occurring diversity among and between components within biological systems affects interactions with the environment.

Chapters:

Ch.39 Motor Mechanisms and Behavior
Ch.40 Population Ecology and the Distribution of Organisms
Ch.41 Species Interactions
Ch.42 Ecosystems and Energy
Ch.43 Global Ecology and Conservation Biology

Unit 10 Overview of Lecture and Discussion Topics:

1. Aspects of animal behavior.
2. Aspects of biomes.
4. Regulation of population growth.
5. Community interactions.
6. Species diversity and composition.
7. Community biodiversity.
8. Energy flow and chemical cycling in ecosystems.
9. Primary productivity.
10. Energy transfer between trophic levels.
11. Human activities that threaten biodiversity.

Activities:

1. Students will complete AP Biology lab #12: Fruit Fly Behavior. However, this lab will be modified to use pill bugs or sow bugs instead of fruit flies. (Supports Big Idea 4; SP 1, 2, 3, 4, 5, 6, 7) [CR6] & [CR8]
2. Students will complete AP Biology lab #10: Energy Dynamics. (Supports Big Idea 4; SP 1, 2, 3, 4, 5, 6, 7) [CR6]
3. Students will complete model of a biome that demonstrates knowledge of biological processes and concepts across scales. (Connects Big Idea 4 to Enduring Understanding 2.A; SP7) [CR3d] & [CR4d]
4. Students will practice with calculations that model population growth. (SP 1, 2)
5. Students will complete AP Biology released free response questions related to cell communication, cell cycle, and meiosis. (SP 7)
6. Students will complete online assignments at www.masteringbiology.com which correspond with chapters 39, 40, 41, 42, and 43 in their textbook and will reinforce the concepts covered in these chapters. (SP 1)