

South Forsyth High School – Advanced Placement Biology

Course Syllabus

2014-2015

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COURSE DESCRIPTION:

All students need an opportunity to experience science as a process and not just learn biology as a collection of unrelated facts. This means that the course should emphasize how scientists use their observations and readings to ask questions that can lead to new experiments. These experiments build on the work of others and eventually lead to additional evidence on different topics. This investigative process will be used throughout this AP Biology course. It is important for students to become excited with discovery as they ask and answer their own questions about natural/biological phenomena that they see, read about, or experience in the laboratory and field. In addition, it is critical that students connect new concepts with what they know, with each connection they help themselves build a solid framework of biological knowledge and scientific know-how. This framework will help students to enter their future, prepared for whatever may lie ahead of them.

Prerequisites: Honors Biology and Chemistry

Textbook and Materials: Biology, eighth ed., Campbell/Reece, Benjamin Cummings Publishing Co., 2008
AP Biology Laboratory Manual for Students or 1/2" binder for copies of labs
2" 3-ring binder with pockets and 10-12 dividers
Carbonless lab notebook
Pencils, pens (blue or black ink only), loose-leaf paper
Calculator – four-function with square root ONLY

Course Organization:

This course is structured around the four big ideas and the enduring understandings in the Curriculum Framework. All essential knowledge will be taught and all learning objectives will be addressed through this curriculum. The course will focus on inquiry-based laboratory work and the use of the seven science practices in both lab and non-lab activities.

The four Big Ideas are:

1. The process of evolution drives the diversity and unity of life.
2. Biological systems utilize free energy and molecular building blocks to grow, to reproduce and to maintain dynamic homeostasis.
3. Living systems store, retrieve, transmit and respond to information essential to life processes.
4. Biological systems interact, and these systems and their interactions possess complex properties.

Students will be given a copy of the big ideas and enduring understandings to self-monitor mastery of these major organizing tools. The big ideas and enduring understandings will also be posted in the room. The learning objectives will be used as a guide to build the rest of the class discussions, not as a checklist to be marked off through the year, but as a way to help students learn a focused amount of biological content with the use of specific scientific process skills. Skills will be practiced every day, not necessarily all skills every day, but each day at least one skill will be used to introduce the biological content students study.

Social and Ethical Concerns:

It is vitally important that students connect their classroom knowledge to socially important issues. The course will allow students to learn about and discuss many issues in a variety of formats. Issues will be discussed in a class setting, both live and electronically through such programs as an ItsLearning forum, and students may research and report on a current topic that has social or ethical issues associated with it. Since the goal will be to discuss a timely event, the list below should be seen as illustrative as new issues continually appear.

- Stem cell research (Big Idea 3)
- Global warming (Big Idea 4)
- Antibiotic resistance and the problems with improper antibiotic use (Big Idea 1)

- Genetically modified food (Big idea 3)
- The use of genetic information (Big Idea 3)

Application of the Science Practices in the Laboratory Program:

Students will be able to apply the science practices throughout their laboratory work; a matrix describing their application is below. Many of the science practices will be used in all of the student-directed laboratory and field investigations, however, some science practices will be emphasized to a greater degree than others in each particular investigation. Those that are emphasized are indicated by an “X” in the matrix.

AP Lab	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6	SP 7
BLAST	X				X		
Hardy-Weinberg	X	X			X		
Artificial Selection	X	X			X		X
Cellular Respiration	X	X	X			X	X
Photosynthesis	X	X	X	X		X	X
Diffusion & Osmosis		X		X	X		
Cell Division	X				X	X	X
Bacterial Transformation	X		X		X	X	X
Restriction Enzyme Analysis			X			X	
Energy Dynamics	X	X	X	X	X	X	X
Fruit Fly Behavior	X		X	X	X	X	X
Transpiration	X	X		X		X	X
Enzyme Activity					X	X	X

The Laboratory Program:

The students will be engaged in investigative laboratory work for a minimum of 25% of instructional time. These labs will be inquiry based, student-directed investigations. There will be at least two laboratory experiences per big idea selected. These labs will be spread throughout the school year and will be conducted during at least one out of every four class meetings during the year. The descriptions below summarize the student inquiry portion of the investigation. Additional prescribed activities supplement the student inquiry.

Big Idea 1: Evolution

- BLAST Activity: Students use NCBI to compare DNA and protein sequences for organisms to test student-generated hypotheses on their relatedness.
- Hardy-Weinberg Spreadsheet development to investigate factors affecting Hardy-Weinberg equilibrium.
- Artificial Selection: Students will grow organisms such as Fast Plants and select for specific traits over several generations.

Big Idea 2: Cellular Processes, Energy and Matter

- Cellular Respiration: Students investigate some aspect of cellular respiration in organisms.
- Photosynthesis: Students investigate photosynthetic rate under a variety of student selected conditions.
- Diffusion/Osmosis: Students investigate diffusion and osmosis in model systems and in plant tissue.

Big Idea 3: Genetics and Information Transfer

- Cell Division: Mitosis and Meiosis: Students compare mitotic rate after exposure to lectin or other substances presumed to affect mitotic rate.
- Bacterial Transformation: Students investigate bacterial transformation.
- Restriction Enzyme Analysis: Students investigate restriction enzyme analysis.

Big Idea 4: Interactions

- Energy Dynamics: Students develop and analyze model systems that describe energy flow.
- Fruit Fly Behavior: Students investigate chemotaxis in fruit flies.

- Transpiration: Students investigate the movement of water through plants in a model system.
- Enzyme Investigation: In an open inquiry lab, students will investigate and quantify factors that affect enzyme action.

Communication:

Students will maintain a laboratory notebook throughout the course. In addition to the laboratory notebook, students will communicate to others in formats such as group presentations, PowerPoint presentations, poster sessions, and written reports. Communication tools are not only for the laboratory experiences, but represent examples of the collaboration, reflection, and articulation seen in the course as a whole. Students will use this collection of their work over time and reflect on changes they can see in the quality or substance of their work through the year as they prepare to move into college courses and research experiences in the future.

Evaluation: Daily Work (includes homework), Labs, Lab Quizzes = 25%, Projects, Tests = 75% → 50% per semester → Final Course Grade
 *Midterm and Final Exams each will be weighted as 2 summative test grades

Grading Scale: A – 100-90, B – 80-89, C – 70-79, F – 69 and below

Makeup/Late Work Policy:

All missed work and assessments are the responsibility of the student when they are absent from school. A student who is absent on the class day before a regularly scheduled assessment will be responsible for completing the assignment on the regularly scheduled day and time. Students who have been absent more than two consecutive days (including the assessment day) will be given five (5) school days to make up the assessment and/or other assignments. This does not include major projects, research papers, etc., where the deadline has been posted in advance. The teacher has the discretion to grant a longer period of time to make up work if there are extenuating circumstances.

Long-term projects must be turned in on the previously scheduled date. If a student is absent on that day, they must turn in the project the day they return to possibly receive full credit. For every day late thereafter, their highest possible grade will be a 70. A daily synopsis of class and any handouts given out in class will be posted on ItsLearning. ItsLearning can be accessed using the following website - <https://forsyth.itslearning.com/>.

Late daily assignments can be turned in for a possible grade of a 70 until the summative test on that unit. Once that unit test is over, no daily (formative) assessments will be accepted.

Exam Exemption Policy:

Students may exempt the final exam in May if they have earned an overall course average of 90 or above.

Availability for Extra Help:

My planning periods are 1st and 5th. I am available for extra help before school on Tuesdays and Thursdays or during Instructional Focus. All AP students receive yearlong passes to come to my classroom during Instructional Focus time. Other dates and times are available by appointment.

General Course Description and Tentative Schedule:

Unit 1: Introduction to Biology and the Chemistry of Life – 3 weeks
 Unit 2: Cells and Cellular Processes – 5 weeks
 Unit 3: The Genetic Basis of Life – 5 weeks
 Unit 4: Evolution – 6 weeks
 Unit 5: Organism Form and Function – 7 weeks
 Unit 6: Ecology – 6 weeks
 Exam Review

The Advanced Placement Biology Examination – Monday, May 11, 2015