AP BIOLOGY COURSE SYLLABUS

SAINT VIATOR HIGH SCHOOL

**2013 - 2014**

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[AP BIOLOGY WEB PAGE](http://www.quia.com/pages/ecairo.html)

**COURSE DESCRIPTION**: **AP Biology Lab (11,12) (CR4) (CR6) (CR7) (CR8)**This is an introductory college course for accelerated students with a special interest in biology.  The course satisfies and exceeds the requirements set by the College Board for AP Biology which includes the study of the “Four Big Ideas”.  The student acquires an in-depth understanding of many biological processes and principles.  Emphasis is on molecular and cell physiology, genetics, organisms and populations, evolution and ecology.  Comprehensive lab experience is included in this course. Evaluation is based on student review of current journal articles, tests and laboratory work. The course meets for 1½ periods daily (65 minutes per day). Field trips enhance study.   College credit may also be earned through an arrangement with Saint Mary’s University of Minnesota, (B110, Botany & Zoology, 4 credits), or by taking the Advanced Placement examination.

Prerequisite: Honors Biology, Honors Chemistry, and Biology teacher recommendation.

**The Big Ideas: (CR2)**

* **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, stor, retrive, transmit and respoond to information essential to life processes.

**CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework.

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

**INSTRUCTIONAL RESOURCES AND REQUIRED MATERIAL: (CR1)**

* Textbook-Campbell’s Biology, 9th Edition: Reece, URRY et al
* Test Prep AP Biology Test Prep Series: Fred W. Holtzclaw, Theresa Knapp Holtzclaw
* Mastering Biology Website that accompanies Campbell 9th Edition textbook.
* AP Biology Investigative Labs: An Inquiry Approach - College Board Publication
* Three - ring binder with pockets to be used exclusively for AP Biology.

**CR1:** Students and teachers use a recently published (within the last 10 years) college-level textbook.

**CURRICULAR REQUIREMENTS**

|  |  |
| --- | --- |
| **Curricular Requirements** | **Page(s)** |
| **CR1:** Students and teachers use a recently published (within the last 10 years) college-level textbook. | **1** |
| **CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework. | **1, 6, 7, 8, 9** |
| **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. | **8, 9** |
| **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. | **6, 7, 9** |
| **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. | **7, 8** |
| **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. | **8, 9** |
| **CR4a:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea1. | **7** |
| **CR4b:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2. | **6, 9** |
| **CR4c:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 3. | **8** |
| **CR4d:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 4. | **6, 7,8, 9** |
| **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. | **7, 8, 9** |
| **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. | **1, 3, 4, 5, 6, 7, 8, 9,**  |
| **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. | **1, 4** |
| **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. | **1, 4, 6, 7, 8, 9** |

**COURSE GOALS/ LEARNER OUTCOMES (CR4) (CR6) (CR7) (CR8)**

**GOAL 1.** Students will use problem solving, analytical and critical thinking skills to solve basic problems in biology including traditional genetics, molecular genetics, microbiology, and others.

 Objective 1a: Students will describe the scientific method and apply it to answer a

 question relevant to their own lives.

 Assessment: Exams

 Objective 1b: Students will explain modern lab techniques used in molecular genetics

 and explain the uses for these procedures.

 Assessments: Lab reports

**GOAL 2.** Students will use the scientific process to solve problems. This may include generating hypotheses, designing meaningful experiments, controlling variables, gathering relevant data, interpreting results, and drawing conclusions.

 Objective 2: Students will generate hypotheses, complete experiments,

 analyze data, and develop conclusions regarding a number os scientific

 concepts including; ecological succession, microscopy, organic

 compounds, enzyme activity, cellular respiration, photosynthesis, and

 Mendelian genetics.

 Assessment: Lab reports

**GOAL 3.** Students will be able to explain and apply the fundamental principles of biology chemistry, or physics.

 Objective 3a: Students will be able to explain how light energy is converted o chemical

 energy through photosynthesis and describe the chemical reactions

 involved in this process.

 Assessment: Exams

 Objective 3b: Students will be able to describe the process of cellular respiration and

 trace ATP production during the metabolism of glucose to carbon dioxide

 and water.

 Assessment: Exams

 Objective 3c: Students will describe the process of cell division and explain how

 mistakes during this event can lead to cellular abnormalities.

 Assessment: Exams

 Objective 3d: Students will be able to explain the central dogma of molecular biology

 and to apply this concept by generating an amino acid sequence from a

 DNA sequence.

 Assessment: Exams

**GOAL 4.** Students will demonstrate an ability to critically interpret the scientific work of others. This includes the ability to read and interpret data, understand graphic representations, interpret basic mathematical and statistical arguments, detect invalid arguments and know when and how to access authoritative information from reliable sources.

 Objective 4: Students will compare results from their own laboratory investigations to

 articles from the primary literature.

 Assessment: Exams

**ASSESSMENT OPPORTUNITIES: (CR4) (CR6) (CR7) (CR8)**

 Each quarter your grade is detemined by the total accumulated points received from the folllowing categories:

* Tests: 100 points each. Usually three or four a quarter. Tests will be in the same format as the AP exam which includes multiple choice, short answer, and essay.
* Quizzes: usually announced but not always. Covers material assigned which includes reading, viewing video lectures, labs, or other work assigned as homework.
* Homework: 10-15 points each. Consists of Reading Guides, worksheets or group work.
* Laboratory: 25-35 points each. A minimum of 30% of our class time will be spent on lab work. Labs will be inquiry based and will include written reports.
* Scientific paper interpretation: 20-30 points each. Reading and interpreting scientific research. Assigned 1 or 2 each semester.
* Semester exam: Students are required to take a semester exam that accounts for 20% of the semester grade.

**POLICIES:**

1. Attendance, tardies, missed/late assignments or exams, disabilities, and academic

 dishonesty – see Agenda pages 18-28.

2. Homework

 A. Late work policy:

 1. On homework that is checked or graded in class, no late work is accepted.

 2. On homework or lab that is collected, work must be turned in on the day

 and time it is due. The time is always the period that you have Biology at

 the start of class. After that it is considered late and will only be accepted

 for one day and graded with a penalty. No late work is accepted after one

 day.

 B. Extra Credit: **No extra credit** will be given, this is a science department policy.

3. Classroom Policy and Procedures

 A. Be on time for class. Please respect my time as well as the other students

 by being in your seat when the bell rings. After two warnings an after school

 detention will be assigned.

 B. There is no eating, drinking, or chewing gum. After two warnings an after

 school detention will be assigned.

 C. Be prepared for class!!! Responsibility and time management are an integral part of

 this course. You know what you need to do to be succesful. See me if you are having

 trouble.

4. Attendance/absence

 A. Absences can be very costly‑‑ Please make every attempt to be in class every day. It is important to find a reliable lab partner to discuss lab information as well as provide lecture notes that were missed due to an absence.

 B. It is the students responsibility to make-up any work due to absence. It is

 important to see me for assignments missed.

 C. All work must be made up within a reasonable amount of time depending upon the

 length of absence.

5. Teacher availabity

 See website <http://www.quia.com/pages/contact.html> for current office hours. A

 student can also see me anyday after class to arrange a time to meet.

6. Communication

 A. Students wishing to email me should be copied to their parents email. My response to

 the student will be copied to the parent email that is listed in the student records.

B. Telephone and email communication between student, parents and teacher will be

 responded to between the hours of 7:30 A.M. and 3:30 P.M. Monday through Friday.

**ADDITIONAL AP INFORMATION**

There are two ways to earn college credit for this class. One is by passing the AP exam given in May by the College Board. **Every student in an AP class at Saint Viator must take and complete the AP exam. Failure to do this will result in the removal of the AP designation for the course.**

1. Most colleges accept a score of 3 or higher on the AP Test. However, some may only take a score of 4 or 5 and some will only accept a 5. When you make your college selection, please ask the college admissions office, your counselor or Ms. Dugan about obtaining this credit.
2. Credit may also be obtained through Saint Mary’s University of Minnesota – Program for Advanced College Credit (PACC). The Saint Mary’s course is Biology/Zoology course B110/111.
3. To get college credit for this course, a fee for tuition to Saint Mary’s must be paid in September. I will let you know as soon as I get that information.
4. Grades below a C are non‑transferable (no credit is given). Two grades will be sent to Saint Mary's—a class grade and a lab grade.

 The following grading scale will be followed for St. Mary’s credit:

 **A 92 – 100**

 **A/B 88 – 91**

 **B 82 – 87**

 **B/C 78 – 81**

 **C 70 - 77**

1. You will receive 4 transferable college credit hours, and the grade that you earn in this course will be placed on your official Saint Viator transcript and a college transcript.
2. Many colleges will accept this transferable college credit. However, some schools will not. Again, when you make your college selection, you must find out if the credit will transfer.

**COURSE OUTLINE**:

This syllabus provides an overview of the course. It is in accordance with the requirements

established by the College Board for AP Programs and has been approved by Saint Mary's

College.

I. Molecules and Cells

**CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework.

 **Big ideas: 2, 3, 4**

 A. Basic Biological Chemistry 8/21-9/12

 1. Atoms, molecules, bonding, pH

 2. Water and its properties

 3. Uniqueness of carbon and its functional groups

 4. Organic molecules and their biological importance.

 - carbohydrates, lipids, proteins, nucleic acids

 5. Enzymes

 - rates of activity, regulation, cofactors and coenzymes

**CR4b:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2.

**Readings:** Chapters 2, 3, 4, 5

 **LABS**: **AP Lab #13 - Enzymes and Organic Molecules Lab**

 B. Cellular structure and functions 9/13-10/4

 1. Prokaryotic vs. eukaryotic cells

 2. Plant and animal cells

 3. Structure and function of cell membrane

**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.

 - Osmotic potential, passive and active transport

 4. Structure and function of organelles, motility and cytoskeleton

**Readings:** Chapters 26, 27, 28, 7, 8

 **LABS: AP Lab #4 - Osmosis and Diffusion**

 C. Energy transformations 10/7-11/5

**CR4b:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2.

 1. ATP, energy transfer and coupled reactions

 2. Glycolysis, fermentation and aerobic respiration

 3. Chemiosmosis

 4. Photosynthesis

**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.

 5. C3 and C4 photosynthesis

**Readings:** Chapters 9,10

 **LABS: AP Lab # 6 - Cellular Respiration**

 **AP Lab #5 - Photosynthesis**

 D. Cell Communication & Cell Cycle 11/6-11/15

1. Life cycle: mitosis, meiosis, and cytokinesis

**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.

1. Cel to cell recognition
2. Communication between cells.

**Readings:** Chapters 11, 12, 13

**LABS: AP Lab #7 - Affects of lectin on cell division**

 **- Sordaria frequency of cross-over**

II. Ecology 11/19-12/5

**CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework.

 **Big ideas: 4**

 A. Populations Ecology

1. Population dynamics
2. Interspecifice relationships
3. Coevolution

 B. Community ecology

1. Structure and characteristics

**CR4d:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 4.

1. Food chains and webs
2. Energy flow and productivity

**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.

1. Stability and non-equilibrium models

 C. Ecosystms

1. Biomes
2. Ecological succession
3. Biogeochemical cycles

**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.

1. Ecological concerns and solutions

**Readings:** Chapters 50, 52, 53, 54

 **LABS: AP Lab #10: Dissolved Oxygen and Net Primary Productivity**

III. DNA and Heredity

 **Big ideas: 1, 3**

 A. Molecular genetics 12/6-12/13

**CR4c:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 3.

1. DNA‑ structure and replication

2. Eukaryotic chromosomal structure, nucleosome

3. RNA‑ transcription and translation

4. Regulation of gene expression

5. Mutations

6. Recombinant DNA, DNA cloning, hybridization

7. DNA and RNA viruses

**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.

**Readings:** Chapters 16, 17, 19, 20

**LABS: AP Lab #8 and 9 - Molecular Biology (Electrophoresis and Transformation)**

 B. Heredity 12/16-1/10

 1. Mendel's Laws and probability

 2. Exceptions to Mendel's laws, Gene linkage

**CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework.

 3. Inheritance patterns: chromosomes, genes, alleles, and interactions

 4. Human genetic defects

 a. detection and correction

 b. symptoms

 **Readings:** Chapters 15, 20, 21

  **LABS: AP Lab #1 - selection using Fast Plants**

 IV. Evolution 1/21-2/5

**CR4a:** The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea1.

 1. Origin of life

 2. Evidence for evolution

 3. Natural selection

 4. Hardy‑Weinberg Principle

 5. Factors influencing allelic frequencies

 6. Speciation

 a. isolating mechanisms

 b. allopatry

**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.

 c. sympatry

 d. adaptive radiation

 7. Patterns of evolution

 a. divergence and convergence

 b. punctuated equilibrium

 c. gradualism

 **Readings:** Chapters 22, 23, 24

 **LABS: AP Lab # 2 - Populations (Hardy-Wienberg using Excel spreadsheets)**

 **AP Lab 3 – Comparing DNA sequences using BLAST**

V. Organisms and Populations

**CR2:** The course is structured around the enduring understandings within the big ideas as described in the AP Biology Curriculum Framework.

 **Big ideas: 1, 2, 4**

 A. Phylogeny and the Tree of Life 2/6-2/12

* Bacteria and Archea
* Protists and Fungi
* Reading and developing phylogenetic trees **(CR4a)**

 B. Animal Diversity 2/13-2/21

* Classification ( acoelomate, pseudocoelomate, protostome and deuterostome phyla)
* Structure and function of tissues, organs and systems in vertebrates

**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.

* Gametogenesis, fertilization, embryogeny and development
* Animal behavior

**Readings:** Chapters 25, 32, 33, 34, 40

**LABS: AP Lab #12 - Animal Behavior**

 **Bess Bug Lab**

 **Termintes and Pheremones Lab**

 D. Animal Anatomy and Physiology 2/24-3/21

* Skeletal and Muscular systems

**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.

* Digestive and Respiratory systems
* Ciculatory system and Defense system
* Reproductive, Excretory, and Nervous systems

**Readings:** Chapters 40-49

 **LABS: Determining Blood Pressure and Heart rate**

D. Plants 3/31-4/16

 1. Classification

 2. Adaptations to land

**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.

 3. Structure and physiology of vascular plants

 4. Alternations of generations in moss, fern, pine, and flowers

 5. Seed formation, germination and growth in seed plants

 6. Hormonal regulation of plant growth

7. Plant response to stimuli: tropisms and photoperiodicity

**Readings:** Chapters 35, 36, 37, 38, 39

 **LABS: AP Lab #11 - Transpiration**

If all units proceed on schedule the last few weeks will be used for review and practice for the AP exam.

Syllabus is subject to change.