AP Biology Course Syllabus

Teaching Philosophy

Students learn by doing. This course allows students opportunities to participate in the learning process by using the techniques scientists use of formulating questions and conducting research to find their own answers. This inquiry based instruction will provide students a deeper level of learning in biology. The skills they take away from this course will allow them to be successful as they move onto college and beyond.

Textbook: Life: The Science of Biology, 9th edition. Sinauer and Freeman 2011 [CR1]

Course Organization

This course is structured around the four big ideas and the enduring understandings identified in the AP Biology Curriculum Framework. 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 big ideas are interrelated and as such at least two are addressed in each unit of instruction. Students will be provided with a copy of the big ideas and enduring understandings. They will also be posted in the classroom. Students will be asked to create a curriculum map indicating the connections between the big ideas and enduring understandings as the course progresses. [CR2], [CR3]

The schedule we are currently using consists of three 43 minutes class periods and two 100 minutes class periods per week. This allows students to engage in laboratory work for more than 25% of the instructional time. [CR7]

The grid below illustrates the units of study and the essential knowledge addressed in each unit. Under essential knowledge the big idea is represented by the first number, the enduring understanding the letter followed by the final number representing the essential knowledge. In the activities column the activity is followed by the science practices (SP) that students will be demonstrating. The activities for each unit are not an exhaustive list. Based on a variety of formative assessments conducted throughout the year others will be added. [CR4] [CR6]

Unit	Essential	Activities

	Knowledge	
1. **Evolution** Chapters 21-25 [CR3a]	**1.A.1-1.A.4** **1.B.1-1.B.2** **1.C.1-1.C.3** **2.D.2** **3.A.1** **3.C.1** **4.B.4** **4.C.1** **4.C.3**	• Population Genetics (lab #2) **SP 1, 2 and 5 [CR6]** • Cladistics Using BLAST and Sequence Alignment Tools (lab #3) **SP 1 and 5 [CR4a]** • Artificial Selection using Wisconsin Fast Plants (lab #1) **SP 1, 2, 5 and 7 [CR6]**
2. **Ecology** Chapters 54-58 [CR3b)	**2.A.1-2.A.3** **2.C.2** **2.D.3** **2.E.2-2.E.3** **3.E.1** **4.A.5-4.A.6** **4.B.3** **4.B.4** **4.C.4**	• Energy Dynamics, estimating productivity (lab #10) **SP 1-7 [CR6]** • Fruit Fly Behavior (lab #12) **SP 1 and 3-7 [CR6]**
3. **Origin of Life** Chapters 2.4, 3, 4, 5, and 8 [CR3d]	**2.A.1** **2.A.3** **1.C.1** **2.A.2** **1.D.1-1.D.2** **2.B.1** **2.B.3** **3.A.1** **4.A.1** **4.B.1** **4.B.2** **4.B.4** **4.C.1**	• Student designed experiments investigating factors affecting enzymatic reactions (lab #13) **SP 5-7 [CR6]**
4. **Cell Function** Chapters 6, 52, 45 and 35	**2.A.3** **2.B.1-2.B.2** **2.D.2-2.D.3** **3.E.2** **4.A.4**	• Diffusion and Osmosis lab investigation (lab #4) **SP 2, 4 and 5 [CR6]** • Transpiration (lab #11) **SP 1, 2, 4, 6 and 7**
5. **Cell Communication** Chapters 7, 41 and 37 [CR3c]	**2.C.1-2.C.2** **2.D.1** **2.D.3** **2.E.1-2.E.3** **3.B.2** **3.D.1-3.D.4** **3.E.1**	• Claymation **SP 1, 4 [CR4c]**
6. **Defenses** Chapters 42 and 39	**2.D.3-2.D.4** **3.D.2** **4.C.1**	• Disease Projects **SP 3, 4, 5 [CR4b]**
7. **Energetics**	**2.A.2** **2.B.3**	• Cellular Respiration (lab #6) **SP 1,2,3,6 and 7 [CR6]**

Chapters 9 and 10	**2.D.1** **4.A.1-4.A.2** **4.A.4**	• Photosynthesis (lab #5) **SP 1, 2, 3, 4, 6 and 7 [CR6]**
8. **Needs of Cells** Chapters 40, 49, 50 and 51	**2.A.1-2.A.3** **2.C.2** **2.D.2** **4.A.4** **4.B.2**	• Dissection • Physiology lab activities
9. **Using Energy** Chapters 46, 47, and 48	**2.A.1-2.A.2** **3.E.1** **4.A.2** **4.A.4** **4.B.2**	• Eye dissection • Nervous System activities followed by student designed experiments **SP 2-6**
10. **Asexual Reproduction** Chapters 11.1-11.3 and 13	**2.D.1** **3.A.1-3.A.2** **3.C.2** **4.A.1-4.A.2**	• Mitosis lab (lab #7) **SP 1, 5-7** • Cancer research project **SP 1,2, 4, 5, and 7** • Lego DNA **SP 1**
11. **Sexual Reproduction** Chapters 11.4-11.5 and 12	**3.A.2-3.A.4** **3.C.1-3.C.2** **4.C.1-4.C.3**	• Calculating crossover frequency (lab #7) **SP 1, 5-7** • Feline Genetics lab **SP 2, 3, 4, 5 and 6**
12. **Making Proteins** Chapters 14, 15, 17 and 18	**3.A.1** **3.B.1** **3.C.1-3.C.3** **4.A.2** **4.C.1**	• Bacterial Transformation (lab #8) **SP 1, 3, 5-7 [CR6]** • RE analysis of DNA (lab #9) **SP 3 and 6 [CR6]**
13. **Gene Regulation** Chapters 16, 19 and 20	**2.C.1** **2.E.1** **3.A.1** **3.C.2**	• Lac Operon Gene Regulation **SP 3, 6 and 7 [CR6]** • Bioethics project **SP 4, 5, and 7 [CR4d]**

Social and Ethical Concerns [CR5]

It is vitally important that students connect their classroom knowledge to socially important issues. This course will allow students to learn about and discuss many issues in a variety of formats. Since the goal will be to discuss a timely event the topics will be generated based on current news items. The format for the topic will vary but include blogging and current event presentations in class. Students will also participate in a debate on a bioethical issue

The Laboratory Program [CR6]

Our schedule allows for well over 25% of the instructional time in the laboratory setting. Students have access to laboratory equipment as well as computers on a daily basis. [CR7] Activities are listed above in the grid with the corresponding unit and science practice (SP). There are at least two laboratory activities per big idea. Many of the activities will be conducted over several days or weeks. Other activities will be added based on formative assessments and interest of the students.

Communication [CR8]

Students will maintain a laboratory notebook and a portfolio throughout the course. The portfolio will be used to allow for self-reflection on the part of the student. Students will also have opportunities to communicate with each other throughout the year via group and single presentations, PowerPoint presentations, and poster presentations.

[Please note that curricular requirements are indicated in red throughout the document. Not all examples have been annotated.]