

## KAP Biology – Energy in Living Systems

**Course Overview:** This course is designed to introduce students to the process of scientific thinking as well as the principles of biochemistry, cell biology, physiology, and ecology. Topics cover the study of life from the biochemical to the global levels, concentrating on the flow of energy and materials through organisms. Students will read current research and discuss methods and approaches to unanswered questions.

Keep in mind that college courses are considerably more demanding than “normal” high school classes. Students are expected to be highly self-motivated in order to meet these demanding requirements. You will often be responsible for several assignments at the same time. If you do not stay current in your assignments for this class you will fall behind very quickly!

This course is equivalent to the Biology 115 course taught at Kenyon College in Gambier, Ohio. It will meet both Kenyon College and River View High School requirements.

### Major themes:

- Life is dynamic and constantly changing to adapt to new conditions in their environment
- Types of biomolecules and how they interact to produce the flow of energy necessary for life
- The hierarchical organization of structure and function within living things, from molecules to cells to organisms
- Ecological relationships among living things and their physical environments
- Read and interpret primary literature and compare to popular source representations
- Develop critical thinking and problem-solving skills including understanding alternate hypotheses and conflicting data
- Develop scientific writing and computing skills
- Articulate logical support of scientific ideas and questions

### Required Text

We will use the same textbook as students use at Kenyon College: *Biological Science* by Scott Freeman, 4<sup>th</sup> Edition, 2011.

The student websites for the course at [wps.prenhall.com/esm\\_freeman\\_biosci\\_2/21/5464/1398909.cw/index.html](http://wps.prenhall.com/esm_freeman_biosci_2/21/5464/1398909.cw/index.html) and [www.masteringbiology.com](http://www.masteringbiology.com) may prove useful as it has self-assessment tools and additional information. These are great places to get extra practice. There may be a few assignments from here later in the year.

Miss Casey also has a lot of information on the school information that you will need for class at [www.river-view.k12.oh.us](http://www.river-view.k12.oh.us). Once there go to the Schools then RV High School then Classrooms and finally Miss Casey. Select the KAP class on the menu.

You will be given other reading assignments as needed.

### How to Do Well in This Class

#### Preparation

- Reading assignments should be read BEFORE class. This will help you more fully understand the lectures. Readings may not be completed in class, but you are still responsible for the information contained in them
- When you are given the lab procedures before class, you will be expected to know exactly what you are going to do during the lab and/or ask questions about procedures
- Come to class prepared and ready to pay attention

- Take thorough and detailed notes. Lecture material includes material not found in the text. If you are absent, you need to get the information you missed.
- Learn the vocabulary. You cannot understand complex biological concepts if you don't understand the words being used

### **Class Attendance and Participation**

- Any time in class – ask for clarification, pose a question, link disparate ideas together...
- Absences should be rare in this class. When you are absent, use your syllabus as a guide to keep you up to date
- If you are absent the day of the lab, you will be expected to make arrangements with Miss Casey to make up the lab. After school is usually the best time for lab make-up.
- There are few times when we will need an extended period to collect data for a lab. Students are required to attend just the same as during the school day. These will be conducted after school. Students will be given compensation time during the enrichment lab period for the time spent collecting this data. (In other words, they won't have to come to lab during enrichment)
- Review textbook assignments and notes after class to consolidate material. Images from the PowerPoint won't be posted on the website, although their location will be listed when possible. If you want a copy of a particular image see Miss Casey.

### **Getting Help**

- Make good use of your web resources especially Miss Casey's website and website for the textbook. Don't forget to use the blog and useful links
- Your best chance to get help is to make arrangements to see me during or right after school.
- E-mail is the best way to reach me although if you e-mail after school hours I may not see it until morning.
- Do not call me at home unless it's an emergency that can't wait until the next day. I will not answer the phone for anyone but family or friends after 8:00 PM.
- Connect with other people in the class

### **Homework**

- Most homework will not be typically collected for a grade. However, assignments may be collected to check on your progress and get feedback from Miss Casey
- The questions in the textbook have the answers in the back of the book. They make good practice for the tests. Try to answer them first on your own, then check to see if you are correct
- There will be a few graded assignments that aren't in the book. They will be found on Miss Casey's website. Be sure to check Progress Book or the class calendar for when these assignments will be due.

### **Writing Assignments/Presentations**

- The first semester will concentrate on having students read articles assigned by the teacher. Students will do a summary of the main ideas from the article and respond to questions about what they read in the article. Each assignment will be worth 15 points
- The second semester will include 2 presentations worth 50 points and a literature review worth 50 points on an assigned research topic. It is important to properly cite information from the papers.
- Students will also be doing 1 formal lab write ups each nine weeks worth 30 points
- Scientific writing is different from other types of writing. You aren't telling a story. Focus on stating the facts without a lot unnecessary adjectives and adverbs. Be concise
- Be sure for any formal writing that you properly document sources and include a bibliography if you are citing multiple sources

## Labs

- Most of the labs will be conducted during enrichment period although some may extend into the class period.
- Most labs will be worth 10 points and will assess what you learned from that lab. One lab each nine weeks will be assigned for a more formal write-up and are worth 30 points.
- During enrichment periods where we aren't doing labs, the time will be used as review sessions for any areas you are having problems.
- We have a limited amount of lab time. The time during enrichment takes precedence over all other activities. Do not schedule make-up work during this time nor may you attend club meetings. Students who miss the lab period for an unexcused absence will not be allowed to make up that lab or if a multi-day lab will have points deducted from their lab.

## Tests and Quizzes

- There will be two exams each nine weeks (except the last nine weeks which will only have one), one before interims and one near the end of the nine weeks worth 100 points
- There will also be a comprehensive exam at the end of each semester. These exams will cover all the material from the semester. Because this course is also for college credit, there will be no exemption from the final exam. All students will be required to take the test regardless of their grade.
- Two announced quizzes will be given each nine weeks worth 50 points
- Several brief pop quizzes may be given during the nine weeks ranging from 5-20 points as needed

## Grading

- To calculate your Kenyon Grade the exams will be combined with the other your (9weeks grades to make a single Kenyon grade. For your River View Grade the grade will be calculated like any other class with four nine week grades and two exam grades. This is a 5-point class.
- Due to the difficulty of the course, students will be graded using scale below instead of the standard River View Grading Scale
  - A – 90% - 100%
  - B – 80 % - 89.9%
  - C – 70% - 79.9%
  - D – 60% - 69.6%
  - F – 0% - 59.9%

## Academic Honesty

- Plagiarism and cheating will not be tolerated. Not only will it have serious consequences here at River View but also at Kenyon College.
- Read over the policies for River View in your student handbook
- Read over the policies for Kenyon College at [www.kenyon.edu/x13678.xml](http://www.kenyon.edu/x13678.xml) . You will need to scroll down the page to find the policy

### Sequence of Learning Activities:

This is meant to be a **tentative** schedule. We will follow the basic sequence by may not always be on the projected data. You will be given other reading assignments as needed. Major assignments are indicated. Other assignments will be posted in Progress Book or on the Classroom Calendar.

Date	Subject	Readings
Aug 24	Intro to course and syllabus	
Aug 25	Seating, syllabus if needed, Kenyon survey, books assigned	
Aug 26	Biology Methods	Section 1.5, Bioskills 1
Aug 27	How to Read and Interpret Primary Scientific Research	Kenyon Tutorial – Go to links page, Bioskills 2
Aug 30	Set dates to do offsite labs What is Life?	Section 1.1; “Seven Pillars of Life”; Section 4.4
Aug 31	First Life Form	Section 4.4
Sep 1-2	First Artificial Cell – Living or Not	
Sep 7	Guiding Theories for Biology	Read Sections 1.2 & 1.3
Sep 8-9	Tree of Life: Eukaryotes	Read Section 1.4; Skim Chapters 29-32
Sep 10-13	Tree of Life: Prokaryotes; <b>1<sup>st</sup> Article Due on Sep 10</b>	Section 28.1-28.3; Phylogenetic structure of the prokaryotic...
Sep 14	<b>Quiz #1 – Life, Guiding Theories, and Tree of Life</b>	
Sep 15	Review Basic Atomic Structure	
Sep 16-17	Review Chemical Bonds	
Sep 20-21	Review Chemical Reactions	Section 9.1, Section 2.3
Sep 22-23	Water	Section 2.2
Sep 24	Review Acids and Bases	
Sep 28	Importance of Carbon	Section 2.4
Sep 29-30	Energy – <b>2<sup>nd</sup> Article Due on Sep 30</b>	Section 9.1, Section 2.3
Oct 1	<b>Exam #1 – Introduction and Chemistry Review</b>	
Oct 6-Oct 7	Early Origin of Life Experiments and Amino Acids	Section 3.1 and 3.2; Life on Earth; Emergence of Cells...
Oct 8, 11	Protein Importance and Structure	Section 3.3 and 3.4
Oct 12-13	Enzymes and Catalysis	Section 3.5
Oct 14	<b>Quiz #2 -- Proteins</b>	
Oct 15	Nucleic Acids -- <b>3<sup>rd</sup> Article Due</b>	Section 4.1
Oct 18	DNA Structure and Function	Section 4.2
Oct 19	RNA Structure and Function	Section 4.3
Oct 20	Lipids – <b>1st Formal Lab Write-Up (Pillbug Lab Material/Methods and Results)</b>	Section 6.1
Oct 21	<b>Exam #2 – Biomolecules including proteins and Early Origin of Life Experiments</b>	
<b>OCT 22 – END OF NINE WEEKS</b>		

<b>Date</b>	<b>Subject</b>	<b>Readings</b>
Oct 25-26	Phospholipid Bilayers	Section 6.2
Oct 27-28	Diffusion, Osmosis and Membrane Proteins	Section 6.3
Oct 29, Nov 1,2	Membrane Proteins	Section 6.4
Nov 3	Bacterial and Archaeal Structures and Functions	Section 7.1
Nov 4, 5, 8	Eukaryotic Cell Structures and Functions	Section 7.2; The Birth of the Nucleus
Nov 9	Putting Parts into a Whole	Section 7.3
Nov 10	<b>Quiz #3 –Cell Structures &amp; Functions</b>	
Nov 11-12	Nuclear Transport; <b>4th Article due on Nov 12</b>	Section 7.4
Nov 15-16	Endomembrane System	Section 7.5
Nov 17, 18	Cytoskeleton	Section 7.6
Nov 19, 22	Multicellularity and Cell Communication	
Nov 23	<b>Exam #3 – Membranes, Cell Structure/Function</b>	
Nov 24, 30, Dec 1	Cellular Specialization and Protist Diversity; 3 <sup>rd</sup> Formal Lab Write-up (Results and Discussion)	Section 29.1 – 29.3
Dec 2	Sugars as Monomers	Section 5.1
Dec 3,6	Structure of Polysaccharides; <b>5<sup>th</sup> Article due on Dec 3</b>	Section 5.2
Dec 7	Role of Carbohydrates	Section 5.3
Dec 8	Quiz #4: Carbohydrates	
Nov 9	Overview of Photosynthesis	Section 10.1
Dec 10, 13	Photosynthesis: the Light Reactions;	Section 10.2 – 10.3
Dec 14-15	Photosynthesis: the Dark Reactions; C <sub>3</sub> v. C <sub>4</sub> plants	Section 10.4; Plant Wannabees
Dec 16-17	Review Cell Energetics, Nitrogen Fixation	p. 510-511; 749-50
Dec 20-22	<b>Semester Exams</b> —Select Topic for Literature Review	
Jan 3	Overview of Cellular Respiration	Section 9.2
Jan 4-5	Glycolysis; <b>Turn in 6<sup>th</sup> Article on Jan 4</b>	Section 9.3
Jan 6	Processing Pyruvate to Acetyl CoA; <b>Turn in 2<sup>nd</sup> Formal Lab Write-Up (Cemetery Lab – Results and Discussions)</b>	Section 9.4
<b>JAN 6 – END OF NINE WEEKS/SEMESTER</b>		

<b>Date</b>	<b>Subject</b>	<b>Readings</b>
Jan 10-11	The Citric Acid Cycle	Section 9.5
Jan 11-13	Electron Transport and Chemiosmosis	Section 9.6
Jan 13-18	Fermentation	Section 9.7
Jan 19	Interactions with other Metabolic Pathways	Section 9.8
Jan 20	Review Cell Energetics	
Jan 21	<b>Quiz #5 – Cellular Respiration; Literature Review Article Due</b>	
Jan 24	Plant Diversity	Section 30.3
Jan 25-26	Plant Form Diversity	Section 36.1
Jan 27-28	Plant Tissues	Section 36.3
Jan 31-Feb 1	Water Potential and Water Movement	Section 37.1
Feb 2-3	Water Movement from Roots to Shoots	Section 37.2
Feb 4, 7	Water Absorption and Water Loss; <b>Literature Review Article Due Feb 4</b>	Section 37.3
Feb 8-9	Translocation	Section 37.4
Feb 10	<b>Exam #5 – Cell Energetics and Plants</b>	Section 32.2 and 41.1
Feb 11	Animal Form	
Feb 14-15	Animal Tissues, Organs, and Systems	Section 32.3 and 41.2
Feb 16-17	Animal Diversity; Literature Review Article Due Feb 17	Section 32.3 and 32.4
Feb 22	Cell Signaling	Section 8.2 and 8.3
Feb 23	Overview of Cell to Cell Signaling	Section 47.1
Feb 24-25	Hormones	Section 47.2
Feb 28, Mar 1	How Hormones are Regulated	Section 47/3
Mar 2	<b>Quiz #6 – Animal Tissues, Organs, Systems, and Hormones</b>	
Mar 3-4	Principles of Electrical Signaling; Literature Review Article Due Mar 4	45.1
Mar 7-8	Dissecting Action Potential	45.2
Mar 9-10	The Synapse	45.3; What the Synapse Tells the Neuron
Mar 11	Nerves and Muscles; <b>3rd Formal Lab Write-Up Due (TBD - Methods/Materials, Discussion, Results)</b>	46.5
Mar 14	<b>Exam #6—Animals, Hormones, and Electrical Signaling</b>	
Mar 15	Sensory Organs—Convey Information to the Brain	46.1
Mar 16	Hearing and Vision	46.2- 46.3
Mar 17	Taste and Smell	46.4
Mar 18	Senses Directing Mating Behavior; <b>Turn in Literature Review Paper</b>	51.3
<b>MAR 18 – END OF NINE WEEKS</b>		

Date	Subject	Readings
Mar 21-22	<b>Literature Review Presentations;</b> Select Community Presentation Topic	
Mar 23	Homeostasis: General Principles	41.4
Mar 24-25	Homeostasis: Thermoregulation	41.5
Mar 28-29	Osmoregulation and Osmotic Stress	42.1
Mar 30	Water and Electrolyte Balance in Aquatic Environments	42.2
Apr 4	Water and Electrolyte Balance in Terrestrial Insects	42.3; Water Vapor Absorption in Arthropods...
Apr 5	Water and Electrolyte Balance in Terrestrial Vertebrates	42.4
Apr 6-7	Energy Flow and Metabolism	41.3
Apr 8	<b>Quiz #7 – Homeostasis, Water and Electrolyte Balance</b>	
Apr 11	Demography	52.1
Apr 12-13	Population Growth	52.2
Apr 14-15	Population Dynamics	
Apr 18-20	Species Interactions	53.1
Apr 21	Community Structure	53.2
Apr 25, 26	Community Dynamics	53.3
Apr 27	Species Richness	53.4
Apr 28	<b>Exam #7 – Sensory Organs, Homeostasis and Populations, Communities</b>	
Apr 29, May 2	Energy Flow in Ecosystems	54.1
May 3	Global Biogeochemical Cycles	54.2
May 4-5	Biodiversity	55.1-55.2
May 6, 9-10	Threats to Biodiversity	55.3; A Second Chance for Rainforest Biodiversity
May 11-12	Importance to Biodiversity	55.4
May 13	<b>Quiz #8 – Biodiversity Turn in 4<sup>th</sup> Formal lab write-up (Gall Lab -- materials/methods, results, discussion)</b>	
May 16-17	Global Warming	54.3
May 18-19	<b>Community Presentations;</b> Kenyon Survey	
May 20	<b>Final Exam</b>	
<b>CONGRATULATIONS GRADUATE – END OF NINE WEEKS/YEAR</b>		