BCCS - ADVANCED BIOLOGY CURRICULUM MAP (Revised 5-7-09)

Month	Content What topic(s) is being covered and what is the important vocabulary? What do students need to know		Skills What do students have to be able to do connected to the Content?	Essential Questions What are fundamental, enduring questions that will guide study and instruction?	Standards/ Benchmarks What benchmarks are met through this topic?	Instruction What activities are used to develop the skills and knowledge?	Resources What materials, texts, videos, internet, software, or human resources support instruction?	Assessment What evidence (products and/or performances) is collected to establish that the Content and Skills have been learned?
August	***Topic:*** Karyotyping	***Vocabulary:***	• Convert a chromosomal photograph into a completed karyotype.	• What chromosomal defects are evidenced by the completed karyotype?	None	3 karyotypes are completed as homework	Biology in the Laboratory - Helms	Completed karyotypes are graded.
September	***Topic:*** Mendelian and non-mendelian patterns of inheritance	***Vocabulary:***	• Demonstrate the ability to solve a variety of genetics problems that include dominant / recessive genes, codominant genes, sex-linked genes, sex-influenced genes, epistasis, collaboration and gene complementation. • Conduct a laboratory experiment to determine the nature of the gene that produces a certain mutant trait in Drosophila.	• How are traits passed on from generation to generation? • What type of gene (sex-linked, autosomal) is responsible for a particular trait in Drosophila?	Heredity #4, 6 Heredity #4, 5	Problem sets that are the intellectual property (IP) of John Gehring. Parental Drosophila provided by John Gehring.	Biology – Neil Campbell Lifetime Laboratory Experiences	Daily quizzes and two period long exams. Students write a scientific paper using the format provided by Michigan State University.
	Chi Square test of Significance and linkage		• Demonstrate the ability to determine if the difference between observed and expected results is significant, highly significant or not significant. • Demonstrate the ability to solve a variety of genetics problems involving linkage patterns.	• How can we determine if the difference between what we expect from a genetic cross is significantly different from the results we observe having conducted that cross? • How can we determine if genes are linked or not?	None Heredity #4, 5	Two problem sets that are the IP of John Gehring. One six problem set that is the IP of John Gehring.	Biology – Neil Campbell Biology – Neil Campbell	Two Chi square quizzes. Two linkage quizzes and one Chi square/linkage exam.
	Hardy Weinberg		• Demonstrate the ability to utilize the hardy Weinberg Law and the Hardy Weinberg generalizations to solve a variety of problems.	• How does Hardy Weinberg provide powerful evidence of the continual presence of evolution in all population?	Evolution #4, 5, 6	Three problem sets that are the IP of John Gehring.	Biology – Neil Campbell	Four Hardy Weinberg quizzes and one Hardy Weinberg exam.

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October	***Topic:*** Chemistry in the context of life.	***Vocabulary:***	• Describe the types of chemical bonding that form molecules.	• How is a molecule's shape related to its function?	None	Animations that are the IP of John Gehring. One problem set that is the IP of John Gehring.	Biology – Neil Campbell	One quiz
	Water		• Demonstrate a conceptual understanding of the origin of the polarity of water. • Demonstrate a comprehension of the effects that this polarity has on a variety of life forms.	• What are the biological effects that result from the polarity of the water molecule?	None	Animations that are the IP of John Gehring.	Biology – Neil Campbell	Free response mini exam.
	Carbon		• Sight recognition of the key functional groups.	• How do the various functional groups contribute to the molecular diversity of life?	None	Animations that are the IP of John Gehring.	Biology – Neil Campbell	One functional group quiz.
	Macromolecules		• Sight recognition of carbohydrates, lipids, nucleic acids, and proteins.	• How are polymers formed? • What is the function of carbohydrates, lipids, nucleic acids and proteins, and how is their structure related to their function, and how specifically are carbohydrate, lipids, and proteins synthesized?	Cells #8, 11	Class discussion combined with problem sets authored by Keeton and Campbell and quizzes authored by Gehring. Enzyme kinetics demonstration.	Biology – Neil Campbell	One protein, lipid and carbohydrate quiz. Unit exam that is a combination of multiple choice, short answer and free response authored by John Gehring.

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November	***Topic:*** Photosynthesis	***Vocabulary:***	• Demonstrate a conceptual understanding of light phase reactions of photosynthesis. • Demonstrate a conceptual understanding of how chloroplasts synthesize ATP chemiosmotically. • Demonstrate a conceptual understanding of the Calvin Cycle.	• How do plants convert light energy to chemical energy in the form of carbohydrate? • How do plants use light energy to establish proton gradients and how do they harvest that convert that potential energy to ATP? • How do plants use the chemical energy captured in the light reactions to reduce CO2?	Cells -– #3, #9, #12	Animations and problems sets authored by Gehring, Keeton, and Campbell Lab – Chromotographic analysis of plant pigments.	Biology – Neil Campbell	Light reactions free response quiz. Chemiosmosis free response quiz. Calvin cycle free response quiz. Unit exam authored by John Gehring.
December	***Topic:*** Membrane structure and function	***Vocabulary:***	• Describe the fluid mosaic model of the cell membrane. • Describe the various mechanisms responsible for transport of selected solutes across a membrane.	• What is the current model of the molecular architecture of membranes? • How does the structural organization of membranes provide for transport and recognition? • What are the various mechanisms by which substances cross membranes?	Cells #5	Osmosis demonstration Membrane transport animations that are the IP of John Gehring. Problems sets authored by Gehring, Keeton and Campbell.	Biology – Neil Campbell	Membrane multiple choice and free response exam authored by John Gehring.

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January	***Topic:*** Nervous Systems	***Vocabulary:***	• Describe the nature of neurons and neural signals. • Describe the structure and function of the vertebrate brain.	• How do membrane potentials arise? • How do action potentials travel? • How do neurotransmitters function to bridge synaptic clefts?	Organization of Living Things #13	Class discussions supplemented by problem sets authored by Gehring, Keeton and Campbell. Synaptic transmission modeling lab. Vertebrate (sheep) brain dissection.	Biology – Neil Campbell	Action potential, synaptic transmission mini exam authored by John Gehring. Brain dissection lab practical and negative feed back free response exam.
February	***Topic:*** Digestive Systems	***Vocabulary:***	• Demonstrate an understanding of the anatomy / structure hormonal regulation and function of the vertebrate digestive system. • Demonstrate an awareness of the structural adaptations of digestive systems that are associated with diet.	• How is the structure and function of the various digestive organs related? • How are the functions of the digestive organs hormonally controlled?		Class discussion supplemented by problem sets authored by Keeton and Campbell. Dissection of the digestive system of the vertebrate rat.	Biology – Neil Campbell Dissection Lab Guide authored by John Gehring.	Digestive system lab practical Digestive system exam regarding the biochemistry and hormonal regulation of digestion.

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March	***Topic:*** Controlling the internal environment	***Vocabulary:***	• Demonstration of a conceptual understanding of the various mechanisms of thermoregulation in both ectothermic and homeothermic organisms. • Demonstrate a conceptual understanding of osmoregulation in various animal groups with a special emphasis on the vertebrate kidney.	• What adaptations are possessed by both ectotherms and endotherms that allow them to thermoregulate? • What is the structure of how vertebrate nephron and how does that structure function to produce osmotic homeostatis.	Organization of Living Things #13	Class discussions supplemented by problem sets from Keeton and Campbell. Dissection of a vertebrate excretory system.	Biology – Neil Campbell Dissection guide authored by John Gehring.	Mini excretory system lab practical. Multiple choice and free response exam regarding osmoregulation in vertebrate chordates.
April	***Topic:*** Gas Exchange mechanisms in animals The biochemistry of glycolysis, fermentation and cellular respiration.	***Vocabulary:***	• Demonstrate a conceptual understanding of how gas exchange occurs in themajor animal phyla such as Cnidaria, Annelida, Arthropoda, Mollusca and Chordata. • Demonstrate a conceptual understanding of how cells synthesize ATP by glycolysis and support the glycolytic pathway in the absence of molecular oxygen by fermentation pathways. • Demonstrate a conceptual understanding of how cells convert the chemical energy in the form of ATP.	• What adaptations are possessed by cnidarians, annelids, mollusks, arthropods and chordates that allow them to gas exchange with their environment? • How does chemiosmosis function in bioenergtetics? • How are organic molecules broken down by catabolic pathways? How do cells generate ATP in the absence of oxygen?	Organization of Living Things #13 Cells #9	Class discussions supplemented by a problem set authored by John Gehring. Demonstration dissection of a large insect. Dissection of the respiratory system of a rat. Class discussions supplemented by problem sets authored by Campbell and Keeton. Cell respiration lab.	Biology – Neil Campbell Dissection guide authored by John Gehring. Biology – Neil Campbell	Mini respiratory system lab practical. Multiple choice and free response exam regarding gas exchange in the major animal phyla. Glycolysis, fermenation, CoA formation, Krebs cycle and chemiosmosis mini exams. Unit exam authored by John Gehring. Cell respiration lab exam.

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May	***Topic:*** The biochemistry of muscle cell contraction	***Vocabulary:***	• Demonstrate a conceptual understanding of the interactions between actin and myosin and the regulatory proteins in a muscle contraction.	• How do interactions between myosin and actin underlie muscle contractions. • How do calcium ions and the regulatory proteins control muscle contractions.	Living Things #13	Teacher demonstration and student modeling of actin and myosin interactions.	Biology – Neil Campbell	Multiple choice and free response examination.
	Circulation of body fluids		• Demonstrate a conceptual understanding of how body fluids are circulated in vertebrate fish, amphibians and mammals.	• How does the structure of vertebrate arteries, veins and heart relate to their functions?	Living Things #13	Dissection of a mammalian heart. Cardiac test of fitness lab. EKG lab.	Biology – Neil Campbell Dissection guide authored by John Gehring AP Lab #10	Multiple choice and free response examination. Lab practical exam.
	The hormonal regulation of the estrous cycle		• Demonstrate a conceptual understanding of how hormonal interactions regulate the estrous cycle in mammals.	• How is the sexual cycle regulated in mammalian vertebrates?	Living Things #13	Teacher lead discussion	Biology – Neil Campbell	Free response examination.
	Data analysis – Means and standard deviation.		• Compute means and standard deviations from raw data.	• What does the standard deviation reveal about the n values?	None	Teacher introduced model problem.	None	Take home problem set.