Rowan-Salisbury School System

Introduction to Biology Pacing Guide
2009-2010

Course Description: This course is meant to precede Biology. It focuses on topics that are weighted heavily on the Biology EOC and are often the most difficult for students to comprehend and for teachers to explain. However, this course is designed to be more interactive and student-centered as much as possible. Students in this class will acquire basic content knowledge but also will gain a greater understanding of particular lab skills which will benefit them in whatever science they will take in the future. Students should gain in-depth knowledge about heavily weighted Biology EOC topics while acquiring more topical knowledge about other parts of the Biology curriculum.

Days	SCOS Objectives	Content	Guiding Questions	Suggested Resources
1-5	1.01, 1.02, 1.03, 1.04, 1.05	Lab Safety, Scientific Method, Types of Data, Types of Variables, Theory vs. Law vs. Hypothesis vs. Conclusion, Basic Characteristics of Life	-How can we have fun in lab while still being safe? -How can you tell the independent variable from the dependent variable? -Why is quantitative data more reliable than qualitative data? -What are the basic characteristics of life? -What purpose does the scientific method serve?	-Paper Football Lab -Flinn Science Lab Safety Test - Vioxx Articles (check FDA website) -Lab Safety Walk - Is the flame a living organism activity?
6-10	4.01	Classification, Binomial Nomenclature, Taxons, Dichotomous Keys, Carolus Linnaeus, Basic Overview of Six Kingdoms, History of Classification	-Why is the classification system set up in Latin? -What problems did Aristotle have with his classification system? -Based on a cladogram how do you determine which organisms are more closely related than others? -How do you properly use a dichotomous key, what problems exist with using a dichotomous key? -What are different taxons from largest to smallest? -If given the entire taxonomy of 3 different organisms how do you determine which two are most closely related?	-Shoe classification activity - Alien Dichotomous Key - Shell Dichotomous Key - Classification of Common Household Items (i.e nails, screws, buttons, bolts, ect.)
11-12	4.03, 4.04	Viruses	-Is a virus living on not? -What are the parts to a virus? -What is the difference between the lytic and lysogenic cycles? -How is a provirus different from a retrovirus? -Why is HIV capable of surviving regardless of attempts to cure the disease?	-Lysogenic and Lytic Cycles Charts -Information about DNA's reverse transcriptase being a "sloppy copier" - Use gang-warfare as an example of viral infiltration
13-14	4.01, 4.03	Bacteria	-What are some common diseases caused by bacterial infections? -What are the main shapes of bacteria? -How can bacteria be killed? -What survival methods do bacteria have to combat poor conditions? -What is the difference between a eubacteria and an archeabacteria? -What are the common features among organisms in this group?	-Bacterial Pictures (shapes) -Bacteria Lab

15	4.02, 4.04, 4.01	Protists	-What are the major groups of protists? -Why do protists look so dissimilar to each other? -What are the common features among organisms in this group? -What protists exist that are of particular importance to humans?	-Protist Lab with Microscope
16	4.01	Fungi	-What are the major groups of Fungi? -What are common characteristics among all fungi? -How are fungi and plants notably different?	-Dissection of a Mushroom
17-18	4.03, 4.02, 4.01	Plants	-What is the difference between a non-vascular and vascular plant? -What is difference between a gymnosperm and an angiosperm? -What are the common phyla of plants and their representative species? -What is the role of xylem and phloem? -What are the parts of a flower and what are they used for? -What are the common features among organisms in this group? -What are some common plant tropisms that can be exhibited?	-Flower Dissection Lab -Plant Walkabout -Phyla Flow Chart
19-20	4.03, 4.02, 4.01, 4.04, 4.05	Animals	-What are the major phyla of animals? -What are common characteristics among all animals? -What are some common characteristics among mammals? -What is the difference between an acoelomate, pseudocoelmate, and ceolomate? -How does the anatomy of a worm compare with your anatomy? -What are some common worms that cause infections in man? -What are the different types of worms and what type of body cavity do they exhibit? -What are some common examples of animal behavior?	-Human and worm anatomy coloring book - Parasite video - Gross Anatomy kids book
21	4.03, 4.02	Worm Dissection	-How is the anatomy of a worm similar and dissimilar to that of a human?	-Worm dissection -Candy Bar Dissection Lab

22-27	5.01, 5.02, 4.05	Abiotic vs. Biotic Factors, Types of Symbiosis, Food Chain / Food Web, Trophic Levels, Food Pyramid (Energy Pyramid), Basics of Carbon, Nitrogen, and Water Cycles	-What are differences between abiotic and biotic factors? -How does a food chain fit with a food web? -How does an increase or decrease of a specific organism within a food web affect other organisms? -Why is it impossible to destroy carbon, nitrogen, and oxygen? -What things make up an ecosystem?	- Planet Earth Video - Walkabout for abiotic / biotic factors - Foldable for cycles
28-29	5.03, 5.01	Global issues, Stewartship, Carrying Capacity, Symbiotic Relationships	-What is carrying capacity and how will we know when it has been reached? -What effects does global climate change have on organisms? - What impact does global climate change have on humans and their ability to survive? -What can we do to slow pollution and reduce our carbon footprint? -What are the 3 types of symbiotic relationships and give an example of each?	-Inconvenient Truth Video -Carrying Capacity Airplane Game -Give Students Chance to Find their Carbon Footprint online (Ed Begley Jr.)
30-33	2.01. 2.04	Organic Molecules (Lipids, Proteins, Nucleic Acids, and Carbohydrates), Reactants & Products, Chemical Equations (very basic), Polymers and Monomers (subunits), Enzymes and Catalysts	-How can we identify different organic compounds? What are their characteristics? -Why does the Atkins Diet pose cause weight loss but can be very dangerous? -When is energy typically released? How then is energy stored? - What are the subunits to each of the organic molecules? -How is match.com similar to a catalyst?	- Atkins Diet Handout - Foldable for Organics Compounds and Monomers - Organic Molecules Lab - Fast Food Nutritional Fact Sheet (student picks favorite meal)
34-42	1.01, 2.01, 2.02, 2.03, 4.01	Plant vs. Animal Cells, Prokaryotic vs. Eukaryotic Cells, Parts of the Cell (Organelles), Proper use of Microscope, Parts of the Microscope, History of the Microscope, Development of Cell Theory, Disproof of Spontaneous Generation	-How do we properly use a microscope and what are the correct names of all the parts? (skill) -How has the microscope been used to further our understanding of the world around us? -What are the names of the parts of a cell and what do they do? -How are plant cells and animal cells different and how are they alike? -How are prokaryotic cells and eukaryotic cells different and how are they alike? -What is spontaneous generation?	-Venn Diagrams (Plant /Animal Cells) & (Prokaryotic vs. Eukaryotic) - Tag the microscope game - Microscope Lab - Organelle Bingo

43-46	2.02, 2.03	Types of Cellular Transport, Structure of Cell Membrane , Identification of Hypertonic, Hypotonic, and Isotonic Cells	-Which way will the water move? -What are the differences between active and passive transport? -How are osmosis and diffusion different? -What things can pass through the cell membrane with ease? -Can you master the ability to determine if a cell is hypertonic, hypotonic, or isotonic? (skill)	- Celery Lab (may use as DEMO) - Random Cell Game - Gummy Bear Lab with RAFT
47-52	2.05	Photosynthesis, Types of Cellular Respiration, ATP Production	-What are the reactants and products of photosynthesis and cellular respiration? -How are the processes of photosynthesis and cellular respiration related and where do they occur? -What are the different types of cellular respiration and how much difference is there in terms of efficiency (ATP production) for each process? -What is ATP? -How is ATP made, what is it used for, where in cell is it made, and what does it break down into?	- Yeast Lab (use Gatorade for good result) - Elodea Lab - Lactic Acid Fermentation Class Demonstration (wall sits, close pin activity) -Flow Charts
53-60	3.01	DNA Structure, DNA vs. RNA, mRNA vs. tRNA vs. rRNA, Transcription, Translation, History of DNA Discovery, Mutations (frameshift and point)	-Who contributed what to the discovery of the structure of DNA? -What are the differences between DNA and RNA? -Why is proper transcription and translation important so that the correct amino acid is made? -How is DNA made into a protein? -What are the results of a frameshift mutation and of point mutation and how do they differ? -What is the role of mRNA, rRNA, and tRNA in protein synthesis?	-DNA Origami -Transcription / Translation Sentences -www.nobelprize.org (see medicine section) -DNA arcade-style game -DNA Movie -DNA / RNA Venn Diagram -DNA History Timeline - Life History Video - Play Telephone to simulate mutation
61-62	3.01, 3.02	Cell Cycle, Mitosis, Cancer, Somatic cells (body cells)	-What part of the cell cycle lasts the longest? -What are the 4 parts to mitosis and what happens during each phase? -How is cancer related to the cell cycle? -What does each part of mitosis look like?	-Mitosis Microscope Lab -Mitosis Flip Chart

63-65	3.02	Meiosis, Gametes (sex cells), Crossing-over, Genetic Recombination, Non-Disjunction	-Why is genetic diversity (or recombination) important in a population? -What role does meiosis play in creating genetic recombination? -What are the stages of meiosis and what does meiosis ultimately produce? - How is meiosis and mitosis different from each other?	-Potato Famine Article (Irish Monoculture of Potato) -Meiosis Flip Chart
66-79	3.03	Genetics, Monohybrid Crosses, Dihybrid Crosses, Punnett Squares, Pedigrees, Mendel's Laws, Multiple Alleles, Polygenetic Inheritance, Dominant / Recessive, Incomplete Dominance, Co-dominance, Blood Types, Genetic Disorders (Both simple and complex), Carriers, Sex-Linkage	-What rules do Mendelian Genetics always follow? -Can you turn a word problem into the correct dihybrid or monohybrid cross? (skill) -What are the possible blood types and why is it NOT possible identify a person based in blood typing? -How is co-dominance and incomplete dominance different? Give a common example of each. -What does the term sex linkage mean and what diseases are typically related to this? -How can you predict based on a pedigree the chances of an unborn child having a particular disease? -Why does inbreeding produce offspring that may have greater chances of having certain genetic disorders? (ex. Royal Families) -Why do siblings from the same parents look different from each other? -Based on a personal account can you correctly make a pedigree of a family? (skill)	-Montel Show "You ARE NOT the father" game -Royal Family Pedigrees -Mr. Teacher's Strange Family with Genetic Disorders -Genetics of Parenthood Activity -Disease Acting Game -Genetics Terminology Bingo - ReBob's (from Biology Corner)

80-82	3.04	Genetic Technology, Gene Splicing, Human Genome Project, Gel Electrophoresis Technology, Gene Therapy	-How does the "CSI" stuff work? -Why is mtDNA (mitochondrial DNA) used in some cases? -What is a restriction enzyme (where does it typically cut)? - Why do some fragments of DNA travel faster down a gel? -What organisms that we come into contact with have been genetically modified? -What are the concerns about growing a monoculture crop over a geographically large area?	-Gel Electrophoresis Simulation -Article on Genetically Modified Wheat -CSI Rowan County - *"Death of a Teacher"* crime simulation
83-87	3.05	Evolutionary Theory, Types of Selection, Mechanism of Evolution, Adaptations, Darwin, Anti-biotic Resistance,	-What is evolution and how does it occur? -What are some of the benefits that humans reap due to evolution? -What examples lead Darwin to believe that evolution occurred by natural selection? - Can you predict what might happen to a population given a particular selection pressure? -What are some common examples of evolution that are occurring today and why does it seem that diseases continue to get stronger and stronger over long periods of time? -What are some common evidences of evolution? -Explain what a common ancestor is?	-Foldable for Evidences of Evolution -Articles about microbial resistance -SAS in Schools Website on evolution - Museum Walk with Evidences of Evolution -Disease Transmission Lab - Paper Butterfly Placement in Classroom (runs 1 week) - Evolution of a Non-Biological Topic (i.e. televisions, communication, gaming systems) - 20 Questions (must be Yes / No) to scaffold dichotomous keying

Other suggestions:

1. Link this learning with applicable prefixes and suffixes. Students will be quizzed once a week with each quiz being cumulative. Students will be assigned 10 prefixes/suffixes per week. Each quiz except the first will be 20 questions long.
2. Design all tests to be **cumulative**, with new information being weighted the heaviest on each test.
3. Use some form of assessment (formative) every day to insure students are building knowledge.