**Biology Scope and Sequence 1st Semester 2017-2018**

**HOP: Habits of Practice**

**Practice 1:** Asking Questions/Defining Problems **Practice 4:** Analyzing/Interpreting Data **Practice 7:** Engaging in Argument from Evidence

**Practice 2:** Developing and Using Models **Practice 5:** Using Math & Computational Thinking **Practice 8:** Obtaining/Evaluating/Communicating Info

**Practice 3:** Planning/Carrying Out Investigations **Practice 6:** Constructing Explanations/Designing Solutions **Practice 9:** Metacognition

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| **Sequence of Concepts** | **Rationale for Sequence** | **Prior Knowledge** |
| **Scientific Method**   * Lab Safety * Design your own experiment * Nature of science * Characteristics of life | Students should be well versed in safety procedures specific to the lab and teacher. For an inquiry based approach to science it is important to begin with a student driven experiment. | * Lab equipment * Steps of scientific method * Variables |
| **Biochemistry**   * Chemistry Review, * Macromolecules, * Enzymes, | The flow of the course is to begin with the smallest units and build up the largest processes. At this time it is important to activate students prior chemistry knowledge to support future endeavors with chemical equations. | * Atomic structure and bonding |
| **Cells Structure and Function**   * Types - in-depth organelle structure and function * Transport - passive, active transport, solutions | It is critical students have a deep understanding of cell structure and function. Further exploration will build on the important roles of several organelles. | * Basic cell types, structure and function * Cell theory |
| **Matter and Energy Flow**   * ATP/ADP * Photosynthesis - light and dark reactions * Respiration - steps, Aerobic and Anaerobic | This unit builds on the structure and function on cells but begins to connect the smallest organelles to the outer world and photosynthesis and respiration are foundational in carbon, oxygen, and energy cycling. | * Types of cells * Cell function * Types of matter * Chemical equations * Thermodynamics * Concentration gradient |
| **Cell Reproduction**   * Division **-** mitosis, meiosis, stem cells | Understanding cell reproduction is foundational to further investigations in genetics and biotech engineering. | * Cell structure and function |
| **Genetics**  Mendelian   * Pedigrees * Karyotypes * Sex-linked Traits * Incomplete Dominance * Codominance * Multiple Alleles * Polygenic Inheritance   **Molecular**   * DNA   + Structure and Function   + Mutations   + Replication   + Protein Synthesis * Biogenetic Engineering   + Selective breeding   + Recombinant DNA   + DNA Fingerprinting and gel electrophoresis   + Genetic modifications   + Cloning | Here we integrate cellular knowledge to reveal characteristics of organisms. Students needs to have a strong understanding of cellular structure to be successful as the more detailed concepts are revealed in this unit. | * Basic inheritance, Punnett square * DNA as genetic material and structure * Cell structure and reproduction |
| **Biodiversity of Change**   * Natural Selection * Adaptations * Coevolution * Classification * Taxonomy | The previous unit on genetics reveals the complex processes responsible for the biodiversity of the planet. Here students connect genetics and cell reproduction to real world applications and observational experiences. | * Heritable traits * Binomial nomenclature * Levels of classification * Use of dichotomous key |
| **Interdependence**   * Biological Succession * Biomes * Population Dynamics * Human Impact on the Environment * Biogeochemical Cycles | This final unit ties together all the intricate pieces of biology. Students need to apply knowledge of cell function and genetics to connect larger concepts like biogeochemical cycling and population dynamics. | * Energy flow * Trophic levels * Species Interaction |

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| **Teacher Notes** |
| Some teachers may prefer to invert the order of the genetics unit. The approach of this document is to start with Mendel and his experiments as a foundation for DNA, RNA, and biogenetic engineering. The book reflects the order of this document with Mendelian Genetics (10.2) directly following Meiosis (10.1).  Matter and Energy Flow follow cell transport as the structure of cells is still fresh for students.  Interdependence is the final unit as it should primarily be a review.  The flow of the course is from the smallest components of living things to the largest and most complex organization of life.  Embedded activites from the pacing guide as well as additional resources are available on the resource disk.  The five practices model fits well into the embedded activities of the pacing guide. Each SAIB activity comes with a teacher resource packet outlining best practices for each lab. Additionally, a summary of each practice is available with the supplemental resources.  The SAIB DNA lab is a fantastic segway into biogenetic engineering. |
| **Websites Utilized:**  Glencoe Biology Online Access to Book Resources: WWW.GLENCOE.COM use Quick pass gb3038c6 (\*\*note that c6 references the chapter that you want; for example use c2 if you want chapter 2 resources ) EOC State testing and curriculum sites:  http://www.tn.gov/education/assessment/samplers.shtml  http://www.tncurriculumcenter.org/ http://www.tncore.org/ http://pacehighschool.net/Documents/FCAT\_EOCdocs/EOC2013/BiologyEOC\_ReviewPacketNC.pdf \*\*Great, in depth EOC review with answers  https://www.ngsslifescience.com/biology\_lesson\_plans.html https://www.nabt.org/websites/institution/index.php?p=116 http://csip.cornell.edu/Curriculum\_Resources/default.html#Bio http://www1.kent.k12.wa.us/curriculum/science/secondary/inquirylessons.htm http://www.nsta.org/publications/press/extras/adi-bio.aspx http://www.bscs.org/bscs-science-inquiry-approach http://www.learnnc.org/lp/pages/5319 (designer babies, dna technology) http://petersj.people.cofc.edu/CCLI/ http://www.lifescitrc.org/collection.cfm?collectionID=2035 http://access.ncsa.illinois.edu/CoverStories/BiologyWorkbench/ http://www.indiana.edu/~oso/lessons/index.htm http://www.learner.org/resources/discipline-science.html http://www.nytimes.com/learning/general/subjects/science\_index.html http://www.pbs.org/wgbh/evolution/educators/teachstuds/tguide.html http://serendip.brynmawr.edu/exchange/bioactivities https://learn.concord.org/?subjects=life-sciences&resource\_types=&grade\_levels=&keyword= https://concord.org/stem-resources/subject/biology http://www.exploratorium.edu/snacks https://www.biologycorner.com/ http://www.brynmawr.edu/biology/franklin/InquiryBasedScience.html http://www.indiana.edu/~oso/ISTEME/LPGuide.htm https://www.asdk12.org/depts/science/ESCARGOtweb/documents/MythsAboutInquiryBasedLearning.pdf http://www.nature.com/nchembio/journal/v2/n10/full/nchembio1006-503.html https://shelleywright.wordpress.com/2011/09/09/confessions-of-an-inquiry-teacher/ http://carolinascienceonline.com/index.php/search/results/All\_Resources,0,0,,Concepts\_&\_Practices,30,7,tn,1.html?q=Concepts+%26+Practices https://science.education.nih.gov/customers/WebPages/CSHome.html (free resources in print or as downloads)  **Article and Common Core Activities**  http://www.biologynews.net/ www.newsela.com https://sites.google.com/a/sduhsd.net/sduhsd-common-core-resources/science-index/sci-bio http://www.sciencedaily.com/news/plants\_animals/biology/ http://www.thenakedscientists.com/HTML/articles/biology/ http://highered.mcgraw-hill.com/sites/0072437316/student\_view0/online\_labs.html http://www.mhhe.com/biosci/genbio/virtual\_labs\_2K8/ http://www.mrgraba.net/1st-semester-accelerated-biology-worksheets--presentations.html  <http://www.northallegheny.org/Page/8979>  **Videos Animations and Clips**  <http://www.pointloma.edu/experience/academics/schools-departments/department-biology/faculty-staff/dianne-anderson-phd/concept-cartoons-0> - Great resource for Concept Cartoons  www.bozemanscience.com  http://www.goldiesroom.org/video\_archive.htm  https://www.khanacademy.org/science/biology  http://www.sumanasinc.com/webcontent/animations/biology.html  <https://www.youtube.com/watch?v=L0k-enzoeOM> - mitosis  <https://www.youtube.com/watch?v=qCLmR9-YY7o> - meiosis  <https://www.youtube.com/playlist?list=PL3EED4C1D684D3ADF> - 40 episodes of crash course biology  <http://vcell.ndsu.edu/animations/>  <https://www.youtube.com/watch?v=iNbr8SVn8UU> - photosynthesis, the video aligns with the leaf disk lab in the additional resources  **Powerpoints and Generic Biology Curriculum sites**  http://www.worldofteaching.com/biologypowerpoints.html  http://actionbioscience.org/  http://sciencespot.net/ local.brookings.k12.sd.us/biology/cellstructure.htm www.biologyjunction.com www.biologycorner.com www.help4teachers.com www.iteachbio.com http://www.biology.arizona.edu/DEFAULT.HTML http://www.internet4classrooms.com/gateway\_biology.htm  **Online labs/Interactivities**  http://www.occc.edu/biologylabs/  http://www.phschool.com/science/biology\_place/labbench/ http://www.udel.edu/biology/ketcham/microscope/  <http://accessexcellence.com/AE/>  Online vocabulary/graphing/etc  http://www.discovery.com/  http://nces.ed.gov/NCESKIDS/createagraph/default.aspx http://www.discoveryeducation.com/free-puzzlemaker/?CFID=3208214&CFTOKEN=18370909 http://www.pbslearningmedia.org/search/?q=\*&selected\_facets=supplemental\_curriculum\_hierarchy\_nodes\_exact: 1  http://www.nobelprize.org/educational/  http://www.pbs.org/wgbh/nova/sciencenow/ http://www.sciencebuddies.org/engineering-design-process/engineering-design-compare-scientific-method.shtml |