Biology 2: Systems and Cycles

Week 1: Genetics Intro
Concepts:

- Mendel's experiments with peas
- Laws of inheritance
- Dominant vs recessive
- Alleles

Reading:
https://openstax.org/books/biology-ap-courses/pages/12-1-mendels-experiments-and-the-laws-of-probability
Activity:
Optional Homework:
http://sitn.hms.harvard.edu/flash/2014/crispr-a-game-changing-genetic-engineering-technique/

Week 2: Genetics continued
Concepts:

- Phenotypes and genotypes
- Punnett squares
- Types of dominance

Practice Problems:
https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:985c00e0-1d53-4c78-a872-8cb9b453c99a
In class reading: https://learn.genetics.utah.edu/content/basics/patterns/
Optional Homework:
https://openstax.org/books/biology-ap-courses/pages/12-2-characteristics-and-traits

Week 3: Cellular Respiration and ATP part 1
Concepts:

- What is ATP
- Energy use in cells
- Importance of cellular respiration
- Inputs and outputs of ATP

Optional Homework: look through this study
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5329739/

Week 4: Cellular Respiration
Concepts:

- Overview of glycolysis, krebs cycle, ETC

We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.

- Fermentation
- Equation

Class Activity: http://www.bch.cuhk.edu.hk/vlab2/animation/fermentation/index.html
Class video: https://www.youtube.com/watch?v=4Eo7JtRA7lg&t=385s

Optional Homework: https://www.youtube.com/watch?v=sQK3Yr4Sc_k

Week 5: Photosynthesis
Concepts:

- Overview of photosynthesis
- Where it happens
- Why it happens/importance

Activity: Draw a colorful diagram to keep with you to refer back to, explore scenarios with images-what happens when not enough sunlight? What happens if not enough water?

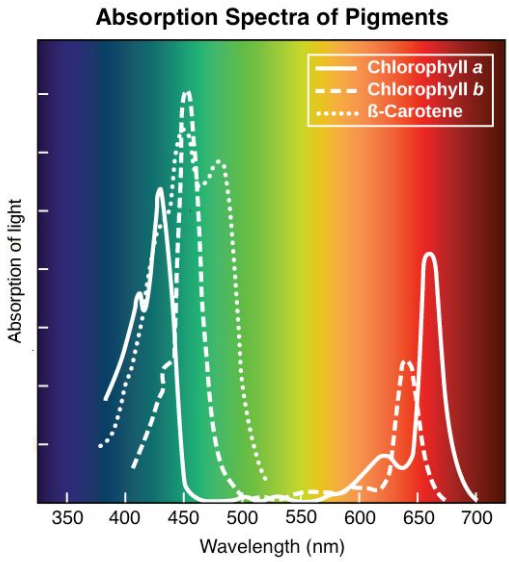
Optional Homework: Practice problems-https://btms.fortmillschools.org/UserFiles/Servers/Server_57118/File/photosynthesis_worksheet_HW.pdf

Week 6: Light Dependent & Light Independent Photosynthetic Reactions
Concepts:

- Light dependent reaction
- ETC
- Calvin Cycle
- Absorption of light/pigments

Video:
https://www.youtube.com/watch?v=dAF5FngVa7A

- Look at photo examples



We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.

Optional Homework:
https://www.sciencenewsforstudents.org/article/scientists-look-hack-photosynthesis-greener-planet
http://www.biology.arizona.edu/biochemistry/problem_sets/photosynthesis_1/01q.html
Try this problem set

Week 7: Water Cycle
Concepts:

- what is the water cycle
- Diagram each step

Interactive Activity:
http://studyjams.scholastic.com/studyjams/jams/science/ecosystems/water-cycle.htm
Reading for help: https://www.freedrinkingwater.com/resource-water-cycle-student-guide.htm

Optional Homework: Reading:
https://www.usgs.gov/special-topic/water-science-school/science/acid-rain-and-water?qt-science_center_objects=0#qt-science_center_objects

- Draw a diagram of the water cycle

Week 8: Nitrogen and Carbon Cycles
Concepts:

- Carbon cycle
- Nitrogen cycle
- Importance
- Fossil Fuel Effects

Activity (needs to be slightly adapted for Zoom):
https://www.calacademy.org/educators/lesson-plans/carbon-cycle-role-play
Video on Nitrogen Cycle: https://www.youtube.com/watch?v=K5EOZenSSB8

Optional Homework: https://serc.carleton.edu/eslabs/carbon/2b.html

Week 9: Beginning Anatomy and Physiology
Concepts:

- Animal Form
- Tissues (types of tissue, what they do)
- Homeostasis in the human body
- Preview the different systems in the body

We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.

Intro reading:
https://openstax.org/books/anatomy-and-physiology/pages/1-1-overview-of-anatomy-and-physiology

Fill out: https://www.biologycorner.com/anatomy/intro/organ_systems.html
Optional Homework:
Questions-https://www.biologycorner.com/anatomy/tissues/review_ch5_tissues.html
Article: https://www.sciencenewsforstudents.org/article/fashioning-inks-print-tissues

Week 10: Circulatory System
Concepts:

- Intro
- Veins Vs. arteries
- Identify regions of the heart
- Functions

Video: https://mass.pbslearningmedia.org/resource/tdc02.sci.life.stru.circulator/from-the-heart/
Activity: Label diagram of the heart
https://mass.pbslearningmedia.org/resource/tdc02.sci.life.stru.heartmap/map-of-the-human-heart/

Optional Homework:
https://openstax.org/books/biology-ap-courses/pages/31-2-components-of-the-blood
Week 11: Circulatory System Continued-
Concepts:

- Types of blood cells and their roles
- Valves
- Blood pressure and how it's measured

Activity: Watch video https://www.youtube.com/watch?v=_vZ0lefPg_0

- Make your own stethoscope activity
  http://www.henry.k12.ga.us/cur/mybody/circ_lessons.htm
  (ask students previously to please bring a paper towel or toilet paper role)

Optional Homework: Start doing a little research for the upcoming project/pick a topic you might explore in class for the project

Week 12: In class project: Research a disorder that impacts the function of the circulatory system, present your information to the class answering the following questions:

- What is this condition/disorder called?
- What part of the circulatory system does it impact?
- How does it impact the normal processes of the circulatory system?
- What are the symptoms/effects of this condition?
- What are treatments for this condition?

We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.

Resources

- https://openstax.org/books/biology-ap-courses/pages/12-1-mendels-experiments-and-the-laws-of-probability
- http://sitn.hms.harvard.edu/flash/2014/crispr-a-game-changing-genetic-engineering-technique/
- https://documentcloud.adobe.com/link/review?uri=urn:aaid:scds:US:985c00e0-1d53-4c78-a872-8cb9b453c99a
- https://learn.genetics.utah.edu/content/basics/patterns/
- https://openstax.org/books/biology-ap-courses/pages/12-2-characteristics-and-traits
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5329739/
- http://www.bch.cuhk.edu.hk/vlab2/animation/fermentation/index.html
- https://www.youtube.com/watch?v=4Eo7JtRA7lg&t=385s
- https://www.youtube.com/watch?v=sQK3Yr4Sc_k
- https://btms.fortmillschools.org/UserFiles/Servers/Server_57118/File/photosynthesis_worksheet_HW.pdf
- https://www.youtube.com/watch?v=dAF5FngVa7A
- https://www.sciencenewsforstudents.org/article/scientists-look-hack-photosynthesis-greener-planet
- http://www.biology.arizona.edu/biochemistry/problem_sets/photosynthesis_1/01q.html
- http://studyjams.scholastic.com/studyjams/jams/science/ecosystems/water-cycle.htm
- https://www.freedrinkingwater.com/resource-water-cycle-student-guide.htm
- https://www.usgs.gov/special-topic/water-science-school/science/acid-rain-and-water?qt-science_center_objects=0#qt-science_center_objects
- https://www.calacademy.org/educators/lesson-plans/carbon-cycle-role-play
- https://www.youtube.com/watch?v=K5EOZenSSB8
- https://serc.carleton.edu/eslabs/carbon/2b.html
- https://openstax.org/books/anatomy-and-physiology/pages/1-1-overview-of-anatomy-and-physiology
- https://www.biologycorner.com/anatomy/intro/organ_systems.html
- https://www.biologycorner.com/anatomy/tissues/review_ch5_tissues.html
- https://www.sciencenewsforstudents.org/article/fashioning-inks-print-tissues
- https://mass.pbslearningmedia.org/resource/tdc02.sci.life.stru.circulator/from-the-heart/
- https://mass.pbslearningmedia.org/resource/tdc02.sci.life.stru.heartmap/map-of-the-human-heart/
- https://openstax.org/books/biology-ap-courses/pages/31-2-components-of-the-blood
- https://www.youtube.com/watch?v=_vZ0lefPg_0
- http://www.henry.k12.ga.us/cur/mybody/circ_lessons.htm

We would like to acknowledge and thank Phillips Academy Andover and their Biology100/580 class for inspiration in this curriculum.