BIOL 120 Learning Assistant Guidebook

Learning Assistant is the technical name for your role in BIOL 120, however, with the students, we will refer to you all as:

Bio Coaches

In-Class Activities & Meetings

Activity	Date & Time	Location
In-Class Assignment 2	Tuesday February 11th @ 9:35 AM	OCH 1006
LA Meeting	Friday February 14th @ 2 PM	Bio conference room
In-Class Assignment 3	Tuesday February 18th @ 9:35 AM	OCH 1006
In-Class Assignment 4	Thursday February 27th @ 9:35 AM	OCH 1006
LA Meeting	March 13th @ 2 PM	Bio conference room
In-Class Assignment 5	Tuesday March 17th @ 9:35 AM	OCH 1006
In-Class Assignment 6	Thursday April 2nd @ 9:35 AM	OCH 1006
In-Class Assignment 7	Tuesday April 7th @ 9:35 AM	OCH 1006
LA Meeting	April 10th @ 2 PM	Bio conference room
In-Class Assignment 8	Tuesday April 21st @ 9:35 AM	OCH 1006
In-Class Assignment 9	Thursday April 30th @ 9:35 AM	OCH 1006
LA Meeting	Friday May 1st (seminar day but ok?) @ 2 PM	Bio conference room

Additional Requirements

Set up one study session before each of five exams for your team.

I'll set up your groups for you before your first day in class. I'll number them and then you can pick a name if you'd like? These study sessions can be when/where you decide. Students are encouraged but not required to attend. Do not make them study guides.

Have students evaluate your teaching.

I'll have students complete an in-class survey for this. Your grade will not be tied to these evaluations.

Compile assignments given with remarks on how they worked.

I'll collect these electronically before our last meeting. Please keep up to date on them and we'll out a submission plan through our Blackboard organization.

Evaluation by the on-site supervisor.

I'll do this, no worried.

Online LA Reflections and Survey (your evaluation of experience).

We will also do this as an online survey.

LEARNING ASSISTANTS REQUIRED FOR ASSIGNMENTS 2-9

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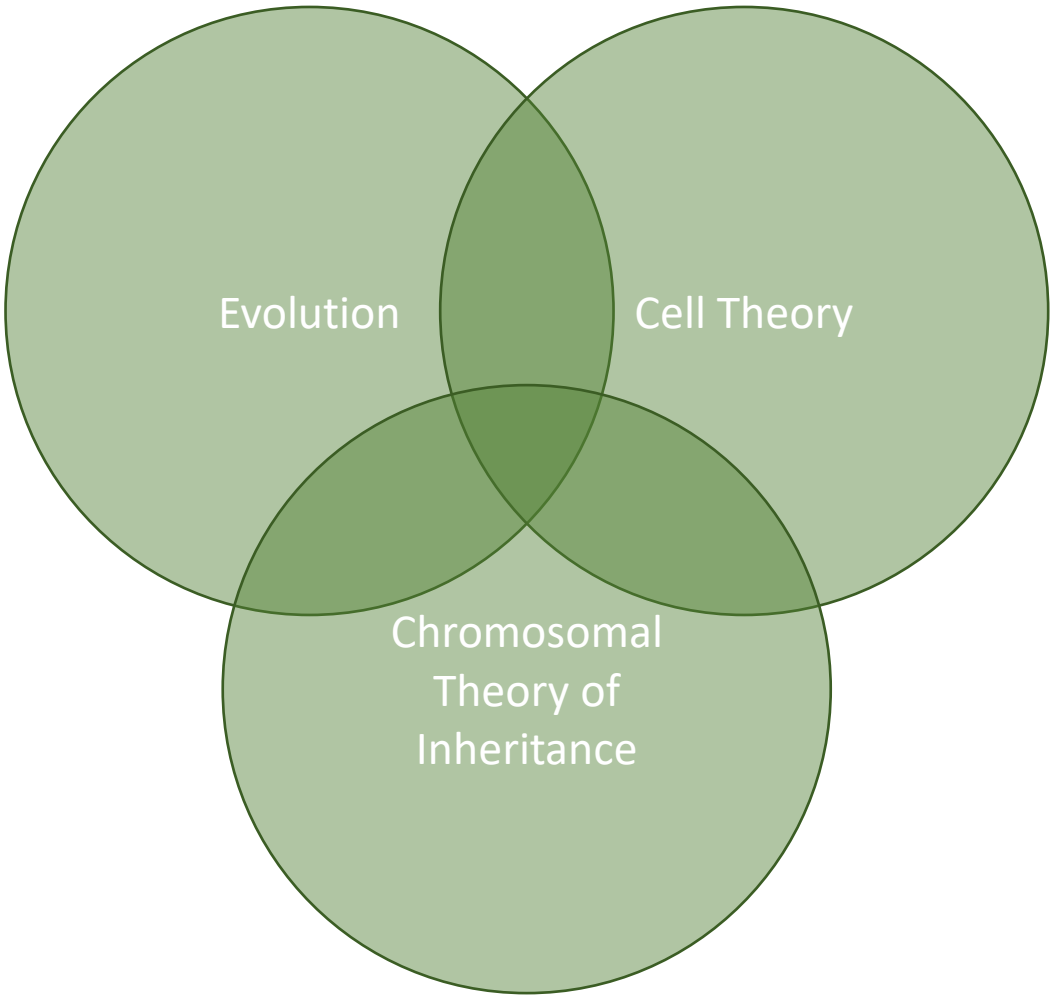
In-Class Assignment 1 – Thursday January 30th

Create a Venn Diagram with the 3 foundational theories we discussed today: Cell Theory, Evolution and the Chromosomal Theory of Inheritance. What do they have in common? What makes each unique?

OBJECTIVES

- We will do this again at the end of the course.
- Study tool for Ch 1.
- Review the 7 requirements for life.
- Understand what a "theory" is.



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In-Class Assignment 2 – Tuesday February 11th

Complete the blank table below regarding Protein structure. The "stabilization column is referring to the components and types of bonding involved in each structure.

OBJECTIVES

- Structure is a difficult concept on exam 1.
- Study tool for Ch 3.
- Review the hierarchy and diversity of protein shape.
- Review important types of bonding.

Level	Description	Stabilized by	Example: Hemoglobin
Primary	The sequence of amino acids in a polypeptide	Peptide bonds	Gly – Ser – Asp – Cys
Secondary	Formation of α-helices and β-pleated sheets in a polypeptide (depends on primary structure)	Hydrogen bonding between groups along the peptide-bonded backbone	One α-helix
Tertiary	Overall three-dimensional shape of a polypeptide (includes contribution from secondary structures)	Bonds and other interactions between R-groups, or between R-groups and the peptide-bonded backbone	One of hemoglobin's subunits
Quaternary	Shape produced by combinations of polypeptides (thus, combinations of tertiary structures)	Bonds and other interactions between R-groups, and between peptide backbones of different polypeptides	Hemoglobin consists of four polypeptide subunits

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In-Class Assignment 3 - Tuesday February 18th

Complete the blank table below regarding Protein structure. The "stabilization column is referring to the components and types of bonding involved in each structure.

OBJECTIVES

- Reorganize information and content
- Compare and contrast
- Review chapters 3-6
- Many of these concepts are vital to rest of BIOL 120

	Monomers	**Special Bonds (types)**	**Primary functions**	**Functional Groups**	**Examples/ Types**	**Structure**	**Comprise**	**Shape (Draw or Paste)**
Protein	Amino acids, can ionize in water	Peptide bonds	Serve diverse functions	Carboxyl, Amino	Catalase, hemoglobin	Alpha, beta, tertiary or quaternary	C, H, O, N sometimes P and S	
Nucleic Acid	Nucleotides	Phosphodiester	Information carriers	Vary	RNA and DNA	Single or double stranded, helix or supercoiling	A sugar–phosphate backbone With 4 nitrogenous bases	
Carbs (mono)	Monosaccharides are monomers	C-C backbone	Energy	Carbonyl & Hydroxyl	Triose/ pentose/ hexose, etc.	Rings or chain, aldose or ketose	C, H & O	
Carbs (poly)	Series of mono-saccharide rings (e.g., glucose)	Glyosidic linkage	Energy, structural support, cell signaling, etc.	Carbonyl & Hydroxyl	Starch, chitin, glycoproteins, glycolipids	Alpha or beta	C, H & O	
Lipid	None	Ester bonds	Energy storage, cell membranes, signaling	Hydroxyl & Carboxyl & others	Fats, oils, steroids and phospholipids	Can include ring structures or isoprenoid	Diverse, characterized by insolubility in water	

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In-Class Assignment 4 - Thursday February 27th

Draw a plasma membrane, include and label the following structures

- Phospholipid (with labeled amphipathic parts)
- Cholesterol Molecules
- Integral protein
- Peripheral protein
- Channel protein
- Carrier protein
- Protein Pump

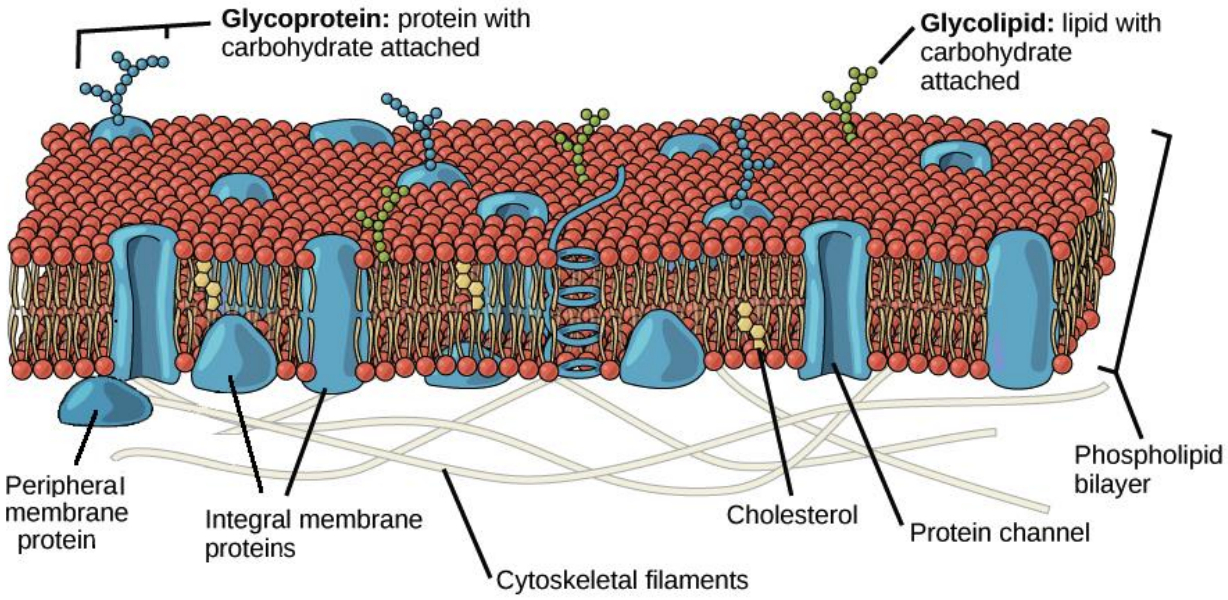
Diagram the following process with arrows and labels

- Diffusion
- Osmosis
- Solute moving through a channel and a carrier protein
- Active transport
- Secondary transport

OBJECTIVES

- Reorganize information and content
- Combine several sections from chapter 6.
- View several processes together and compare and contrast.

Some derivation of the below with solute and arrows to represent the different types of diffusion and transport.



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In-Class Assignment 5 – Tuesday March 17th

Complete the blank table below regarding how cells connect and communicate.

OBJECTIVES

- Reorganize information and content
- Compare and contrast
- Review chapter 11

	Comprise	**Primary Function**	**Variation**	**Associated Molecules**	**Other Notes**	**Trick**
ECM Animals	Collagen (cable-like protein) & proteoglycans (proteins & poly-saccharides)	Attach the ECM to the membrane, anchor the cytoskeleton to the ECM & transmit signals	Yes, amount varies (bone vs. cartilage) and composition varies based on elasticity required	Integrins Glycoproteins		Concrete and rebar
ECM Plants	Primary cell wall: cable-like microfibrils	Defines the shape of the plant cell	Secondary cell wall: structure correlates with cell function	Cellulose Pectin Expansins Lignin	Tugor pressure	
Lamella	Continuous with adjacent plant cells and is made up of pectins (jelly-like)	Adheres plant cells together	Plant cells only	Polysaccharides		Glue/ falling petals
Tight Junction	Membrane proteins in adjacent animal cells	Chains of proteins line up and bind to each other, stitches 2 cells together	Animal cells only, may be looser in some tissues than others	Proteins	They can open and close and form a watertight seal	Paper clips
Desmo-somes	Membrane proteins in adjacent animal cells	link the cytoskeletons of adjacent cells via integral membrane proteins	Animal cells only, common in epithelial and muscle tissue	Anchoring proteins	Intermediate filaments	Snaps
Gap Junction	Membrane proteins in adjacent cells connect and line up	Cell-Cell communication & transfer	Animal cells only	Proteins	Channels for small molecules to flow back and forth	
Plasmo-desmata	Narrow thread of cytoplasm that passes through the cell walls of adjacent plant cells	Cell-Cell communication & transfer	Plant cells only	Cytoplasm	Plasma membranes, cytoplasm, and smooth ER of two cells connect	

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In-Class Assignment 6 – Thursday April 2nd

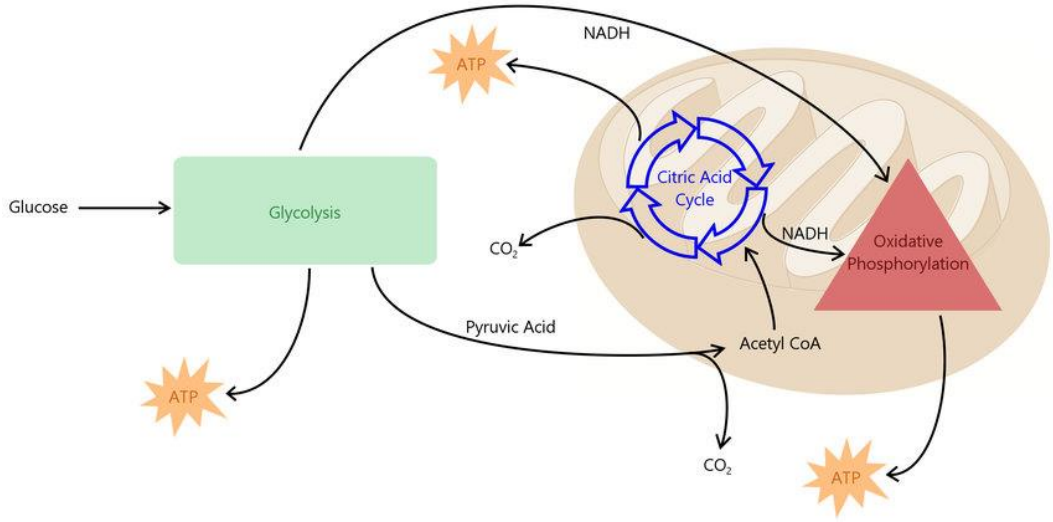
Chose!

- Activity 1: Follow the energy through the phases of cellular respiration. Where does it start, where does it end up, where is it in-between? Construct a diagram or flow chart that shows the pathway of energy or complete the table below.
- or Activity 2: Complete the table below

OBJECTIVES

- Reorganize information and content
- Activity 1: Think explicitly about the energy involved, converted and transferred
- Activity 2: Summarize each in one place, think holistically!
- Review chapter 9

Activity 1: Many correct ways to diagram the energy, but something like…



or Activity 2:

Phase of Cellular Respiration	Inputs	Outputs/ Products	Product Destination	Where Does it Occur?	Type of Phosphorylation
Glycolysis					
Pyruvate Grooming					
Citric Acid Cycle					
Electron Transport Chain					
Chemiosmosis					

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In-Class Assignment 7 – Tuesday April 7th

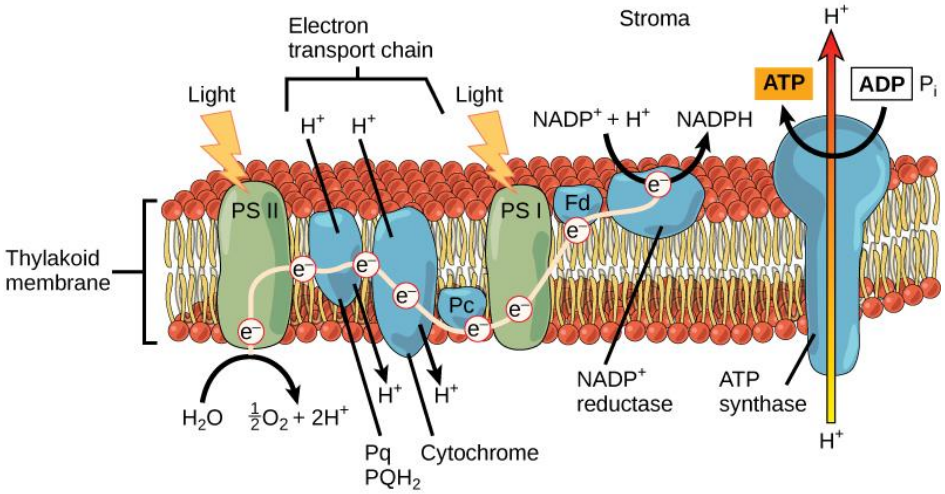
Create a 3-part flow chart of photosynthesis. Circle the pathways involved in the light reactions and draw a box around the pathways involved in the Calvin Cycle.

- Light >>>> ATP
- Water >>>> NADPH
- CO2 >>>> Glucose

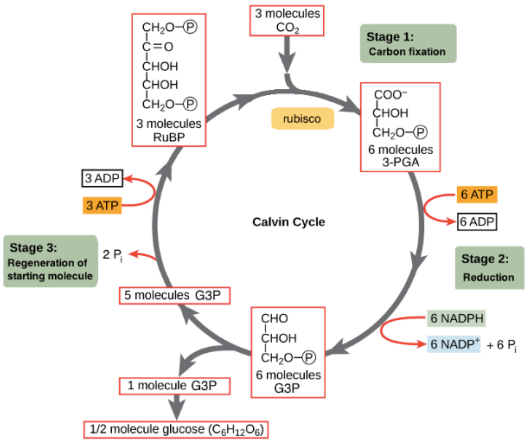
OBJECTIVES

- Reorganize information and content
- Think explicitly about the energy involved, converted and transferred
- Recognize the 2 phases and pathways involved in each
- Review chapter 10

Some variation of the below for Light >>>> ATP and for Water >>>> NADPH (gets circled)



Some variation of the below for CO2 >>>> Glucose (gets boxed)



LEARNING ASSISTANTS REQUIRED FOR ASSIGNMENTS 2-9

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In-Class Assignment 8 – Tuesday April 21st

Complete the following crosses and calculate the phenotypic and genotypic ratios for each. Provide the genotypic and phenotypic ratios for each cross.

Gene: Pea pod color. Alleles: G = green (dominant) and g = yellow (recessive)

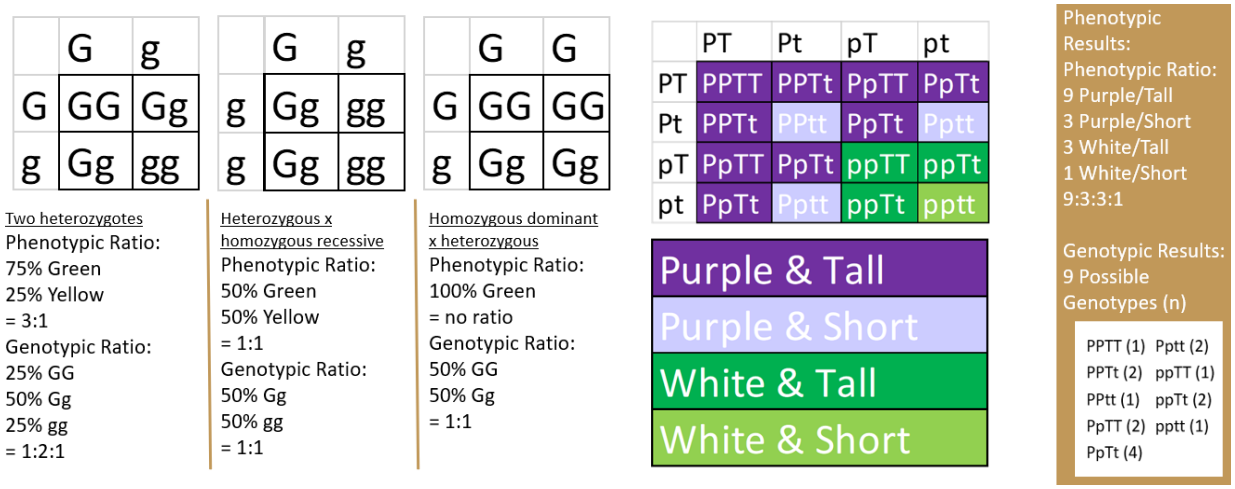
- Two heterozygotes
- Homozygous dominant x heterozygous
- Heterozygous x homozygous recessive

Complete the following cross and calculate the phenotypic ratio. Gene: Flower color & Plant Height. Alleles: P = Purple (dominant) and p = white (recessive); T = Tall (dominant) and t = short (recessive)

- Cross: Two doubly-heterozygous parents (PpTt x PpTt)

OBJECTIVES

- Practice for the exam
- Learn the terminology
- Learn expected ratios
- Review chapter 14



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In-Class Assignment 9 – Thursday April 30th

With a partner, create a strand of DNA 21 bps long. Use the start and a stop codon. Then transcribe it into mRNA and translate it into a polypeptide. Next, trade your DNA strand with another group, have them do the same. Trade back and check their work, discuss.

OBJECTIVES

- Practice for the exam
- Learn the terminology
- Review Central Dogma: Transcription vs. translation
- Understand DNA coding and sequencing
- Review chapter 16

Example (students will be given the chart as well)

DNA	5' ATG-CCG-TTT-TAC-GAC-CCT-TAA 3'
	3' TAC-GGC-AAA-ATG-CTG-GGA-ATT 5'
RNA	5' AUG-CCG-UUU-UAC-GAC-CCU-UAA 3'
Polypeptide	Met---Pro---Phe---Try---Asp---Pro---STOP

Second Position

First Position	U		C		A		G		Third Position
U	UUU	Phe / F	UCU	Ser / S	UAU	Tyr / Y	UGU	Cys / C	U
	UUC		UCC		UAC		UGC		C
	UUA	Leu / L	UCA		*UAA*	*STOP*	*UGA*	*STOP*	A
	UUG		UCG		*UAG*	*STOP*	UGG	Trp / W	G
C	CUU	Leu / L	CCU	Pro / P	CAU	His / H	CGU	Arg / R	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Gln / Q	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Ile / I	ACU	Thr / T	AAU	Asn / N	AGU	Ser / S	U
	AUC		ACC		AAC		AGC		C
	AUA		ACA		AAA	Lys / K	AGA	Arg / R	A
	AUG	Met / M	ACG		AAG		AGG		G
G	GUU	Val / V	GCU	Ala / A	GAU	Asp / D	GGU	Gly / G	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glu / E	GGA		A
	GUG		GCG		GAG		GGG		G

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In-Class Assignment 10 – Tuesday May 5th

This will be a review activity for the comprehensive final. LAs are welcome but not required!