Final Review
BIO-1305 - Biology 1 – Campbell Textbook

Hello and welcome to the weekly resources for BIO-1305 - Biology 1 – Campbell Textbook!

This week is Week 15 of class, and typically in this week of the semester, your professors are reviewing for the final exam. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout the semester.

We also invite you to look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester.

If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel, or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop in center during open business hours (M-Th 9am-8pm on class days at 254-710-4135).

Water and It’s Properties
Water is a polar molecule
Hydrogen bonding gives water its unique properties and makes it the universal solvent
Remember to review the special properties of water including surface tension, high specific heat, and heat of vaporization!

Macromolecules
Carbohydrates: polysaccharides made of monosaccharides connected through glycosidic linkages

Lipids: includes fats, phospholipids, and steroids that have hydrophobic character
Proteins: polypeptides made of amino acids connected through peptide bonds. They have primary, secondary, tertiary, and quaternary structure.

Nucleic acids: polynucleotides, including DNA and RNA, made of nucleotides. Remember to review the distinctions between DNA and RNA!

**Membrane Transport**

Simple diffusion, facilitated diffusion, and active transport are the main types of membrane transport. Diffusion does not require energy but instead relies on a concentration gradient. However, active transport requires ATP to move things against their concentration gradient. An example of active transport is the Sodium-Potassium Pump.

![Sodium-Potassium Pump Diagram](image)

**Energy**

Remember that a negative delta G is associated with an exergonic, spontaneous process, while a positive delta G is associated with an endergonic, non-spontaneous process.

![Energy Diagram](image)

**Cellular Respiration**

This is a HUGE topic to focus on as you are studying for your final exam! Make sure you can “tell the story” of cellular respiration to your friends – that is how you know you are familiar with the information!

![Cellular Respiration Diagram](image)
Glycolysis: takes place in the cytosol, oxygen independent, two phases: energy investment and energy payoff. The goal is to make electron carriers that go to the rest of cellular respiration.

Pyruvate oxidation: oxidization of pyruvate and addition of Co-enzyme A.

Electron Transport Chain: final portion of cellular respiration where ATP is created by a proton gradient. Electron carriers from other parts of cellular respiration bring their electrons to the chain, allowing protons to be pumped into the intermembrane space.
**Photosynthesis**
Two main stages of photosynthesis: light reactions, Calvin cycle
In the light reactions, light is converted into ATP and NADPH. Chlorophyll is excited.
In the Calvin cycle, there are three phases: carbon fixation, reduction, and regeneration of RuBP

**The Cell Cycle**
- **Prophase**—DNA condenses, mitotic spindle begins to form
- **Prometaphase**—nuclear envelope breaks down, kinetochore forms
- **Metaphase**—chromosomes line up at the center
- **Anaphase**—sister chromatids pull apart
- **Telophase**—nuclei reform, chromosomes relax
- **Cytokinesis**—cytoplasm divides and two daughter cells are formed

**Meiosis and Sexual Life Cycles**
- **Genes**: hereditary units
- **Locus**: a gene’s location on the chromosome
- **Homologous chromosomes**: a pair of chromosomes where one comes from mom and one comes from dad
- **Sex chromosomes**: chromosomes that determine sex
- **Autosomes**: all other chromosomes besides sex chromosomes
Genetics
The Law of Segregation: alleles on a gene separate from each other and end up in separate gametes

Inheritance of X-Linked Genes

Genes found on the X chromosome exhibit interesting inheritance patterns. Here are some significant patterns:

- Fathers pass the trait to all daughters but no sons
- Mothers pass the trait to sons and daughters
- If the trait is recessive, a female will only express the trait if she is homozygous
- Heterozygous and homozygous are terms that do not apply to males since they only have 1 X chromosome
- **Deletion**: part of the chromosome is lost
- **Duplication**: broken piece becomes attached to a separate chromosome
- **Inversion**: part of the chromosome breaks but reattaches in the opposite orientation
- **Translocation**: a broken fragment attaches to a nonhomologous chromosome

Transcription and Translation

- **mRNA** – Remember RNA from a few resources back? RNA is the “bridge” between DNA and protein. Specifically, mRNA is the molecule used. mRNA is “messenger” RNA, because it is a “message” that comes from the DNA to be made into a protein.
- **Transcription** – creation of the mRNA molecule from the DNA template.
- **Translation** – creation of a polypeptide from the mRNA. Occurs on ribosomes

All diagrams, tables, and external information is property of Pearson Campbell Biology 12th edition, unless otherwise specified.
**Initiation**

The initiation phase of translation involves the assembly of the ribosome, the mRNA, and the initiator tRNA

1. **Ribosome binding site**
   - The ribosome binds to the 5' end of the mRNA.
   - This region is complementary to the start codon (AUG).

2. **mRNA binding site**
   - The mRNA is bound to the ribosome, starting from the 5' end.

3. **Initiator tRNA**
   - An initiator tRNA (Met-tRNA) is bound to the ribosome at the P site.

4. **Translation initiation complex**
   - The initiation complex is formed, including the ribosome, mRNA, and Met-tRNA.

**Elongation**

The elongation phase involves the addition of amino acids to the growing polypeptide chain.

1. **Codon recognition**
   - The ribosome moves along the mRNA, recognizing codons at the A site.
   - tRNAs with anticodons complementary to the codons at the A site bind to the ribosome.

2. **Peptide bond formation**
   - GTP is hydrolyzed to GDP + Pi, providing energy for the formation of a peptide bond between the growing polypeptide and the incoming aminoacyl-tRNA.

3. **Translocation**
   - The ribosome moves to the next codon, shifting the tRNA and mRNA along the ribosome.

**Termination**

The termination phase occurs when the ribosome reaches a stop codon.

1. **Release factor binding**
   - A release factor binds to the ribosome at the P site, recognizing the stop codon.

2. **Polypeptide release**
   - The completed polypeptide is released from the ribosome.

3. **Ribosome recycling**
   - The ribosome discharged from the mRNA and the tRNA.

Thanks for checking out these weekly resources! Don’t forget to check out our website for group tutoring times, video tutorials and lots of other resources: [www.baylor.edu/tutoring](http://www.baylor.edu/tutoring)!