

Biology 261, Fall 2007

“Cram sheet” for Exam III

These are the chapters you were assigned. Don't forget to look at the old exams, your warm ups and your quizzes as well.

Metabolism part I: Glycolysis, Fermentation,	9, 10
Metabolism part II Krebs's cycle and Electron Transport	10
Metabolism part III: Photosynthesis	11
DNA, DNA replication, Cell Cycle, Mitosis	18, 19
Meiosis and Genetics	Whatever we got to in 20 on Nov 30th

Metabolism (general)

Importance of ATP

Locations of each pathway (including electron transport)

Be able to, using the net reaction for aerobic respiration, tell what is role of water, oxygen, carbon dioxide and sugars, when and where they are used or produced

What is the function of NADH and FADH₂

The starting and ending materials of each pathway (what goes in, what comes out, what other things, such as ATP are “made” or used

The centrality and universality of glycolysis

The relationships between glycolysis and fermentation

The relationship between glycolysis and gluconeogenesis

The relationship between glycolysis and the PDH reaction+ Kreb's cycle.

The role of gluconeogenesis

Substrate level vs oxidative phosphorylation

Glycolysis and Fermentation

Every cell can do glycolysis, no oxygen is required.

The reactions of glycolysis: each reactant, enzyme, ATP, NADH etc

The net yields of ATP, NADH

The reactions of alcohol or lactate fermentation each reactant, enzyme, ATP, NADH etc

The reason cells switch to fermentation

PDH reaction and Kreb's cycle

Use of the TCA (Kreb's) cycle for amino acids, to catabolize fatty acids.

The PDH reaction: each reactant, enzyme, ATP, NADH etc, what happens to

The reactions of Kreb's cycle: each reactant, enzyme, ATP, NADH etc

What are the net yields of ATP, NADPH, FADH₂

How the cycle is constructed, what is the acceptor, what does the right side do ?

Electron transport and oxidative phosphorylation

Where does this happen?
What is the final electron acceptor?
What happens in electron transport (include names of carriers)?
What does electron transport accomplish?
What is meant by chemiosmosis?
What is ATP synthase?
How does chemiosmosis lead to the phosphorylation of ATP?

Photosynthesis

Be able to, using the net reaction for photosynthesis tell what is role of water, oxygen, carbon dioxide and sugars, when and where they are used or produced
The connections between photophosphorylation and Calvin cycle.
Where does photophosphorylation occur?
What is the role of light in this process?
What happens (include names of photosystems and carriers) in non-cyclic photophosphorylation? (be able to show this in a membrane, not just the Z scheme)
What is the final electron acceptor/How is NADPH produced?
What does electron transport accomplish?
What is meant by chemiosmosis?
What is ATP synthase?
How does chemiosmosis lead to the phosphorylation of ATP in chloroplasts?
What happens in non-cyclic photophosphorylation?
What is non-cyclic photophosphorylation needed?
Where does the Calvin cycle occur?
What are the reactants and enzymes we covered (for C3) plants.
What are the roles of the right and left sides of the cycle?

The flow of genetic information.

You should be able to diagram or to state what is meant by the flow of genetic information from DNA to protein. *By the final exam, you will be able to provide details for each process.*

DNA as the genetic material

The structure of DNA, including the 5' and 3' ends, the composition of DNA
What is it about DNA that stores genetic information?
What is a genome?
The relationship between genome size and organismal complexity
How do prokaryote, mitochondrial and chloroplast genomes differ from nuclear genomes?
What is a nucleosome, what is their function?
Why is chromosome packing necessary, what effect does that have on transcription?

Several experiments lead to the identification of DNA as the genetic material: we covered only Hershey –Chase bacteriophage experiment which was the definitive experiment.
You should know the details of the above experiment, the techniques that were used, why they were used and what the results were.
You should also be able to apply the information from the above experiment to new questions.

The replication of DNA and its role in the cell cycle

How did Meselson and Stahl use heavy nitrogen to demonstrate that DNA replication is semi-conservative?

You should know the details of the above experiments, the techniques that were used, why they were used and what the results were.

You should also be able to apply the information from the above experiments to new questions.

You should know the phases of the cell cycle and where DNA synthesis occurs in the cell cycle.

You should be able to describe the process of DNA replication, including the enzymes involved (recall we learned this with the prokaryote enzyme names) .

Where does the free energy needed for DNA replication come from?

Why is it necessary for cells to replicate DNA prior to mitosis?

What is the outcome (not the steps in) of mitosis?

Meiosis and the Behavior of Genes (this is chapter 20)

Whatever we have gotten to here, which is likely to have been a brief review of Mendelian Genetics and an overview of meiosis.