

Review for Final Exam

The final is comprehensive.

~25% of the final will cover material from earlier in the semester (and thus, the same areas covered by the first 2 exams will be covered).

The remainder will cover material not yet tested.

Everything in the textbook covered during this semester is fair game.

Everything in my notes should be considered important.

Here are the essentials to know (items in bold are the most central):

Chapter 25: DNA metabolism

Semi-conservative replication & experiments to test it

Origins of replications & replication forks

Enzymology of DNA polymerases: **DNA pol I** & pol III

Continuous & discontinuous synthesis, Okazaki fragments

The process of replication and roles of all the players:

subunits of DNA pol

exonuclease activities

sliding clamp & loading complex

helicase & topoisomerase

SSBs

primase

ligase

Initiation of replication

Repair of DNA

mismatch repair

base excision

nucleotide excision

DNA recombination

Holliday structures: how they are made & resolved

Chapter 26: RNA metabolism

Types of RNA

transcription

prokaryotic

stages

pol II (eukaryotic)

factors involved

pol I & III

Post-transcriptional processing

5' cap

poly-A addition

splicing

group 1 & 2 introns

pol II transcripts (spliceosome)

Elements of a gene (enhancers, promoter, start site, splice sites, etc...)

Chapter 27: Translation & beyond

Genetic code

- How it was deciphered
- How it makes sense
- Exceptions

Translation

- The process in prokaryotes & eukaryotes**

- tRNA structure & function**

- Amino acyl-tRNA synthetases**

- Initiation, elongation, termination & role of the factors**

- Proofreading**

- Post-translational processes

 - Folding & chaperones

 - Translocation across bacterial membrane & ER membrane

 - Import into mitochondria & nucleus

 - Movement within the endosecretory system

 - Degradation (ubiquitin system, N-end rule)

Chapter 28: Regulation of gene expression

General principles

- transcriptional, activators, repressors, operon model, etc.**

- Examples

 - The *lac* operon (lac repressor & catabolite repression)**

 - The *trp* operon (attenuation)

 - Ribosome synthesis (stringent response, r-proteins)

- DNA-binding proteins

 - General mode of action**

 - Helix-turn-helix

 - DNA-binding proteins in eukaryotes

 - Modular structure (DNA-binding, protein interaction, transactivation)**

 - Homeodomain (helix-turn-helix)

 - Zinc finger

 - Leu zipper

 - Helix-loop-helix

- General concerns of transcriptional regulation in eukaryotes

 - Effect of chromatin & chromatin remodeling**

 - Transcriptional activation**

 - Enhancers

 - Transactivators

 - Coactivators

- The *GAL* system in yeast**

Presentations

- Caspases & their activation

- Student presentations