

# Review for Final Exam

The final is comprehensive.

~15% of the final will cover material from earlier in the semester

- I will assume throughout the exam that you have consolidated the prior material (including things from last semester).
- Specific questions about earlier material from this semester will be relatively short and not require memorization of arbitrary details.

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** (including 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

Rec system

Telomeres & telomerase□

## 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 & their relation to spliceosome

pol II transcripts (spliceosome)

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

Catalysis by RNA (ribozymes)

## 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

Post-translational modifications

Translocation across bacterial membrane & ER membrane

Import into mitochondria

Movement within the endosecretory system



## 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)

**The *GAL* system in yeast**

### 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

□

## Presentations