

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 polymerase

exonuclease activities

sliding clamp

primase & loading complex

helicase & topoisomerase

SSBs

Polymerase I (RNAse H in eukaryotes)

ligase

Initiation of replication

Repair of DNA

mismatch repair

base excision

nucleotide excision

DNA recombination

Holliday structures: how they are made & resolved

Rec system

Chapter 26: RNA metabolism

Types of RNA (mRNA, rRNA, tRNA)

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

The following were of sufficient quality to justify taking a question from them:

Motors & Dynein (A. Inamdar)

ATP-dependent proteolysis (I. Izevbaye)

Gene silencing & RNAi (MA Knoxx)

Prions (C. Funderburk)