Things to know for final exam

EXAM DATE: 5/18/05
The Final Exam will consist of 70 multiple-choice questions and 5 fill-ins for a total score of 150 points. It will cover chapters 12-17. Bring a SCANTRON #882 and a pencil. You will have 1 hour and 15 minutes to complete the exam. The exam will be taken mostly from the notes given in class and lecture and some material from your Freeman book. If you find a topic confusing, email me for clarification or read the appropriate chapter of your book. It will include everything we have cover in lecture, including the following topics:

DNA synthesis, Mutation and Repair - Chapter 12
Transcription and Translation - Chapter 13
Control of Gene Expression in Prokaryotes and Eukaryotes - Chapter 14 & 15
Genomes & Biotechnology and its applications - Chapters 16 & 17

The questions below are design to help you for the next exam. The exam is not limited to these questions only. Make sure you can answer them.

DNA synthesis, Mutation and Repair - Chapter 12
Explain how researchers discover that DNA is the genetic material (have a general idea of the experiments by Griffith, Hershey and Chase, and Chargaff)
List the three main components of a nucleotide
Explain how Watson and Crick deduced the DNA structure
Know the bases in DNA and distinguish between purines and pyrimidines
Explain the “base-pairing rule’
Describe the structure of DNA and explain the different chemical bonds between nucleotides and bases
Explain semiconservative replication
Describe the process of replication and the enzymes involved in each step
Define antiparallel, and know why continuous synthesis of both DNA strands is not possible
Distinguish between leading and lagging strand
What are mutations and how can they occur?
Explain why base-pair insertions or deletions have a greater effect then base-pair substitutions

Transcription and Translation - Chapter 13
Explain the Central Dogma in Biology
List the three stop codons and the one start codon
Explain in what way the genetic code is redundant
Explain the evolutionary significance of a nearly universal genetic code
Explain the three major steps in transcription: initiation, elongation and termination
Describe the general role of RNA polymerase in transcription
Distinguish between mRNA, tRNA, and rRNA
Describe the structure of tRNA and explain how its structure is related to its function
What is aminoacyl-t-RNA synthetase and what is its function?
Describe the structure of a ribosome
Describe the process of translation including initiation, elongation, and termination and explain what enzymes, protein factors, and energy sources are needed for each stage
What determines the primary structure of a protein?
Describe the difference between proteins made in free ribosomes and in the rough endoplasmic reticulum
Explain how eukaryotic mRNA is processed before it leaves the nucleus
Control of Gene Expression in Prokaryotes & Eukaryotes (chapter 14 & 15)
Explain why organism would regulate the expression of their genes
Explain how the Lac operon works
Explain how the Trp operon works
What are the effects of mutations in the following segments of the lac operon:
   a-in the repressor active site
   b-in the repressor allosteric site
   c-in the operator DNA sequence
   d-in the Promoter region
   e-in the Lac Z, Y and A
Describe how eukaryotic organisms are able to regulate their genome
Explain methylation and why is important
Explain Histones and how can they regulate gene expression
Explain transcription factors and how can they regulate gene expression

Include reading from handouts
(book pages 298, 300, 302 and 305)

Genomes and Genetic Engineering and its applications - Chapter 16 & 17
How many nucleotide bases are found in our genome?
How is complexity of the organism with amount of genes related?
How is DNA sequencing useful to society?
What methods are used in the DNA sequencing.
Explain how you sequence DNA using the Sanger Method.
Explain how are Dideoxy dyes used for DNA sequencing.
Explain how DNA features can be used to create unique “fingerprints”
Explain how advances in recombinant DNA technology have helped scientists study the eukaryotic genome
Describe the natural function of restriction enzymes
Describe how restriction enzymes and gel electrophoresis are used to isolate DNA fragments
Explain how the creation of sticky ends in plasmids by restriction enzymes is useful in producing a recombinant DNA molecule
Explain how plasmids or vectors are used in DNA technology
List and describe the two major sources of genes for cloning
Describe the function of reverse transcriptase enzyme
Describe how bacteria can be induced to express eukaryotic genes products
What is the Human Genome Project?
Describe how recombinant DNA technology can have medical applications such as diagnosis of genetic diseases, development of gene therapies, vaccine production, and development of pharmaceutical products
Describe how gene manipulation has practical applications for agriculture
Know the definitions given in handout.