Reading Guide---Chapter 18 (and a bit of Chapter 11)

This topic is worthy of an entire semester of study. I can only reasonably ask you to scratch the surface of the complexity of gene regulation. When you feel yourself getting bogged down in the details, step back and remind yourself of the big picture. That is what is most important.

Chapter 18.1 **Big Picture**: Prokaryotes do not have a _____. Therefore, transcription and translation occur simultaneously and cannot be controlled separately.

Operons
What is an operon?
What type of organism utilizes operons to control gene expression?
Compare and contrast positive control to negative control
Compare and contrast inducible operons to repressible operons

Chapter 18.2 **Big Picture**: Eukaryotes do have a _____. Therefore, transcription and translation occur in separate cellular compartments and can be controlled separately.

Pre-transcriptional Control
Explain the term epigenetic inheritance
Distinguish between euchromatin and heterochromatin in terms of *both* structure and function.
Explain DNA methylation in the context of genomic imprinting.

Transcriptional Control
Identify the structure (protein or DNA) and function of each:
- Transcription factor
- Enhancer
- Activator

Explain and give an example of co-ordinated control

Post Transcriptional Control
Explain and give an example of:
- Alternative RNA splicing
- mRNA degredation

Translational Control
Explain and/or give an example of
- Initiation factors
- Protein processing
- Protein degradation

Chapter 18.3
Read this section with the intention to appreciate that there are many different types of RNA transcripts with diverse roles in the cell (not just mRNA and tRNA). I am not holding you responsible for the details of any one of these in particular.

Chapter 18.4
Read this section for sheer amazement. Understand the conceptual difference between an embryonic cell and a determined cell (specialized cell) in the context of gene expression.

Chapter 18.5 **Big Picture**: At its most basic level (and therefore oversimplified), cancer is the result of unregulated progression through the cell cycle.

Cancer
How is a proto-oncogene related to an oncogene?

- What is the mechanism for translocation?—you will need to review outside this chapter
- What is the mechanism for transposition (fig. 21.9)?
- What is the mechanism for a point mutation?—you will need to review outside this chapter

How does the protein product of an oncogene interfere with the cell cycle?

What is a tumor suppressor gene?
How does the protein product of a tumor suppressor gene interfere with the cell cycle?

Chapter 11 (selections as indicated below)
Big Picture: The behavior of a cell is determined by changes in either gene expression or in the activity of proteins that are already present in the cell. A cell's behavior may change depending on chemical signals present in the extracellular or intracellular environment.

Cell Signaling
Reception (fig. 11.7)**:** Identify structural similarities among the 3 types of cell surface signal receptors.
How does the mechanism of action of a G protein coupled receptor resemble the mechanism of action of a receptor tyrosine kinase?
How is the mechanism of action of an intracellular receptor different from the mechanism of action of a cell surface receptor?
Transduction (fig. 11.16)**:** What is the role of the "phosphorylation cascade" in signal transduction?
Response (fig. 11.15, 11.17):
Give an example of a nuclear response to a cell signal (one sentence!)
Give an example of a cytoplasmic response to a cell signal (one sentence!)