

Week 5 – Nucleic Acids and Transcription

Part I – Nucleic Acid Structure

Learning Goal: Appreciate the structure and function of nucleic acids.

After the pre-class assignments you should be able to:

- Discuss the central dogma of molecular biology
- Describe the structure and organization of DNA
- Compare and contrast the structures of DNA and RNA
- Provide the complementary sequences of a given sequence of DNA
- Describe how gel electrophoresis separates nucleic acid fragments based on size
- Describe how Southern blots allow specific genes or DNA sequences to be visualized on a gel

By the time you take the second midterm you should also be able to:

- Explain what makes DNA a good molecule for information storage
- Compare and contrast the major and minor groove and the information they provide
- Predict whether two nucleic acid molecules will hybridize based on their sequences
- Interpret results from experiments using gel electrophoresis or Southern/Northern blots as a method.

Part II – Transcription

Learning Goal: Understand how the information stored in DNA is transcribed into an RNA message in both prokaryotes and eukaryotes.

After the pre-class assignments you should be able to:

- Define the role of promoters and terminators in the process of transcription
- Label the promoter, transcription start site, exons, introns, and polyA signal sequence on a model of a eukaryotic gene
- Compare and contrast transcription in prokaryotes and eukaryotes
- State the function of eukaryotic mRNA modifications
- Describe the process of splicing and the role of the spliceosome in eukaryotic gene expression

By the time you take the second midterm you should also be able to:

- Determine the product of transcription given the DNA sequence of a gene
- Evaluate how transcription factors bind to promoter sequence and their effect on transcription
- Predict how changes to the DNA sequence of a gene and/or the function of proteins involved in transcription and mRNA processing will alter the final products of transcription
- Interpret results from gel electrophoresis experiments and how mutation may affect the products of transcription and their migration distances on a gel