Chapter 17
Class Notes

I. The Flow of Genetic Information

- Transcription – The synthesis of RNA using DNA as the template.
- Translation – Synthesis of a polypeptide, which occurs under the direction of messenger RNA.

I. The Flow of Genetic Information

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(DNA) ➔ Gene (Genotype) ➔ mRNA ➔ One or more Polypeptides ➔ Protein (Phenotype)
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Question 17.1

II. Review of RNA structure

Transcription
III. Transcription: A Closer Look

- **RNA polymerase** – Catalyses the transcription of RNA from DNA.

- Key features of RNA polymerase:
  A.
  B.
  C.

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III. Transcription: A Closer Look

- **Initiation of transcription**
  (i.e., How does transcription begin?)

- Steps:
  1.
  2.
  3.

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III. Transcription: A Closer Look

- **Transcriptional Elongation**

- Key points:
  1.
  2.
  3.
  4.
III. Transcription: A Closer Look

- **Transcriptional Termination**
  (i.e. How does transcription end?)

- Key points:
  1.
  2.
  3.

Pre-mRNA Modifications

IV. **Eukaryotic** modifications mRNA after transcription.

- Eukaryotic mRNA is processed in the nucleus before being transported to the cytoplasm.

- Modifications:
  -
  -
  -
  
  - *WHY?*
  -
  -
IV. **Eukaryotic** modifications mRNA after transcription.

- Modifications (continued):
  - **Introns**
  - **Exons**

  - **WHY have introns?**

V. Introduction to Translation:

**The Genetic Code**

- **Codon** = a three nucleotide sequence in mRNA that specifies which amino acid will be added to a growing polypeptide.

- How could 4 nucleotides encode 20 amino acids?
V. Introduction to Translation: The Genetic Code

Codon Chart

VI. Translation Factors

• Key factors in translation
  – Messenger RNA (mRNA)
  – Amino acids
  – Transfer RNA (tRNA)*
  – Ribosomes*

* Will expand upon in more detail
VI. Translation Factors

• tRNA function
  

VI. Translation Factors

• tRNA Structure
  – Cloverleaf (planer view), L-shaped (3-D), or barrel
  
  – One end has three bases called an anticodon
  • Anticodon =
    
  – Other end is the amino acid attachment site.

VI. Translation Factors

• Ribosome
  
  – Coordinates pairing of tRNA with mRNA
  
  – Two subunits (large and small)

  –
VI. Translation Factors

- Each ribosome has 3 sites
  - 
  - 
  - 

VII. Building a Polypeptide: The Translation Process

- Translation occurs in three stages
  1. Initiation
  2. Elongation + Translocation
  3. Termination

VII. Building a Polypeptide: The Translation Process

* Initiation of Translation

  1. 
  2. 
  3. 
  .
VII. Building a Polypeptide: The Translation Process

*Translational Elongation + Translocation*

1. 
2. 
3. 
4. 

VII. Building a Polypeptide: The Translation Process

*Translational termination*

- Stop codons are UAA, UAG and UGA
- Stop codons do not code for an amino acid
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VII. Building a Polypeptide: The Translation Process

*Polyribosomes* – multiple ribosomes binding to the mRNA and synthesizing polypeptides.

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- 
VIII. Point mutations can effect the function of a protein.

• **Point mutation =**

• **Two categories:**
  –
  –

• **Base pair substitution =** the replacement of one base pair with another base pair.

• Can result in...
  –
  –

• **Missense =**

• **Nonsense =**
VIII. Point mutations can effect the function of a protein.

• **Insertions or deletions**
  - More harmful than base pair substitutions due to their potential effect on the reading frame.

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**Question 17.3**