Unit 7: Gene Expression and Biotechnology

Chapters: **13, 14, section 15.3 and 16**

Standards:

- HS-LS1-1 Use evidence to explain how DNA determines proteins and heritable traits
- HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding heritable traits
- HS-LS3-2 Use evidence to explain causes of genetic variation, including meiosis, viable replication errors, and mutations
- HS-LS3-3 Use probability to explain variation and distribution of expressed traits in a population
- HS-ETS1-1 Analyze a global challenge using qualitative and quantitative criteria and constraints for socially viable solutions
- HS-ETS1-2 Design a solution to a real-world problem through small steps that can be solved with engineering
- HS-ETS1-3 Evaluation a real-world problem based on trade-offs that account for social and environmental impacts

Objectives:

1. Describe how bacterial transformation provided clues about genes.
2. Explain the role of bacterial viruses in identifying genetic material.
3. Explain the role of DNA in heredity.
4. Define the chemical components and structure of DNA.
5. Explain the role of DNA polymerase in copying DNA.
6. Explain how DNA replication differs in prokaryotic cells and eukaryotic cells.
7. Explain how RNA differs from DNA.
8. Explain how the cell makes RNA.
9. Explain how the genetic code works.
10. Explain the role the ribosome plays in assembling proteins.
11. Explain how genes are regulated in eukaryotic cells.
12. Explain the ways mutations change genetic information.
13. Explain how mutations affect genes, and gene expression.
14. Describe how scientists read DNA base sequences
15. Describe research efforts that have resulted from the Human Genome Project
16. Describe the use of selective breeding
17. Describe how people increase genetic variation
18. Describe how scientists copy the DNA of living organisms
19. Describe the use of recombinant DNA
20. Describe how transgenic organisms are produced
21. Describe the benefits of genetic engineering for agriculture and industry
22. Describe how biotechnology can improve human health
23. Describe how DNA is used to identify individuals
24. Describe the privacy issues that biotechnology can raise

Vocabulary:

- transformation
- bacteriophage
- base pairing
- replication
- DNA polymerase
- telomere
- RNA
- messenger RNA
- ribosomal RNA
- transfer RNA
- transcription
- RNA polymerase
- promoter
- polypeptide
- genetic code
- codon
- translation
- anticodon
- mutation
- point mutation
- frameshift mutation
- mutagen
- polyploidy
- restriction enzyme
- gel electrophoresis
- genomic imprinting
- selective breeding
- biotechnology
- hybridization
- inbreeding
- polymerase chain reaction
- recombinant DNA
- plasmid
- genetic marker
- transgenic
- clone
- gene therapy
- DNA microarray
- DNA fingerprinting
- forensics