By the end of this unit, students will be able to…

1. Summarize the purpose and intended outcome of genetic sequencing.
2. Define each of the following: a. Gene b. Genome c. ddNTP d. Chromosome
3. Describe the size of DNA in comparison to other objects using accurate scales of measurements for objects of that size, and summarize the challenges created by working with a substance of this size.
4. Summarize the steps and items necessary to extract a pure sample of DNA from cells (including how the membranes are opened, how the components of the cells are separated, and how the DNA is removed from the nuclei).
5. Define denaturation and summarize why it is necessary for genetic sequencing.
6. Summarize the role served by each of the following components of the Sanger Method:
   a. ddNTPs b. Primer c. Polymerase d. Electrophoresis Gel e. Nucleotides
7. Describe how ddNTP's differ from ordinary nucleotides and how these differences enable DNA to be sequenced in the Sanger Method.
8. Summarize the findings and accomplishments of the Human Genome Project, and explain the direction this research is now moving since the completion of this work in 2003.
9. Define Next Generation Sequencing (NGS) and provide examples.
10. Summarize how each of the following is used to sequence a sample of DNA: 454-Roche sequencing, Illumina-Bridge sequencing, Ion-torrent sequencing, and Nanopore sequencing.
11. Explain the difference between an exon and an intron.
12. Define 'open reading frame' and explain its significance in determining what portions of a sample of DNA contain exons and introns.
13. Explain how researchers are able to determine the function of a gene using knockout mice and using BLAST.
14. Summarize what it means that a knockout mouse is a chimera and explain why this is necessary to understand the function of a gene.