

Genetics Course Outline – Over 50 hours of video

I. - Mendelian and Classical Genetics

- a. Introduction to Genetics – 15 minutes of video**
- b. Mendelian Genetics: Segregation and Independent Assortment – 6hrs of video**
 - Monohybrid crosses and the Law of Segregation – 2.25hrs of video
 - Dihybrid Crosses and the Law of Independent Assortment – 1.5hrs of video
 - Pedigree Analysis: Mendelian Inheritance in Humans – 2.25hrs video
- c. Chromosomes and Cell Division: Mitosis and Meiosis – 5.5hrs of video**
 - Mitosis and the Cell Cycle – 1hr of video
 - Meiosis, Gametogenesis, and Sexual Life Cycles – 1.5hrs of video
 - Sex Determination – 30 minutes of video
 - Sex-Linkage of Traits – 3hrs of video
- d. Mendel Revisited: Exceptions and Extensions – 4.5hrs of video**
 - Altered Dominance Relationships and Multiple Alleles – 2.5hrs of video
 - Gene Interactions, Epistasis, and Modified Mendelian Ratios – 1hr of video
 - Lethal Alleles and Pleiotropy – 30 minutes of video
 - Genes and the Environment – 20 minutes of video
- e. Linkage and Gene Mapping – 6.5 hrs of video**
 - Gene Linkage: An Introduction – 30 minutes of video
 - Mapping Genes Using Recombination Data The Chi Square test: “Goodness of Fit” – 4hrs of video
 - Chi Square Test – 30 minutes of video
 - Linkage and Gene Mapping in Fungi – 2hrs of video

II. – Molecular Genetics and the Nature of the Gene

- a. DNA Structure and Replication – 3.5 hours of video**
 - DNA is the Genetic Material – 40 minutes of video
 - The Structure – 1 hour of video
 - DNA replication – 2hrs of video
- b. Mutations and the Nature of the Gene – 8 hours of video**
 - Mutations: Types and Causes – 2.5hrs of video
 - What is the Function of a Gene? – 3hrs of video
 - Fine-Structure Mapping of Viral Genes – 2hrs of video
 - Complementation Testing – 1hr of video
- c. Gene Expression and Protein Synthesis – 7hrs of video**
 - Transcription, RNA, and the Central Dogma – 1hr of video
 - RNA molecules and RNA processing – 1.25hrs of video
 - The Genetic Code – 1.25hr of video
 - The Central Dogma: Translation – 1.5hrs of video
 - (Summary problems section) – 2hrs of video
- d. Recombinant DNA and its Applications - 6.5hrs of video**
 - Amplification and Manipulation of DNA – 3hrs of video
 - Genetic Libraries – 1hr video

- Analysis of Nucleic Acids at the Molecular Level – 2hrs of video
- Applications of Recombinant DNA Technology – 1hr of video

III. – Chromosome Structure, Organization, and Aberrations

a. The Eukaryotic Chromosome – 2.5 hours of video

- Packaging of DNA: Chromosome Structure – 1.25 hrs of video
- Centromeres and Telomeres – 30 minutes of video
- Organization and Types of Sequence Elements – 45 minutes of video

b. Large-scale Chromosome Aberrations - Coming Soon!!!

- Chromosomal Rearrangements
- Aneuploidy
- Polyploidy

c. The Bacterial Chromosome: Mapping and Recombination in Prokaryotes – Coming Soon!!!

- The Nature of the Bacterial Chromosome
- Mechanisms of Recombination
- Gene Mapping in Bacteria

IV. – Gene Regulation

a. Regulation in Prokaryotes – Coming Soon!!!

- The Operon Concept
- The *lac* Operon: An Inducible Operon
- The *trp* Operon: Attenuation
- Regulation in Phage lambda

b. Regulation in Eukaryotes – Coming Soon!!!

- Methods of control
- Regulation of Transcription (inc. availability)
- Post-transcriptional Regulation