

BI 108 : INTRODUCTION TO HUMAN GENETICS

Transcript title

Introduction to Human Genetics

Credits

4

Grading mode

Standard letter grades

Total contact hours

40

Lecture hours

40

Course Description

Designed for non-science majors and introduces students to basic principles of genetics and genetic technologies applied to human health and human affairs. Topics include classical (Mendelian) inheritance, complex inheritance, inherited disorders, analysis of pedigrees, gene structure and gene expression, epigenetic effects on gene expression, sex determination and the genetics of cancer. Some technologies introduced include: the use of DNA in genealogy and forensic biology, gene-editing technologies, and reproductive cloning technologies.

Course learning outcomes

1. Search genetic databases (OMIM/GenBank, FlyBase) and apply genetic concepts to diagnose genetic disorders using inquiry-based case studies.
2. Describe mechanisms of gene transmission and identify genetic markers used to trace ancestry in genealogy studies.
3. Trace the flow of information from allele to phenotype.
4. Describe how epigenetic gene silencing can occur.
5. Explain why cancer has not yet been cured and explore new technologies that help our own immune systems target cancerous cells.
6. Argue the benefits and costs of using gene-editing technologies in human reproduction.

Content outline

1. Structure and function of the human genome
2. Learn how to use Genetic Databases (GenBank and OMIM)
3. Overview of the eukaryotic cell
4. The cell cycle, development, and aging
5. Human reproduction, meiosis, the genetics of sexual development
6. Reproductive Technologies (Reproductive technologies - Somatic Nuclear Transfer)
7. Gene transmission (Mendel's laws and simple Mendelian inheritance - complete dominance)
8. Complex inheritance patterns including gene interactions, polygenic inheritance, co-dominance, incomplete dominance, and pleiotropy
9. DNA structure and DNA replication
10. Gene mutations, genetic testing and study of human genetic disorders
11. DNA technologies and Gene Editing

12. Gene Expression and regulation of gene expression
13. Epigenetic Gene Regulation
14. Genomics and DNA markers
15. Allele Frequencies in Populations
16. DNA forensics and DNA in human ancestry and evolution
17. Genetics of Cancer

Required materials

Textbook.

General education/Related instruction lists

- Science not Lab