

Introduction to Genetic Analysis

Course Syllabus

Instructor:

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Course Description:

Genetics is a discipline of biology that deals with the molecular structure and functions of genes. Given that genes are prevalent in all living organisms, genetics has applications to many biological fields, including molecular biology, evolutionary biology, and paleontology. In this course, we will discuss the principles of genetics and how to apply them at the molecular, cellular, and organismal level. The topics include: structure and function of genes, complementation test, probability and pedigree analysis, mitosis and meiosis, recombination and genetic linkage, tetrad analysis, human genetics, gene structure and DNA analysis, mutagenesis, suppressor mutations, and genetic regulation.

Prerequisites:

One year (or equivalent) of general biology is required.

Lectures:

Unless otherwise notified, lectures will be given on **Sundays** in room **4-149** from **1:00 pm to 2:20 pm**.

Problem Sets (Optional):

There will be **SIX** optional problem sets in this course. **Rewards** will be given to those students who successfully complete the entire problem set. The material on the problem sets will be taken directly from lecture. They are due at the **beginning** of class. Collaboration is encouraged but not required. If you work with other students in the class make sure you write his/her name at the top of your problem set. Solutions to problems should be written independently (see section on academic honesty below).

Academic Honesty:

Although you are encouraged to collaborate with other students on problem sets and material presented in the course, copying answer solutions directly from another person is **cheating** and **strongly discouraged**. Remember, solutions must always be written up independently!!!

Lecture Calendar

Lecture 1: July 10th 2011

- Introductions
- What is a Gene?
- Overview: DNA Replication and Protein Synthesis
- Physical Definition of a Gene
- Gene Function and Complementation Test

Lecture 2: July 17th 2011

- Mendelian Genetics
- Probability of Inheritance
- Two-Gene Segregation
- Chi-Square Test
- Mendelian Inheritance in Humans

Lecture 3: July 24th 2011

- Pedigree Analysis
- Bayes' Theorem
- Chromosomes, Mitosis, and Meiosis

Lecture 4: July 31st 2011

- Genetic Linkage
- Calculating Genetic Distance and Mapping Function
- Genetic Mapping

Lecture 5: August 7th 2011

- Tetrad Analysis
- Human Genetics I

Lecture 6: August 14th 2011

- Human Genetics II
- LOD scores
- Gene Structure in Prokaryotes and Eukaryotes

Lecture 7: August 21st 2011

- DNA Analysis: Polymerase Chain Reaction
- Gene Mutations
- Suppressor Mutations
- Genetic Regulation in Prokaryotes and Eukaryotes
- Conclusions