COURSE DETAIL

GENETICS

Country
Italy

Host Institution
University of Bologna

Program(s)
University of Bologna

UCEAP Course Level
Upper Division

UCEAP Subject Area(s)
Biological Sciences

UCEAP Course Number
126

UCEAP Course Suffix

UCEAP Official Title
GENETICS

UCEAP Transcript Title
GENETICS

UCEAP Quarter Units
6.00

UCEAP Semester Units
4.00

Course Description

By the end of the course, students gain knowledge of the fundamental principles of heredity; they are familiar with the nature, transmission, expression, and variability of genetic information and are able to rigorously interpret genetic experimental data. The course content is divided as follows:

- Introduction to genetics
- Mendelian Genetics
  - Gregor Mendel and basic principles of heredity; monohybrid crosses (dominance and segregation); dihybrid crosses (independent assortment)
  - Predicting the outcome of genetic crosses; probability and Chi-Square test
- Cell division, mitosis and meiosis, chromosomal basis of inheritance
  - Sexual reproduction, mitosis and meiosis. Chromosome theory of inheritance
  - Sex determination and sex-linked inheritance
  - Dosage compensation in mammals
- Human pedigree analysis
- Extensions and modifications of basic mendelian principles
  - Allelic variation and gene function; why some alleles are dominant and other recessive; types of dominance, reduced penetrance, lethal alleles.
  - Genetic heterogeneity, gene interactions and epistasis.
- Linkage, recombination, gene mapping in Eukaryotes
  - Linked genes and crossing over; Constructing genetic maps with recombination frequencies
  - Linkage analysis in human; DNA polymorphisms as genetic markers; the lod-score method
- Overview of genetics of bacterial and viral genetic systems
- Genetic variation, DNA repair and recombination
  - Genetic variability; mutation and polymorphisms; types of genetic variants; molecular basis of mutations; point mutations and their consequences; mutagenesis

- DNA repair mechanisms; DNA recombination mechanisms
          - Variation in chromosome number and structure; mechanisms of structural variation
  - Population genetics
        - Variation in populations; the Hardy-Weinberg equilibrium
        - Factors that alter allele and genotype frequencies in populations
  - Overview of basic techniques in molecular genetics and genomics
        - Basic techniques used to identify, amplify, clone and sequence genes; DNA libraries; genetic, cytogenetic and physical maps
        - The Human Genome Project; map based cloning of genes; association and linkage disequilibrium
        - Analyzing genomic variation
  - Introduction to complex traits
        - Heritability
        - Mapping complex traits

The course also includes LABORATORY practicals:

  - Genomic DNA extraction from buccal swab cells
  - PCR amplification
  - SNP Genotyping by restriction enzyme digestion

Language(s) of Instruction
English

Host Institution Course Number
87615

Host Institution Course Title
GENETICS

Host Institution Course Details
https://www.unibo.it/en/study/course-units-transferable-skills-moocs/course-uni...

Host Institution Campus
BOLOGNA

Host Institution Faculty

Host Institution Degree
L in GENOMICS

Host Institution Department
PHARMACY AND BIOTECHNOLOGY

Course Last Reviewed
2025-2026

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