GENETICS (GEN)

Visit the Course Schedule Search website to find out when courses will be offered during the academic year.

Read more about the courses within this subject prefix in the descriptions provided below.

GEN 804 - Microbial Genetics and Genomics
Credits: 5
Study of heritable information in bacteria, their viruses, and model Eukaryotic microbes and fundamentals of bacterial genomics. Topics will include genetics of bacteriophages and bacteria; genome maintenance, mutation and evolution especially in reference to evolution of pathogens; mechanisms of gene transfer, gene regulation and adaptive responses; analysis of gene expression including by using the latest genomic tools; use of genomic data, including concepts and strategies of genome sequencing and annotation as well as metagenomics approaches for understanding diversity. Practical laboratory training in microbial genetics and genomics. Special emphasis on recombinant DNA techniques, nucleotide sequencing methods, and bioinformatics analysis to dissect and analyze gene function and genome structural features as practical tools for careers in biotechnology. Original research projects will include opportunities to work with bacteria, phages, and yeast.
Grade Mode: Letter Grading
Special Fee: Yes

GEN 805 - Population Genetics
Credits: 3
Exploration of the forces (mutation, selection, random drift, inbreeding, assortative mating) affecting the frequency and distribution of genetic variation in natural populations. Quantifying the structure of populations. Methods of analysis for theoretical and practical applications. One semester of genetics and one semester of statistics recommended.
Equivalent(s): ZOOL 805
Grade Mode: Letter Grading

GEN 806 - Human Genetics
Credits: 4
Genetic basis of human traits and diseases including both traditional methods of diagnosis and contemporary molecular genetic approaches stemming from the human genome project. Case studies exemplify common practices in human genetic counseling and integrate the scientific basis of diagnosis with the special ethical implications of human genetic analysis. One semester of genetics recommended.
Equivalent(s): ANSC 806
Grade Mode: Letter Grading

GEN 811 - Genomics and Bioinformatics
Credits: 0 or 4
Methods, applications, and implications of genomics-the analysis of whole genomes. Microbial, plant and animal genomics are addressed. Medical, ethical and legal implications of genomic data. Computer lab provides exposure and experience in a range of bioinformatics approaches used in genome analysis. One semester of genetics recommended. Computer lab.
Equivalent(s): BCHM 811, MICR 811
Grade Mode: Letter Grading

GEN 812 - Programming for Bioinformatics
Credits: 5
Development of programming skills that enable life science students to ask fundamental biological questions that require computers to automate repetitive tasks and handle query results efficiently. Topics include: computer values of important parameters of biological sequence data; pattern search and motif discovery scripts; accessing, querying, manipulating, retrieving, parsing, analyzing, and saving data from local and remote databases. One semester of bioinformatics and one semester of genetics recommended. Computer Lab.
Grade Mode: Letter Grading

GEN 813 - Microbial Ecology and Evolution
Credits: 4
Evolutionary and ecological forces that generate the tremendous diversity of microbial life on Earth with emphasis on viruses, archaea and bacteria. Functional roles of microorganisms, their population dynamics and interactions, and their mechanisms of evolutionary change in a variety of environmental settings, including natural communities and laboratory microcosms. Introductory microbiology and microbiology lab and one semester of genetics recommended.
Equivalent(s): MICR 813
Grade Mode: Letter Grading

GEN 815 - Molecular Evolution
Credits: 4
Rates and patterns of evolutionary change in biomolecules. Forces affecting the size and structure of genomes. Molecular mechanisms of organismal evolution. Emphasizes integrating evidence from biochemistry, molecular genetics and organismal studies. Methods for reconstructing phylogeny from molecular sequences. One semester of genetics and one semester of statistics recommended. Computer lab.
Equivalent(s): ZOOL 815
Grade Mode: Letter Grading

GEN 817 - Molecular Microbiology
Credits: 5
Fundamental physiological and metabolic processes of archaea bacteria and fungi with a strong emphasis on prokaryotes. Literature-based course with lab. Topics include regulation and coordination of microbial metabolism, bacterial cell cycle, global control of gene expression, signal transduction, and microbial cell differentiation. Introductory microbiology and microbiology lab and one semester of genetics recommended. Lab.
Equivalent(s): MICR 817
Grade Mode: Letter Grading
Special Fee: Yes

GEN 821 - Comparative Genomics
Credits: 4
Explores the central questions and themes in contemporary comparative genomics, including genome biology, phylogenomics, human origins, population genomics, and ecological genomics. Provides the conceptual framework required to evaluate new work in this fast-changing field. One semester of genetics recommended.
Grade Mode: Letter Grading

GEN 825 - Population Genetics Lab
Credits: 2
Hands-on approach to exploration of evolutionary forces affecting the frequency and distribution of genetic variation in natural populations. Wet lab techniques include DNA extraction, restriction enzyme digestion, PCR, DNA fragment size-selection. Computational skills include high-throughput sequencing data control, identifying allelic variants, and generation of population genetic summary statistics. One semester of genetics and one semester of statistics recommended.
Co-requisite: GEN 805
Grade Mode: Letter Grading
Special Fee: Yes

GEN 871 - Molecular Genetics
Credits: 4
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic and epigenetic mechanisms of gene expression and its control; molecular genetic control of cell division and differentiation during development. One semester of genetics recommended.
Equivalent(s): BCHM 871
Grade Mode: Letter Grading

GEN 872 - Evolutionary Genetics of Plants
Credits: 4
Explores diverse aspects of plant genetic change in nature and under human influence. Emphasis will be placed on the unique aspects of plants such as polyploidy and distinctive mating systems.
Equivalent(s): PBIO 872
Grade Mode: Letter Grading