GENOMICS AND COMPUTATIONAL BIOLOGY (GCB)

GCB 493 Epigen of Health & Disease
Also Offered As: BIOL 493
Activity: Seminar
1 Course Unit

GCB 534 Experimental Genome Science
This course will survey methods and questions in experimental genomics, including next generation sequencing methods, genomic sequencing in humans and model organisms, functional genomics, proteomics, and applications of genomics methods. Students will be expected to review and discuss current literature and to propose new experiments based on material learned in the course.
Taught by: C Brown, J Murray
Also Offered As: PHRM 534
Prerequisites: Undergraduates and Masters students need BIOL 431 or equivalent
Activity: Lecture
1 Course Unit

GCB 535 Introduction to Bioinformatics
This course provides an overview of bioinformatics and computational biology as applied to biomedical research. A primary objective of the course is to enable students to integrate modern bioinformatics tools into their research activities. Course material is addressed to biological questions using computational approaches and the analysis of data. A basic primer in programming and operating in a UNIX environment will be presented, and students will also be introduced to Python, R, and tools for reproducible research. This course emphasizes direct, hands-on experience with applications to current biological research problems. Areas include DNA sequence alignment, genetic variation and analysis, motif discovery, study design for high-throughput sequencing, RNA, and gene expression, single gene and whole-genome analysis, machine learning, and topics in systems biology. The relevant principles underlying methods used for analysis in these areas will be introduced and discussed at a level appropriate for biologists without a background in computer science. The course is not intended for computer science students who want to learn about biologically motivated algorithmic problems; BIOL 437/GCB 536 and GCB/CIS/Biol 537 are more appropriate.
Taught by: B Voight, C Greene
Course usually offered in spring term
Also Offered As: CIS 535, MTR 535, PHRM 535
Prerequisites: The course will assume a solid knowledge of modern biology. An advanced undergraduate course such as BIOL 421 or a graduate course in biology such as BIOL 526 (Experimental Principles in Cell and Molecular Biology), BIOL 527 (Advanced Molecular Biology and Genetics), BIOL 528 (Advanced Molecular Genetics), BIOL 540 (Genetic Systems, or equivalent), is a prerequisite.
Activity: Lecture
1 Course Unit
Notes: All students are required to bring a laptop to the lab sessions (Fridays). TAs will provide help with the material, but students should be computer-capable with their own laptop, and should be willing/capable to download and install free software from the internet.

GCB 536 Computational Biology
An introductory computational biology course designed for computational scientists. The course will cover fundamentals of algorithms, statistics, and mathematics as applied to biological problems. In particular, emphasis will be given to biological problem modeling. Students will be expected to learn the basic algorithms underlying computational biology, basic mathematical/statistical proofs and molecular biology. Topics to be covered are genome annotation and string algorithms, pattern search and statistical learning, molecular evolution and phylogenetics and small molecule folding.
Course not offered every year
Also Offered As: BIOL 437
Activity: Lecture
1 Course Unit

GCB 537 Advanced Computational Biology
1. Learn important concepts/methods from statistical data analysis and machine learning as they are applied to computational biology. 2. Learn about current topics in genomics and computational biology through in-depth discussion of both classic and recent papers. 3. Gain hands on experience in data analysis, coding, and evaluating tools/techniques as they apply to topics covered in class. 4. Learn to evaluate, criticize, summarize, and present research papers in genomics and computational biology.
Taught by: Y Barash, R Faryabi
Course usually offered in spring term
Also Offered As: BIOL 537, CIS 635
Prerequisite: GCB 536 or equivalent
Activity: Seminar
1 Course Unit
Notes: This is not a bioinformatics lab. Non-GCB students need to be approved by instructors

GCB 567 Modeling Biol Systems
Also Offered As: BE 567
Activity: Lecture
1 Course Unit

GCB 585 Wistar Inst Cancer Biol
Also Offered As: BMB 585
Activity: Lecture
1 Course Unit

GCB 752 Genomics
Taught by: S Diskin
Course usually offered in spring term
Also Offered As: CAMB 752
Prerequisites: GCB 534 or equivalent, or permission from instructor
Activity: Seminar
1 Course Unit