G4120: Introduction to Computational & Quantitative Biology
Columbia University
Department of Microbiology & Immunology
Fall 2014

Director: Oliver S. Jovanovic, Ph.D.
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Location: HHSC 1212
Day & Time: Monday, 2:00-3:30 P.M.
Credits: 1

Description: This course will introduce graduate students to the concepts and methodology of bioinformatics, computational biology, next-generation sequencing analysis, systems biology, advanced imaging and biostatistics. It will introduce the databases, web sites, software, hardware, algorithms and programming languages currently used to analyze and quantify biological data and explain how these tools are best used.

Instructors: Oliver Jovanovic, Course Director, Microbiology & Immunology (oj2@columbia.edu); Erdinc Atligan, Microbiology & Immunology (ea2500@columbia.edu); German Plata (gap2118@columbia.edu); Raul Rabadan, Systems Biology and Biomedical Informatics (rr2579@columbia.edu); Peter Sims, Systems Biology and Biochemistry & Molecular Biophysics (pas2182@columbia.edu) and Hans-Willem Snoeck, Medicine and Microbiology & Immunology (hs2680@columbia.edu).

Prerequisites: Previous or current graduate-level coursework in molecular biology and genetics, basic computer literacy. A laptop computer is required for the course, and should be brought to every session.

Texts: No required textbooks. Recommended texts include Practical Computing for Biologists by Stephen Haddock & Casey Dunn, BLAST by Ian Korf, Mark Yandell & Joseph Bedell and Introductory Statistics with R by Peter Dalgaard.

Website: Additional course information and course files will be made available at http://www.microbiology.columbia.edu/icqb

Attendance: Students are expected to attend all sessions of the course. In the event of an absence due to illness or an emergency, students are responsible for making up for the material covered in that session.

Assignments: Practical take-home work will be assigned throughout the course.

Grading: Pass/Fail. All assignments must be completed to receive a passing grade.

Notes: Most sessions will consist of a lecture portion, followed by hands-on computer practice with a laptop. Involved questions should be saved for the end of each session, as the course will move quickly, but do not hesitate to ask questions in class if something is unclear or requires additional explanation.
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Fall 2014 Schedule

September 22nd, 2:00-3:30 P.M.  Introduction to Bioinformatics  Jovanovic
September 29th, 2:00-3:30 P.M.  Introduction to Computing  Jovanovic
October 6th, 2:00-3:30 P.M.  Bioinformatics Resources and Databases  Jovanovic
October 13th, 2:00-3:30 P.M.  Genomics and Quantitative Analysis of Evolution  Rabadan
October 20th, 2:00-3:30 P.M.  Probabilistic Techniques and Network Analysis  Plata
October 27th, 2:00-3:30 P.M.  RNA-Seq and the Genome Center  Sims
November 3rd, 2:00-3:30 P.M.  Unix and Scripting  Jovanovic
November 10th, 2:00-3:30 P.M.  Introduction to Programming  Jovanovic
November 17th, 2:00-3:30 P.M.  Introduction to Python and Biopython  Jovanovic
November 24th, 2:00-3:30 P.M.  Quantitative Analysis of Visual Data  Atilgan
December 1st, 2:00-3:30 P.M.  Introduction to Statistics  Atilgan
December 8th, 2:00-3:30 P.M.  Introduction to R  Jovanovic
December 15th, 2:00-3:30 P.M.  Biostatistics  Snoeck