G4120: Introduction to Computational & Quantitative Biology
Columbia University
Department of Microbiology & Immunology
Fall 2019

Director: Oliver S. Jovanovic, Ph.D.
Phone: (212) 305-3647
Email: oj2@cumc.columbia.edu

Location: HHSC 1307
Day & Time: Tuesday, 11:00 A.M. - 12:30 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.

Instructor: Oliver Jovanovic, Ph.D., Course Director (oj2@cumc.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, preferably an Apple laptop running a recent version of OS X.

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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The course will meet Tuesdays, between 11:00 AM and 12:30 PM in HHSC 1307.

September 17th  Introduction to Bioinformatics
September 24th  Introduction to Computing
October 1st    Introduction to Bioinformatics Resources and Databases
October 8th    Unix and Scripting
October 15th   Introduction to Programming
October 22nd   Introduction to Python and Biopython
October 29th   Genomics (with Anne-Catrin Uhlemann)
November 5th   Quantitative Analysis and Presentation of Visual Data
November 12th  Introduction to Sequence Analysis (with Thomas Postler)
November 19th  No class
November 26th  Introduction to Statistics
December 4th   Data Visualization with R and RStudio