G4120: Introduction to Computational & Quantitative Biology
Columbia University
Department of Microbiology & Immunology
Fall 2022

Director: Oliver S. Jovanovic, Ph.D.
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Credits: 1
Location: HHSC 1307
Lecture: Tuesday, 1:00 P.M. - 2:30 P.M.
Hands-on: Thursday, 4:30 P.M. - 5:30 P.M.

Description: This course will introduce graduate students to the concepts and methodology of bioinformatics, computational biology, genomics, next-generation sequencing analysis, systems biology, analysis and presentation of visual data 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). Lecture sessions.

Assistant: Daniel Caron, Teaching Assistant (dpc2136@cumc.columbia.edu). Hands-on sessions.

Prerequisites: Previous or current graduate-level coursework in molecular biology and genetics, basic computer literacy. An Apple computer running a recent version of macOS is highly recommended for the course.

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

Website: Additional course information, lecture notes and course files will be made available at: https://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 session led by the instructor, followed by a hands-on computer session led by the teaching assistant. 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, from 1:00 PM to 2:30 PM in HHSC 1307. A related hands-on session will follow each Thursday, from 4:30 PM to 5:30 PM in HHSC 1307.

September 13th	Introduction to Computational Biology
September 20th	Introduction to Internet Resources & Databases
September 27th	Introduction to Unix and Scripting
October 4th	Introduction to Programming
October 11th	Introduction to Python and Biopython
October 18th	Quantitative Analysis and Presentation of Visual Data
October 25th	Introduction to Statistics
November 1st	Data Visualization with R and RStudio
November 8th	*No class (Election Day)*
November 15th	Genomics (Anne-Catrin Uhlemann)
November 22nd	*No class (Thanksgiving)*
November 29th	Introduction to Sequence Analysis and RNA-Seq (Thomas Postler)
December 6th	Sequence Analysis and RNA-Seq (Thomas Postler)