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).

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

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, 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 portion, followed by hands-on computer practice. 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.
The course will meet Tuesdays, from 11:00 AM to 12:30 PM remotely via Zoom teleconference (invitations will be sent out the day before each class).

**September 15th**  Introduction to Bioinformatics

**September 22nd**  Introduction to Computing

**September 29th**  Introduction to Bioinformatics Resources and Databases

**October 6th**  Introduction to Unix and Scripting

**October 13th**  Introduction to Programming

**October 20th**  Introduction to Python and Biopython

**October 27th**  Genomics (with Anne-Catrin Uhlemann)

**November 3rd**  No class (Election Day)

**November 10th**  Quantitative Analysis and Presentation of Visual Data

**November 17th**  No class

**November 24th**  Introduction to Sequence Analysis (with Thomas Postler)

**December 1st**  Introduction to Statistics

**December 8th**  Data Visualization with R and RStudio