Introduction to biological data analysis in Python  
- Winter 2023 -

A 300-level course introducing computational data analysis in Python, for students in biology and other sciences.

Course description
Computational data analyses have become an indispensable part of biological research and industry. From genome sequencing, electroencephalogram, gene expression microarrays, pedigrees and phylogenetic trees to epidemiological and ecological time series, nearly all domains of biology now necessitate the use of computers. Computer programming is the means by which modern scientists “tell” computers what to do.

This course will introduce students to Python, a free and popular computer programming language, as a powerful tool for biological data analysis. Students will learn to load, analyze and visualize datasets using realistic examples taken from the scientific literature and public databases. Examples will cover a broad range of biological domains, including epidemiology (e.g., COVID19 dynamics), conservation, ecology and population biology (e.g., animal tracking data), physiology and evolution. The course will be very hands-on, with the bulk of the learning process happening through programming exercises.

Prerequisites
Prerequisites include high-school biology (e.g., what is a nucleotide, gene and genome), high-school calculus (e.g., functions, logarithms, square roots, what is a derivative) and high-school statistics (e.g., mean and standard deviation, what is a probability). No prior programming experience is required, but will be of benefit if existent. Basic familiarity with computers (e.g., installing software, downloading files, typing up a lab report) is expected. Students will need to have access to a regular computer (e.g., laptop or desktop) to follow the course examples and complete their homework.

Course format
Lectures + hands-on computer labs + programming exercises with realistic datasets + exams.

Instructor
Stilianos Louca, PhD, Assistant Professor, University of Oregon  
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Textbook
The course will follow a textbook by S. Louca, freely available at:  
http://loucalab.com/archive/BioDataAnalysisPython