BIOL-GA1007 PROGRAMMING FOR BIOLOGISTS

Sessions: One 160 minutes class (Wednesdays 4:55pm-7:35pm)

Location: Online

Recommended texts:

Stevens, Tim (2014) *Python programming for biology, bioinformatics, and beyond.* University Printing House.

Book is available for download from Cambridge code link :
https://bobcat.library.nyu.edu/permalink/f/ci13eu/nyu_aleph004831010

Instructor: Dr. Manpreet S. Katari (msk8@nyu.edu), Dr. Brian Parker (bp56@nyu.edu)

Course Aims: To provide introductory theory and hands-on training in bioinformatics for graduate students or advanced undergraduates in biology who have no prior computational experience. Students will learn basic computer programming as applied to bioinformatics as well as foundational concepts and practical tools that provide a starting point for further advanced study in bioinformatics and computational biology.

Prerequisites:

Undergraduates:

Molecular and Cellular Biology I

Graduates:

None

Grading:

Lab/Homework:	60% [weekly take home assignments and 2 in-class quizzes]
Midterm Exam:	20% (take-home project)
Final Exam:	20% (take-home project)

Course Description:

This course provides introductory theory and hands-on training in bioinformatics for graduate students or advanced undergraduates in biology who have no prior computational experience. Knowledge of foundational concepts and practical applications acquired in this course will provide a starting point for further advanced study in bioinformatics and computational biology. Hands-on exercises will introduce

students to the Linux operating system and provide basic computer programming skills as applied to bioinformatics, using primarily the Python programming language, and, to a lesser extent, the R programming language.

Assignments and Projects:
Grading will be based on in-lab exercises, homework, and take-home projects. There will be two exams during the term that will be take-home projects. The Final Exam will be cumulative, with emphasis on the last portion of the term.

Course Syllabus

Sept 02 (MK) Python Intro: Primitives, Functions, Operators, Flow control
Reading: Chapter 1,2

Sept 09 (MK) NO CLASS - Monday schedule

Sept 16 (MK) Python Data Structures: Collections and Dictionaries
Reading: Chapter 3,4

Sept 23 (MK) More on Python Functions, Modules, and I/O
Reading: Chapter 5,6

Sept 30 (MK) Coding Tips
Reading: Chapters 10

Oct 07 (MK) BioPython and Advanced Python constructs
Reading: Chapter 11

Oct 14 (MK) Python OOP and Relational Databases
Reading: Chapter 7-8

Oct 21 (MK) Introduction to Linux / Command Line execution of scripts

Oct 28 (BP) Introductory sequence analysis: Pairwise Sequence Alignment, Sequence Database Searches (BLAST)
Reading: Chapter 12

Nov 04 (BP) Introductory data analysis with numpy/scipy; Experimental analysis in Differential Gene Expression and Clustering
Reading: Chapter 16-17,23

Nov 11 (BP) Advanced data analysis: Predictive and probabilistic models in Gene prediction/HMM/machine learning

Reading: Chapter 21

Nov 18 (BP) Scientific programming: Workflows & Git

Nov 25 (BP) Data visualization with Python and R

Dec 02 (BP) Machine learning in Python
Reading: Chapter 24

Dec 09 (BP) Review/ Final Programming quiz