**BIOL-GA.1007 BIOINFORMATICS FOR BIOLOGISTS**

**Sessions:** One 160 minutes class (Wednesdays 4:55pm-7:35pm)
Office Hour TBD

**Location:** Computer laboratory classroom

**Recommended texts:**


**Instructor:** Professor Kristin Gunsalus (kcg1@nyu.edu)
Dr. Manpreet S. Katari (msk8@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:**
  - Principles of Biology I
  - Principles of Biology II
  - Molecular and Cellular Biology I
  - Molecular and Cellular Biology II
- **Graduates:**
  - None:

**Grading:**

- Lab/Homework: 60%
- 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 the Python 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

Week 1  Introduction to Linux
Week 2  Python Intro: Primitives, Functions, Operators, Flow control  
Reading: Chapter 1,4
Week 3  Python Data Structures: Collections and Dictionaries  
Reading: Chapter 3
Week 4  More on Python Functions, Modules, and I/O  
Reading: Chapter 2
Week 5  Python Utilities, Working with text, Regular Expressions  
Reading: Chapters 6 and 7
Week 6  Pairwise Sequence Alignment, Sequence Database Searches (BLAST/BLAT)
Week 7  Object-Oriented Programming and BioPython *  
Reading: Chapter 5
Week 8  Python OOP and Relational Databases **  
Reading: Chapter 10
Week 9  Working with Next-Generation Sequence Data
Week 10  Analyzing Differential Gene Expression and Clustering
Week 11  Creating Graphics with Python  
Reading: Chapter 11
Week 12  Web Programming with Python (HTML, XML, CGI)  
Reading: Chapter 9
Week 13  Putting it all together: Workflows
Week 14  Review *

* Exam assigned
** Exam due (Final will be due during Finals Week, date TBD)