Applied Bioinformatics for Organizations and Operations (INLS 890-259) Dr. Kimberly Robasky

Course Description

Thursday, 3:30-4:45P

Jan 11 – April 26
HSL 333
University of North Carolina at Chapel Hill

Are you looking to understand genomic analysis at a level of detail necessary to empower discussions of the most impactful concepts? In this class, we will share with you some of the most important vocabulary used by molecular analysts today. Additionally, through workshopping exercises, you will leave this course empowered by a set of skills prioritized for aspiring leaders responsible for cutting- edge projects and biopharma groups or organizations.

Each class will be begin with a short talk to introduce essential concepts and jargon, to be followed by short, hands-on, real-world exercises to be performed on a virtual machine you will provision yourself from a top cloud services provider. At the end of this course, you will have gained a realistic "view from the trenches" aimed at demystifying the challenges faced by a typical bioinformatician in the field. You will further be comfortable reading, writing and speaking the common parlance of the field. The class will culminate in published works from each student, either in the form of an accepted poster abstract, a curated dataset, or both.

Objectives include learning about the following areas and engaging in related activities:

- Define and understand the nuanced differences between health informatics and bioinformatics

- Be aware of the resources available and commonly used by the bioinformatics community

- Understand how to track breaking topics and technologies in bioinformatics

- Become familiar with the technical vocabulary used by and between bioinformaticians

- Practical experience with using the knowledge gained to communicate key concepts

- 10% Take-home quiz

- 35% In-class practicums

- 15% Class participation - activities in class, regular attendance, contributions to class list

- 40% Final project (mock poster session)

Grading

Based on the UNC Registrar Policy for courses semester grades will be H, P, L or F for graduate students. Grades for individual assignments will be based on points obtained on each assignment, weighted by percentages listed above, to calculate final grades. Numerical grades for the course as a whole will roughly translate into the following letter grades:

Grad Grade	Range
H (High Pass)	95-100
P (Pass)	80-94
L (Low Pass)	70-79
F (Fail)	69 or below

Honor Code

All students are expected to follow general classroom decorum and respect the rights of everyone to have a safe and collegial environment for learning. Violations of general academic practices and norms will not be tolerated. Please refer to the Carolina Honor system to learn more about basic academic expectations at UNC at Chapel Hill: https://studentconduct.unc.edu/honor-system. Do not hesitate to contact the instructor at any time if you have any questions about the honor system in related matters.

Diversity Statement

In support of the University's diversity goals and the mission of the School of Information and Library Science, SILS embraces diversity as an ethical and societal value. We broadly define diversity to include race, gender, national origin, ethnicity, religion, social class, age, sexual orientation and physical and learning ability. As an academic community committed to preparing our graduates to be leaders in an increasingly multicultural and global society we strive to:

- Ensure inclusive leadership, policies and practices

- Integrate diversity into the curriculum and research

- Foster a mutually respectful intellectual environment in which diverse opinions are valued

- Recruit traditionally underrepresented groups of students, faculty and staff

- Participate in outreach to underserved groups in the State
The statement represents a commitment of resources to the development and maintenance of an academic environment that is open, representative, reflective and committed to the concepts of equity and fairness.

- **Required**: Laptop with admin access, installed terminal shell (e.g., putty), wi-fi; power cord. **Required Text-book**: No required text books, additional readings will be assigned and shared as needed.

Course Outline & Calendar

Class 1
Introduction to the class and distribution of the syllabus. Important dates, poster session, practicums described.

Class 2
Overview of Bioinformatics vs Health informatics Take home Quiz #1

Class 3
Compute & storage, on-prem vs cloud - case studies: AWS, gcloud, Azure Practicum #1

Class 4
Generating sequence Practicum #2

Class 5
Interpreting genomes - case studies: CDSS Practicum #3

Class 6
Algorithms and coding: R, Python/Pandas, predictions (HMM, PCA, NLP, impute, phase)

Class 7
Biomarker discovery: GWAS, functional genomics, proteomics Practicum #4

Class 8
Differential expression - case studies

Class 9
Phenotype meets genotype: Ontologies

Class 10
Data Commons - case studies : dbGAP, TopMED, TCGA, GTEx, NCBI Practicum #5

Class 11
Pipelines - case studies : DNANexus, 7Bridges, Arvados Practicum #6

Class 12
Finding the latest advances -
genomeweb, GA4GH, seq-answers/biostars, clinicaltrials.gov, Nature/Science, others Project Assignment: Find a topic for a poster

Class 13
Finding cloud/lab costs & vendors - ASHG, AACR, ASCO, AMIA . Project
Assignment: outline poster, practice walk-through

Class 14
Reading a bioinformatics paper/poster Practicum #7

Class 15
Student poster session: "hot topics"

Contact Information

Instructor Office hours: Tuesday 2p-4p. The instructor will be in suite 540 of
100 Europa Drive. Please do not hesitate to contact the instructor to schedule
other meeting times/places.

Ph: (857) 205-7843
email: krobasky@renci.org (instructor)