**PABIO 536: Bioinformatics, Gene Sequence Analysis and Beyond**

**Spring Quarter 2019**

# Monday & Wednesday 10:00-11:20

## Rooms C-XXX and E-XXX (S. Lake Union campus)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class | Date | Title | Teacher | Topics to be covered |
|  |  |  |  |  |
|  |  | ***Python as a bioinformatic tool*** |  |  |
| 1 | April 1 | What is Bioinformatics, and why? | David/ Tige | Course overview; git and GitHub |
| 2 | April 3 | Intro to python and Jupyter | Shuyi/  Tige | Using python notebooks, markdown,  variables, functions, and methods |
| 3 | April 8 | Python basics | Shuyi/  Tige | Dealing with datasets, python errors,  for loops, if else, making functions |
| 4 | April 10 | Numpy and pandas I | Tige | Numpy arrays and pandas dataframes, how to import, the tidyverse |
| 5 | April 15 | Numpy and pandas II | Tige | Manipulating data, slicing and subsetting |
| 6 | April 17 | Plotting with matplotlib.pyplot | Tige | Introduce pyplot, generate figures,  modify figure elements |
| 7 | April 22 | More pyplot and Seaborn | Tige | How to make heatmaps, better looking figures |
| 8 | April 24 | Dimensionality reduction | Shuyi | PCA and tSNE to visualize complex data |
|  |  | ***Nucleic acids*** |  |  |
| 9 | April 29 | RNAseq I- Gathering the data | Tige | Intro to RNAseq, importing data, and adding metadata |
| 10 | May 1 | RNAseq II- Preparing and checking | Tige | Removing low count genes, normalize samples, and sanity checks of the data |
| 11 | May 6 | RNAseq III- Plotting and analysis | Tige | Linear, contrast, and empirical Bayesian modeling, exporting a gene list, Biojupees |
| 12 | May 8 | Review | Andrew | Review. Propose final project |
| 13 | May 13 | ATAC-seq, ChIPseq | Tige | Data analysis basics, peak finding |
|  |  | ***Network analysis*** |  |  |
| 14 | May 20 | Graphs to functions-  Network analysis | Fred | Types of networks; Network properties; Motifs and modules; Network resources |
| 15 | May 22 | Annotation enrichment analysis | Fred | Protein-protein, regulatory, and metabolomic networks |
| 16 | May 15 | Cytoscape | Shuyi | Network construction and visualization |
|  |  | ***Proteins*** |  |  |
|  | May 27 | *Memorial day: no class* |  |  |
| 17 | May 29 | 3D protein structures | Bart Staker |  |
| 18 | June 3 | Predicting protein structure from sequence | Bart Staker |  |
| 19 | June 5 | Self-guided project | All |  |
| 20 | June 12 | Project presentation | All |  |