

Lab 4: Programming in Python

Background

This lab will be for first Python programming lab. Therefore, the “write-up” will be a bit different than previous labs. In effect, your write-up is your python programs (“xxx.py” file). You will only submit your script file for the assignment to Blackboard. No formal report (like the previous labs) is necessary. However, a large portion of your grade will be based on commenting embedded within your script. Now, choose one of the two following options for software development for this first exercise.

Learning Objectives

1. Gain experience writing scripts in python.
2. Gain experience with the basic concepts covered in class including functions, variables, if/else, for/while loops, etc.
3. Gain experience opening a file and parsing data.
4. To produce some code that is functional and might become useful down the road in a bioinformatics context.

Option 1 - Professor’s Choice

Develop a Python script that:

1. Opens the provided nucleotide FASTA file (but could work with any other nucleotide FASTA file)
2. Calculates the frequency of the four nucleotides in each sequence and across all samples
3. Compares the frequency of transitions to transversions (where transitions or transversions are clear and unambiguous)
4. Writes to an output file the frequencies of the nucleotides in each sequence and across all sequences and the proportions of transitions to transversions.

Be sure to annotate your script with LOTS of comments, including, a comment at the top describing what the software does, how to use it, required input & expected output, comments defining variables, comments defining functions, etc. Your script should run without producing any error or warning messages when run on the provided FASTA file as well as my own super-secret FASTA file.

Option 2 - Student's Choice

Develop a Python script of your choice that performs some function of interest to you. Be sure to annotate your script with LOTS of comments, including, a comment at the top describing what the software does, how to use it, any additional modules required (if any), required input & expected output, comments defining variables, comments defining functions, etc. Your 'choice' must include opening an input file, writing to an output file and doing some data manipulation in between. Be sure to explain at the top of your script what the general purpose of the script is. Your script should run without producing any error or warning messages. If you choose this option, your script will be partially graded on utility and complexity. Your script should be of roughly comparable complexity and usefulness to that of Option 1 (this really just means scripts that do useless but easy-to-code functions will not receive full points).

For Both Options

Attach both your Python file & the data file that you tested it on (we'll see how data file specific it is! – try and make it general). , if other than the provided file as a submission to Blackboard. Do not zip or compress the files—leave them as is. No formal report is necessary—no Word documents, no PDFs. Points in this assignment will be heavily weighted towards good commenting practice—do not neglect the comments in your program.