Programming For Biology 2022

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Instructors
Simon Prochnik
Sofia Robb

- Big Picture
  - Why?
  - Helpful Tips
- Unix
  - Unix 1
    - Unix Overview
      - What is the Command-Line?
    - The Basics
      - Logging into Your Workstation
      - Bringing up the Command-Line
      - OK. I've Logged in. What Now?
      - Command-Line Prompt
      - Issuing Commands
      - Command-Line Editing
      - Wildcards
      - Home Sweet Home
      - Getting Around
      - Essential Unix Commands
      - Getting Information About Commands
      - Finding Out What Commands are on Your Computer
      - Arguments and Command Line Switches
      - Spaces and Funny Characters
      - Useful Commands
      - Manipulating Directories
      - Networking
      - Standard I/O and Redirection
      - A Simple Example
      - Redirection Meta-Characters
      - Filters, Filenames, and Standard Input
      - Standard I/O and Pipes
      - More Pipe Idioms
    - More Unix
    - Link to Unix 1 Problem Set

- Unix 2
  - Text Editors
  - Introduction to vi
    - Getting Started with vi
    - Creating, Writing, And Saving a File Walk through
    - Common Activities and vi Commands
    - Other Useful Tips
    - Mug of vi
- Git for Beginners
  - The Big Picture.
    - Collaboration
    - Storing Versions
    - Restoring Previous Versions
    - Backup
    - The Details
  - The Basics
  - Creating a new repository
    - Keeping track of differences between local and remote repositories
    - Deleting and moving files
    - Get a copy of file on your remote
    - Tips
  - Cloning a Repository
    - Bringing Changes in from the Remote Repository to your Local Repository
    - Links to *slightly* less basic topics
  - Link To Unix 2 Problem Set
- Python Lectures
  - Python 1
    - Python Overview
    - Running Python
      - Interactive Interpreter
      - Python Scripts are Text Files
      - Running Python Scripts
      - A quicker/better way to run python scripts
    - Syntax
      - Python Variable Names
      - Naming conventions for Python Variable Names
      - Reserved Words
      - Lines and Indentation
      - Comments

        - Blank Lines
    - Data Types and Variables
        - Numbers and Strings
        - Lists
        - Tuples
        - Dictionary
        - Command line parameters: A Special Built-in List
        - What kind of object am I working with?
    - Link to Python 1 Problem Set
- Python 2
    - Operators
        - Arithmetic Operators
        - Assignment Operators
        - Comparison Operators
        - Logical Operators
        - Membership Operators
        - Operator Precedence
    - Truth
        - Use bool() to test for truth
    - Logic: Control Statements
        - If Statement
        - if/elif
    - Numbers
        - integer
        - floating point number
        - complex number
        - Conversion functions
        - Numeric Functions
    - Comparing two numbers
    - Link to Python 2 Problem Set
- Python 3
    - Sequences
    - What functions go with my object?
    - Strings
        - Quotation Marks
        - Strings and the print() function
        - print() and Common Errors
        - Special/Escape Characters
        - Concatenation

        - The difference between string _ and integer _
        - Determine the length of a string
        - Changing String Case
        - Find and Count
        - Replace one string with another
        - Extracting a Substring, or Slicing
        - Reverse a string or a list
        - Other String Methods
    - String Formatting
        - The format() mini-language
        - Summary of special formatting symbols so far
        - What's the point?
    - Link to Python 3 Problem Set
- Python 4
    - Lists and Tuples
        - Lists
        - Tuples
        - Back to Lists
        - Accessing Values in Lists
        - Changing Values in a List
        - Extracting a Subset of a List, or Slicing
        - List Operators
        - List Functions
        - List Methods
        - Building a List one Value at a Time
    - Loops
        - While loop
        - While Loop Syntax
        - Infinite Loops
        - For Loops
        - For Loop Syntax
        - Loop Control
        - Loop Control: Break
        - Loop Control: Continue
        - Iterators
        - List Comprehension
    - Link to Python 4 Problem Set
- Python 5
    - Dictionaries
        - Creating a Dictionary
        - Accessing Values in Dictionaries

        - Changing Values in a Dictionary
        - Accessing Each Dictionary Key/Value
        - Building a Dictionary one Key/Value at a Time
        - Checking That Dictionary Keys Exist
        - Dictionary Operators
        - Building a Dictionary one Key/Value at a Time using a loop
        - Sorting Dictionary Keys
        - Dictionary Functions
        - Dictionary Methods
    - Sets
        - Set Operators
        - Set Functions
        - Set Methods
        - Build a dictionary of NT counts using a set and loops
    - Link to Python 5 Problem Set
- Python 6
    - I/O and Files
        - Writing to the Screen
        - Reading input from the keyboard
        - Reading from a File
        - Open a File
        - Reading the contents of a file
        - Opening a file with with open() as fh:
        - Writing to a File
        - Building a Dictionary from a File
    - Link to Python 6 Problem Set
- Python 7
    - Regular Expressions
        - Individual Characters
        - Character Classes
        - Anchors
        - Quantifiers
        - Variables and Patterns
        - Either Or
        - Subpatterns
        - Using Subpatterns Inside the Regular Expression Match
        - Using Subpatterns Outside the Regular Expression
        - Get position of the subpattern with finditer()
        - Subpatterns and Greediness
        - Practical Example: Codons
        - Truth and Regular Expression Matches

        - Using Regular expressions in substitutions
        - Using subpatterns in the replacement
        - Regular Expression Option Modifiers
    - Helpful Regex tools
    - Link to Python 7 Problem Set
- Python 8
    - Data Structures
        - List of lists
        - Lists of dictionaries
        - Dictionaries of lists
        - Dictionaries of dictionaries
        - Building Complex Datastructures
    - Link to Python 8 Problem Set
- Python 9
    - Exceptions
        - try/except/else/finally
        - Getting more information about an exception
        - Raising an Exception
        - Creating Custom Exceptions
    - Link to Python 9 Problem Set
- Python 10
    - Functions
        - Defining a Function that calculates GC Content
        - Using your function to calculate GC content
        - The details
        - Naming Arguments
        - Keyword Arguments
        - Default Values for Arguments
        - Lambda expressions
    - Scope
        - Local Variables
        - Global
    - Modules
        - Getting information about modules with pydoc
        - os.path
        - os.system
        - subprocess
            - Capturing output from a shell pipeline

            - Capturing output the long way (for a single command)
            - Check the exit status of a command
            - Run a command with that redirects stdout to a file using python subprocess
        - sys
        - re
        - collections
        - copy
        - math
        - random
        - statistics
        - glob
        - argparse
    - Many more modules that do many things
    - Link to Python 10 Problem Set
- Python 11
    - Classes
        - You have been using classes to create objects
        - attributes and methods
        - Creating a Class
        - Creating a DNARecord Object
        - Retrieving attribute values
        - Using class methods
        - Getting data into a new instance of our class
            - **init**
    - Link to Python 11 Problem Set
- Workshops