* Exploration into Data Structures and Algorithms
  + Multiple "micro-projects" to demonstrate uses for different data structures (aka “ADTs”)
    - [**Lists**](https://en.wikipedia.org/wiki/List_(abstract_data_type))
      * Linked Lists
      * Arrays
    - **Sets**
    - **Stacks/Queues**
    - **Trees**/*Graphs* (not like stats graphs, but like [networks](https://sites.google.com/site/fusiontablestalks/stories/images/network-nodes.png))
    - *Hash Tables* (aka ”Dictionaries” in Python)
    - *Heaps* (Max Heaps and Min Heaps)
  + Deliverable: One “Assignment” per week to focus on data structures
    - Investigate different “implementations” of data structures
    - Explain some possible uses.
    - Draw a diagram showing common “methods” of the Data Structure.
    - Choose an implementation and write it in some language.
      * Have some tests to show your methods work.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week 1** | **Week 2** | **Week 3** | **Week 4** | **Week 5** | **Week 6** |
| *Setup! (installation of dev. environments, creating docs/GitHub)*  Lists: Linked Lists/Arrays | Stacks | Recursion | Queues | Trees and Binary Trees | Graphs (specifically directed graphs!) |
| **Weekly Assignment 1** | **Weekly Assignment 2** | **Weekly Assignment 3** | **Weekly Assignment 4** | **Weekly Assignment 5** | **Weekly Assignment 6** |
| Assignment #1 in Assignments folder (*Assignment1LinkedLists.py*)  (*Assignment1Arrays.py*) | Assignment #2 *(Assignment2Stacks.py)* | Assignment #3 *(Assignment3Recursion.py)* | Assignment #4 *(Assignment4Queues.py)*  Changed previous assignments to use recursion  (*Assignment1.1LinkedLists.py*) *((Assignment2.1Stacks.py))* | Assignment #5 *(Assignment5Trees.py)* | Assignment #6 *(Assignment6Graphs.py)*  *(Assignment6bHashMaps.py)*  *(Assignment6cDictionaryPractice.py)* |

**Week 1:**

**Day 1:**

▶ Set up a Google Drive folders to organize IS materials and prepared curriculum (Assignment #1 for week #1 is ready),  
▶ Made Progress Report [this] pages for each term and an all encompassing semester progress page,  
▶ Created GitHub Repository for code projects to be visible online.

**Day 2:**

▶ Researched different Python IDLEs (Liclipse vs. Sublime Text 3 vs. Vim vs. Atom) <https://www.slant.co/versus/1245/40/~eclipse-with-pydev_vs_sublime-text> <http://stackoverflow.com/questions/7899732/which-is-the-best-ide-for-python-for-windows>

▶ Settled on Sublime Text 3 due to simplicity, mult. language platform, and easily accessed features. However, Vim is also installed on my laptop to fall back on.

▶ Started Assignment #1 on Linked Lists [*https://www.codefellows.org/blog/implementing-a-singly-linked-list-in-python/*](https://www.codefellows.org/blog/implementing-a-singly-linked-list-in-python/)

**Take home homework:**

▶ Complete Linked List/Arrays Assignments #1/#1b, and uploaded file to Github

▶ Resubmitted Arrays assignment revision based on Casey’s input

**Week 2:**

**Day 1:**

▶ Finished and resubmitted Linked List assignment

▶ Began Week 2’s lesson on stacks [*https://interactivepython.org/runestone/static/pythonds/BasicDS/WhatisaStack.html*](https://interactivepython.org/runestone/static/pythonds/BasicDS/WhatisaStack.html)

▶ Received week 2’s assignment

**Day 2:**

▶ Read through [*https://www.tutorialspoint.com/data\_structures\_algorithms/stack\_algorithm.htm*](https://www.tutorialspoint.com/data_structures_algorithms/stack_algorithm.htm)

▶ Decided to start taking physical (paper) notes to keep in binder for future reference/study purposes. Went back and took a page of note on Linked Lists then went on to do Stacks. Will then consider scanning notes and uploading all notes after Term 1.

**Day 3:**

▶ Completed and submitted stacks assignment

▶ Took ***test*** at bottom of <https://interactivepython.org/runestone/static/pythonds/BasicDS/ImplementingaStackinPython.html>

**Take home homework:**

▶ Resubmitted revisions of LLs and Stacks assignments

▶ Made progress on Codecademy Python course to review functional programming concepts

**Week 3:**

**Day 1:**

▶ Dealt with GitHub difficulties

▶ Started taking notes on Recursion (using websites mentioned in IS Study Progress W3)

▶ Began tasks in Recursion.py assignment

**Day 2:**

▶ Confirmed with GitHub that I am not a robot

▶ Finished Recursion reading/notes

**Take home homework:**

▶ Finished and turned in recursion assignment

**Week 4:**

**Day 1: Presidents’ Day**

**Day 2:**

▶ Implemented recursion into each example function of previous assignments:

▶ Linked List Assignment #1.1 resubmitted

▶ Stacks Assignment #2.1 resubmitted

**Day 3:**

▶ Began research on queues

▶ Converted stack assignment into a queue data type implementation in Python

▶ Submitted Queue assignment #4

**Week 5:**

**Day 1:**

▶ Began research on trees using specified resources (in assignment/also in “Independent Study Progress Report”)

▶ Began progress on Tree.py

**Day 2:**

▶ Continued notes/research on trees (terms traversal methods, recursion, log(n) complexity, tree class constructor (cargo/root, left, right recursive definition), etc)

▶ Completed methods isLeaf(), height(), insert(), contains(), and size() for binary tree class in Tree.py

**Day 3:**

▶ Fixed indentation inconsistencies

▶ Moved on to Tree Class methods

▶ Registered for a student account on online textbook (open source!) <http://interactivepython.org/runestone/static/pythonds/index.html#>

**Take home homework:**

▶ Revised and submitted Tree assignment

**Week 6:**

**Day 1:**

▶ Began research on the graph abstract data type: specifically directed graphs (“digraphs”), what it means for the first node/vertex to be cyclic/acyclic, methods to define instances of a graph and its vertices, edges, weights, etc, and 2 well known implementations: the “adjacent matrix” and the “adjacent list.” <http://interactivepython.org/runestone/static/pythonds/Graphs/toctree.html>

<http://www.wou.edu/~jcm/WebPageSpring2014/Postings/GraphADTIntro.pdf>

▶ Consider reviewing <http://interactivepython.org/runestone/static/pythonds/Introduction/toctree.html> in spare time

▶ (*Assignment6Graph.py*) finished and uploaded

**Day 2:**

▶ Reviewed answer key for Tree assignment

▶ Began research/notes on python dictionaries, also known in data structure language as “Hash Maps”

**Take home homework:**

▶ Completed two more dictionary assignments and uploaded to GitHub/Google Drive

**\* Color when any work has been uploaded/resubmitted/etc. to GitHub**

***\* Style when a quiz or test has been taken***

**\* Color when there is no school scheduled for that day**