Syllabus for CIT 594-001 2020A Data Struc & SoftwDesgn

Course Syllabus

Jump to Today

Learning Objectives and Overview¶

This course will focus on data structures, software design, and advanced Java. The course starts off with an introduction to File I/O, data structures and basics of the analysis of algorithms. Data structures covered will include, lists, stacks, queues, trees, hashing (hash maps), and graphs. The course will also focus on software design and advanced Java topics such as software architectures, design patterns, and memory management. We will use Java for the entire course.

Prerequisites and Co-requisites¶

CIT 591 or similar.

Student Computer¶

Because of the heavy reliance on online materials, all students are required to have a computer to use. All software in the class is multi-platform, so Windows, Mac, and Linux systems are accommodated. However, students will need to be able to install software onto their computers. Therefore, more limited devices like Chromebooks and tablets (e.g., iPads, Fire) may not be acceptable.

Cellphones are not allowed during lectures.

Texts and Materials¶

All readings, in-class work, and homework problems are freely available in this

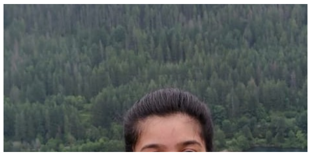
Canvas site. There is no separate textbook required for this course.

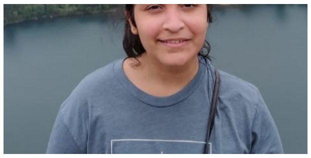
The course content is available **HERE** .

The course will also use Eclipse for composing and executing programs.

The course will use GradeScope to grade all programming assignments (recitation and homework).

Office Hours

Professor Eric Fouh	M 11:00am-1:00pm (except as announced on Piazza) Levine 603
 Matthew Ablonczy	M 11:00 AM - 12:00 PM Levine 603 (w/ Eric) Th 3:00 - 4:00 PM Levine 6th floor bump space
	M 1:30pm- 2:30pm Levine 6th floor bump space

 Shruti Sinha	F 1:45pm-2:45pm Levine 5th floor bump space (Starting 1/24)
 Adam Merry	T, Th 12:30 - 1:30 PM Levine 6th floor bump space (Starting 1/21)
 Xuan Wang	W 10:30 - 11:30 AM F 1:35 - 2:35 PM GRW 5th floor bump space(also in Levine building) See map here: [https://www.facilities.upenn.edu/sites/default/files/pennacce GRW.pdf](https://www.facilities.upenn.edu/sites/default/files/pennacce) (Starting 1/21)
 George Tolkachev	W 12pm - 1pm Levine 5th Floor Bump Space F 5pm - 6pm Levine 6th Floor Bump Space (Starting 1/21)

 Na Li	Th 9:30am - 10:30am F 3:00pm - 4:00pm Levine 5th Floor Bump Space
 Ana Machaidze	M 1:00pm - 2:00pm W 1:00pm - 2:00pm https://whereby.com/cit594ani'soh

Grading¶

Student performance in the course will be evaluated according to the weights in the following table.

Assignment	Percent	Evaluation
Homework	70%	This work is evaluated based on correctness and style. For best learning, homework

		should be completed by the Due date shown on each assignment. There will be a penalty for excessive and late submissions. No submissions after 48 hrs You will have the opportunity to resubmit up to two homework assignments during the final exams week (until May 12). The maximum grade you can earn from the resubmissions is 90% (for each assignment).

Exam	0%	There will be NO in-class exam. The exam is closed-book. There is no final exam in this course
Reading Quizzes	25%	This work is evaluated by correctness and credible effort to demonstrate understanding of the required readings. Each reading quiz must be completed before the Due date shown on each assignment.
Recitations	5%	This work is evaluated based on a credible effort to complete

		to complete recitations tasks and recorded attendance.

Receiving a passing grade in the class requires good attendance, consistent effort to complete assigned work, and submission of a credible project. Higher grades require increasingly better completion of assigned work and higher evaluations on the project.

- Timed exam will be curved based on the class average.
- Other learning activities will not be curved
- There is no rounding up of course grades

Students with Disabilities¶

If you have a disability for which you are or may be requesting accommodations, please contact both your professor and the Office of Student Disabilities Services as early as possible in the semester.

The Office of Student Disabilities Services is available to assist faculty, academic support staff, and students in reaching a joint determination of academic accommodations, where needed.

Weingarten Learning Resources Center
Office of Learning Resources
Office of Student Disabilities Services

3702 Spruce Street, Suite 300
(Stouffer Commons)
Philadelphia, PA 19104-6027

Academic Integrity

Note that all homework submissions are checked for evidence of plagiarism.

Academic dishonesty carries tremendous penalty, and a software is used to catch offenders.

Submitted homework must be your individual work.

It is Not OK to:

- Copying or otherwise looking at someone else’s code
- Sharing your code in any way (copy-paste, github, paper and pencil, …)
- Using code from a previous semester

Course staff *will* check for copying. We will use plagiarism detection tools on your code.

It is OK (and encouraged!) to:

- Discussions of concepts
- Discussion of debugging strategies
- Verbally sharing experience

For more information refer to Penn’s code of academic integrity: http://www.upenn.edu/academicintegrity/ai_codeofacademicintegrity.html

Diversity and Inclusion

We would like to create a learning environment that supports a diversity of thought
this:

- If you have a name and/or set of pronouns that differ from those that appear in
- If you feel like your performance in the class is being impacted by your experie
- As a participant in course discussions, office hours, and recitations, you shoul

If you ever are struggling and just need someone to talk to, feel free to stop by offi with an assurance of full confidentiality.

Mental Health Resources

If you experience significant stress or worry, changes in mood, or problems eating factors, please do not hesitate to reach out immediately, at any hour, to any of the times. Not only are we happy to listen and make accommodations, we can also re

- Counseling and Psychological Services (CAPS) : 215-898-7021 (off hours ar
- Programs for Student Wellness through the VPUL
- Student Health Services
- Reach-a-Peer Helpline (RAP-line) which is available nightly from 9pm-1am a

If you or someone you know is in distress and poses an immediate danger to self 511.

Course Summary:

Date	Details	
Mon Feb 3, 2020	HW1 - Catch a plagiarist	due by 11:59pm
Wed Feb 12, 2020	HW2 - Algorithm Analysis	due by 11:59pm
Wed Feb 26, 2020	HW3 - File Compression	due by 11:59pm

Wed Mar 25, 2020	HW4 - Blockly	due by 11:59pm
Wed Apr 8, 2020	HW5 - Autocomplete	due by 11:59pm
Wed Apr 22, 2020	HW6 - News Aggregator	due by 11:59pm
Wed Apr 29, 2020	Reading Quizzes	due by 11:59pm
Fri May 1, 2020	HW7 - Graphs	due by 11:59pm
Sun May 10, 2020	Recitations	due by 11:59pm

CIT 594-001 2020A Data Struc & SoftwDesgn

Module 1 - File I/O , Algorithm Analysis

Day 1: File I/O

Reading

- Java I/O

- Chapter 2 File Processing

- 2.5. Random Access Files In Java

FileIO.pdf

Day 2 : Java Collections

Java's Collections Framework

Java Garbage Collection Basics

Collections.pdf

Day 3: Review Collections + hw1

Day 4: Algorithm Analysis

□	Mathematical Background (Ch. 3)
□	Algorithm Analysis (Ch. 4)
□	**Levenshtein.java**
□	**LevenshteinTests.java**
□	**Alg_analysis.pdf**

Assignments

HW1 - Catch a plagiarist

Feb 3 | 200 pts

HW2 - Algorithm Analysis

Feb 12 | 100 pts

Feb 10: Chap 3 & 4 quizzes due

Module 2 - Linear Data Structures

Day 5: List ADT

Reading

▯ List ADT (5.1-5.7)

▯ **List_ADT.pdf**

Day 6: Stacks & Queues

Reading

▯ Stacks (Ch. 5.8-5.9)

▯ Queues (5.12-5.13)

Stacks_Queues.pdf

Feb 17: Chap 5 quiz due

Module 3 - Binary Trees

Day 7: Binary Trees

Reading

Binary Trees (Definitions and Traversals)

Binary Trees (Implementation and Expression Trees)

ExpressionTree.zip

Binary_Trees.pdf

Day 8: Huffman Tree

Reading

Huffman Coding Trees

Huffman_Tree.pdf

Day 9 : Binary Search Tree

Reading

- Binary Search Tree
- Comparing Records
- Dictionary ADT
- **BSTDictionary.zip**

□ **BinarySearch_Trees.pdf**

Day 10: Heaps and Priority Queues

□ Heaps and priority Queues

□ **Binary_Heaps.pdf**

Day 11: AVL Tree

Reading

□ AVL Tree

AVL_Tree.pdf

AVL BSTNode.java

AVL BST.java

HW3 - File Compression
Feb 26 | 200 pts

Spatial Data Structures

Day 12: Quad Tree

Reading

Spatial Data Structures

QuadTree.pdf

HW4 - Blockly
Mar 25 | 200 pts

Module 4 - Software Design

Day 13: Class Design/UML

Soft_Design_UML.pdf

Day 14: Design Patterns

Reading

□ Design Patterns

□ **Design_Patterns_I.pdf**

□ **Flyweight.zip**

□ **Visitor.zip**

Day 15: Design Patterns

□ **Composite_Pattern.pdf**

Composite.zip

Strategy.zip

HuffTree.drawio

HuffTree.jpg

Spring Break

Module 5 - Hashing

Day 16: Collections (review), File I/O (review), Hw5 / Trie DS

Trie Data Structure

HW5 - Autocomplete
Apr 8 | 200 pts

addword_Example.pdf

Day 17: Hashing Intro, Open Hashing

Hashing_I.pdf

Hashing: Intro

□ Open Hashing

□ OpenHashing_Example.zip

□ MyHashTable.java

Day 18: Bucket Hashing, Linear Probing, Linear Probing By Steps, Pseudo-Random Probing

□ Hashing_II.pdf

Day 19: Quadratic probing, Double Hashing

□ Hashing_III.pdf

Facebook's Haystack

Google sparse hash data structure (github)

Module 6 - Indexing & General Trees

Midterm: 04/01 (Cancelled)

Day 20: News Aggregator (hw6)

HW6 - News Aggregator
Apr 22 | 300 pts

Dylko-2016-Communication_Theory.pdf

samplefiles.zip

□ **News_Aggregator_Example.pdf**

Day 21: Indexing

□ **Indexing.pdf**

□ Linear Indexing

□ **Facebook’s photo storage.pdf**

Day 22: B+Tree

□ **Indexing_Tree.pdf**

Tree Indexing (B-Trees/B+Trees)

How MySQL Uses Indexes

MySQL: Comparison of B-Tree and Hash Indexes

Module 7 - Graphs

Day 23: Definitions, BFS, DFS

Graphs: Terminology, Implementation, Topological sort

Graph_I.pdf

Day 24: Topological Sort, Shortest-Paths

Graphs_II.pdf

Graphs: Shortest-Paths Problems

HW7 - Graphs

May 1 | 125 pts

Day 25: Minimal Cost Spanning Trees

Graph_III.pdf

Minimal Cost Spanning Trees

Day 26: Skip List (Bonus DS), wrap up

SkipList.pdf