2023SP CS357 Data Structures

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For a faster response, please do **NOT** send me a message on Canvas. Only emails.

Office: JWLA 211 L
MWRF: 10:00 a.m. – 10:50 a.m. (Mountain Time)
T: 10:00 a.m. -12:00 p.m. (Mountain Time)
T: 4:00 p.m. – 5:00 p.m. (Unofficial. It may change due to availability)

Or by appointment here
We can meet using *MS Teams* *

Office Phone: (575) 562-2945

Course Description:
Specification, implementation, and analysis of linear and tree structures.

Prerequisites
CS 123

Programming prerequisites
General knowledge of Python and algorithm tracing.

Lectures:
T R 2:00 p.m. – 3:15 p.m. (Mountain Time)
JWLA 218 / Mediasite

Course dates:
Starts: January 17, 2023
Ends: May 12, 2023
Weeks: 16
Last day to drop: January 24, 2023
Last day to withdraw: April 7, 2023

Required Materials:
- **Data Structures & Algorithms in Python**. Goodrich, Tamassia and Goldwasser. Ed. Wiley
- **Open Data Structures (in pseudocode)** http://opendatastructures.org/ods-python.pdf

Reference Materials:
The instructor will provide additional material for this course

Other material

- **Data Structures Using Python (Lecture Notes)**
https://mrcet.com/downloads/digital_notes/CSE/II%20Year/DATA%20STRUCTURES%20THROUGH%20PYTHON(R20A0503).pdf

- **Data Structures and Algorithms with Python**. Undergraduate Topics in Computer Science. Lee and Hubbard. Ed. Springer.
https://kentdlee.github.io/CS2Plus/build/html/index.html

- **Hands-On Data Structures and Algorithms with Python**. 2nd Edition. Argwal and Baka. Ed. Packt.

Contact me if you cannot get the textbook (e.g., library, Internet).

Learning Objectives:
At the completion of the course, students will be able to,

- Implement Object Oriented Programming concepts in Python.
- Understand and implement recursive thinking in programming.
- Perform basic in Big-O notation analysis for the basic data structure algorithms.
- Understanding how linear data structures work (i.e., array, linked list, stack, queue)
- Understand how non-linear data structures work (i.e., trees, graphs, heaps, hash).

Topics.
In this course, we will attempt to cover in detail:
- Introduction to Data Structures
- Classes and Objects in Python
- Recursive algorithms
- Algorithm Analysis (Big-O notation)
- Array-based sequences
- Linked lists
- Stacks
- Queues
- Hash tables
- Trees (BST, AVL)
- Heaps (Priority Queue)
- Graphs

Relation of Topics – Textbook chapters

Topic	Textbook
Introduction to Data Structures	- **Data Structures Using Python (Lecture Notes)** - Unit 2
Classes and Objects in Python	- **Data Structures Using Python (Lecture Notes)** - Unit 1 - **Data Structures & Algorithms in Python** – Unit 2 - **Hands-On Data Structures and Algorithms with Python** – Chapter 1 - **Data Structures and Algorithms with Python**. Chapter 1
Recursive algorithms	- **Data Structures & Algorithms in Python** – Unit 4 - **Hands-On Data Structures and Algorithms with Python** – Chapter 1 - **Data Structures and Algorithms with Python**. Chapter 3

Algorithm Analysis (Big-O notation)	- **Open Data Structures (in pseudocode)** – Chapter 1 - **Data Structures & Algorithms in Python** – Unit 3 - **Hands-On Data Structures and Algorithms with Python** – Chapter 3 - **Data Structures and Algorithms with Python**. Chapter 2
Array-based sequences	- **Open Data Structures (in pseudocode)** – Chapter 2 - **Data Structures Using Python (Lecture Notes)** - Unit 3 - **Data Structures & Algorithms in Python** – Chapter 5 - **Data Structures and Algorithms with Python**. Chapter 4
Linked lists	- **Open Data Structures (in pseudocode)** – Chapter 3 - **Data Structures Using Python (Lecture Notes)** - Unit 4 - **Data Structures & Algorithms in Python** – Chapter 7 - **Hands-On Data Structures and Algorithms with Python** – Chapter 4 - **Data Structures and Algorithms with Python**. Chapter 4
Stacks	- **Open Data Structures (in pseudocode)** – Chapter 2 - **Data Structures Using Python (Lecture Notes)** - Unit 4 - **Data Structures & Algorithms in Python** – Chapter 6 - **Hands-On Data Structures and Algorithms with Python** – Chapter 5 - **Data Structures and Algorithms with Python**. Chapter 4
Queues	- **Open Data Structures (in pseudocode)** – Chapter 2 - **Data Structures Using Python (Lecture Notes)** - Unit 4 - **Data Structures & Algorithms in Python** – Chapter 6 - **Hands-On Data Structures and Algorithms with Python** – Chapter 5 - **Data Structures and Algorithms with Python**. Chapter 4
Hash tables	- **Open Data Structures (in pseudocode)** – Chapter 5 - **Data Structures & Algorithms in Python** – Chapter 10 - **Hands-On Data Structures and Algorithms with Python** – Chapter 7 - **Data Structures and Algorithms with Python**. Chapter 5
Trees (BST, AVL)	- **Open Data Structures (in pseudocode)** – Chapter 6 - **Data Structures Using Python (Lecture Notes)** - Unit 5 - **Data Structures & Algorithms in Python** – Chapter 8, 11 - **Hands-On Data Structures and Algorithms with Python** – Chapter 6 - **Data Structures and Algorithms with Python**. Chapter 6
Heaps (Priority Queue)	- **Open Data Structures (in pseudocode)** – Chapter 10 - **Data Structures & Algorithms in Python** – Chapter 9 - **Hands-On Data Structures and Algorithms with Python** – Chapter 6 - **Data Structures and Algorithms with Python**. Chapter 9
Graphs	- **Open Data Structures (in pseudocode)** – Chapter 12 - **Data Structures Using Python (Lecture Notes)** - Unit 5 - **Data Structures & Algorithms in Python** – Chapter 14 - **Hands-On Data Structures and Algorithms with Python** – Chapter 8 - **Data Structures and Algorithms with Python**. Chapter 7

The following is a *tentative* schedule of the topics. Be aware that the schedule and/or the topics covered *might change* during the semester.

Week	Period			Topic
1	1/17/2023	-	1/20/2023	Introduction to Data Structures
2	1/23/2023	-	1/27/2023	Classes and Objects in Python
3	1/30/2023	-	2/3/2023	Classes and Objects in Python / Recursive Algorithms
4	2/6/2023	-	2/10/2023	Recursive Algorithms/ Algorithm Analysis (Big-O notation)
5	2/13/2023	-	2/17/2023	Algorithm Analysis (Big-O notation) / Array-based Sequences
6	2/20/2023	-	2/24/2023	Array-based Sequences / Linked Lists
7	2/27/2023	-	3/3/2023	Linked Lists / Stacks
8	3/6/2023	-	3/10/2023	Stacks / Queues + **Midterm**
9	3/13/2023	-	3/17/2023	**Spring Break**
10	3/20/2023	-	3/24/2023	Queues / Hash Tables
11	3/27/2023	-	3/31/2023	Hash Tables / Trees (BST)
12	4/3/2023	-	4/7/2023	Trees (BST) / Trees (AVL)
13	4/10/2023	-	4/14/2023	Trees (AVL) / Heaps
14	4/17/2023	-	4/21/2023	Heaps / Graphs
15	4/24/2023	-	4/28/2023	Graphs
16	5/1/2023	-	5/5/2023	Review
FINALS	5/8/2023		5/12/2023	**Final**

Course Grading:

Assignments	Attendance/ Participation	Quizzes	Midterm	Final	Total
40 %	5%	20%	15%	20%	100 %

Grading Scale:

A	B	C	D	F
[90,100]	[80, 90)	[70, 80)	[60, 70)	[0, 60)

Course preparation:
On average, students should plan to spend at least **10-20** hours per week reviewing the class material and/or working on homework. Please, do not procrastinate.
The student has the responsibility to attend to my office hours (in-person or online) if any topic is not clear.

In-person and online students
For this course the only difference between in-person and online students is that online students are not physically in the classroom.
For assignment, quizzes, participation, etc., there is no difference between these types of students. The deadlines are the same.

The online section follows the pace of the in-person section.

Assignment Policy

Assignments will be assigned at the *instructor's discretion*.

Students with unusual circumstances should contact the instructor of their situation **before** any submission (i.e., medical issues, accidents, etc.).

    1. The maximum extra time for these situations is 24 hours from the due date.

Assignments

Students will solve different assignments based on the topics covered in class. The assignments are ==individual== work.

These assignments may include solving problems and *simple* programs to understand better the different topics and algorithms presented in class

- There will be around 10 programming assignments
- Please submit your homework to the assignment space provided on Canvas. ==**I do not receive homework via email. Everything must be sent through Canvas**==. **Although you will have plenty of time ,** ==**do not procrastinate**==.
- There is **no late submission** nor second attempt for homework assignments. To avoid unexpected issues with the platform, try to submit your assignments at least a day before the due date.
- Important, validate that the correct answer file is uploaded according to the assignment instructions. I'll grade what you submit.
- ==Do not assume things==. If you have any question, **ask me before** start working on your solution.
- Use the grading rubric for programming assignments.

Online students:

The programming assignments will be assigned depending on the pace of the in-person class. So, it is important that you watch the lesson as soon as they are available.

Quizzes

- Students must prepare themselves for a possible quiz after each topic. Each quiz may contain several multiple-choice, True/False, or short-answer questions.
- Quizzes will be conducted on Canvas. It will be the students' **responsibility** to check Canvas for a quiz.
- **No second attempt** will be allowed on a missed quiz unless a medical certificate is presented.
- Once a quiz starts, it needs to be finished.
- Quizzes will have a maximum time to be answered, and they will close automatically after the time expires.

Online students:

The quizzes will be assigned depending on the pace of the in-person class. So, it is important that you watch the lessons as soon as they are available.

Students with disabilities, if you need extra time for the quizzes, please contact the Student Accessibility Office at ENMU. The arrangements are not retroactive.

Attendance/Participation

- All in-person students are expected to attend all classes.
- All students are responsible for all the materials covered in the lecture in their presence and absence.
- To be aware of the announcements and topics covered, all *online students* are *expected* to *watch* the class videos the *same day of the lectures*.
- All online students are welcome to come to class with local students.
- Attendance will be taken for **all** students.
  However, for online students' attendance will be taken through a one-question quiz on Canvas. For these students, the quiz will be open for **two days** (the lecture day and the next day).
  For in-person students, attendance will be taken inside the classroom.
  Attendance will start January, Tuesday, 24.
- Students will be held responsible for all **announcements** made in class.
- If you feel sick (e.g., COVID symptoms) please do not expose the class.

Students with disabilities. This is not a regular quiz. It is an activity for attendance. Therefore, there is no extra time for this activity.

Midterm / Final
- The Midterm/Final will be conducted on Canvas. It will be the students' **responsibility** to check Canvas for these tests.
- I will announce the topics for the midterm at least *one week* before the test.
- The final is comprehensive (i.e., includes all the topics covered in this course)
- **No second attempt** will be allowed unless a medical certificate is presented.
- Once the midterm/final starts, it needs to be finished.
- Midterm/Final will have a *maximum time* to be answered, and they will close automatically after the time expires.
- We will use **Proctorio** on Canvas for the Midterm/Final.
- The date for the midterm for all students is 3/9/2023.
- The date for the final for all students is 5/9/2023.
    1. The midterm/final will open at **8:00 a.m**. and will close at **10:00 p.m.** (You can take it at any time during this day)

Online students:
The quizzes will be assigned depending on the pace of the in-person class. So, it is important that you watch the lessons as soon as they are available.

Students with disabilities, if you need extra time for the quizzes, please contact the Student Accessibility Office at ENMU. The arrangements are not retroactive.

Grades on Canvas.
Your grade on Canvas is just a *reference* of your final grade. They are **not the final** grade. The final grade is in a different system.
The grades shown on Canvas are more likely to improve based on the overall class grades.
Therefore, there are **no remediation assignments** to improve grades. The only consideration could be for those students with an **F** and with *real* possibilities to get a **D.**

Syllabus Modification:
<mark>*The instructor reserves the right to modify any part of the syllabus, including course policies, course schedule, grade weights.*</mark>

Response Time for Questions

For a faster response time, send your questions by email (use your ENMU email). You may use the message system in Canvas, but it is not as immediate as an email. I will try to answer your emails in a 24-hour frame. Expect delays for replies during weekends.
Is the student responsibility to check emails, messages, and announcements on time.

Expect feedback for your assignments within 1-2 weeks after submission. However, I will post a solution for some assignments after the due date, so you can verify if your answer was on the right track.
Once the solutions are published, no work can be received (e.g., in case you had an extraordinary situation for which you had an extension)

Announcements/Communication

- If needed, I will use announcements through Canvas. Please, is the student responsibility to have their Canvas notifications **activated**.
- I encourage you to use the Canvas App for Students.
- There will be a team for this class in MS Teams. Is the student responsibility to install the app.
- Is the student responsibility to check emails, messages, and announcements on time.

Learning Management

The university has provided us with a new learning management system called **Canvas**. You can access Canvas from the myENMU Portal or directly at the university's Canvas Login Page.
Canvas works with most computers, mobile devices, and browsers. You can check this webpage to see if your computer/device and browser are compatible: What are the browser and computer requirements for Canvas? - Canvas Community (canvaslms.com). Mobile apps for Android and Apple devices can be downloaded at no cost from Google Play and the Apple App Store, respectively.
If you are new to using Canvas, here are a few tips:
- **Welcome Tour** - A welcome tour will pop up and show you the main features of the system. This is a great way to get started.

- **Passport to Canvas** - This self-paced student workshop will teach you everything you need to know about Canvas. Check your Dashboard or Courses menu to access the workshop.

- **Help Menu** - If you need help, click on the Help menu**.** You can:
  - Call or chat with **Canvas Support** 24/7
  - Search the **Canvas Guides** for step-by-step help
  - Open the **Student Guide** and scan by topic

- o And more - click Help to see all the support the university has provided for you.

COVID-19 Student Expectations and Responsibilities

Eastern New Mexico University is pleased to have you back this fall and looks forward to your active engagement. To ensure the health and safety of our students, employees, and community, we require a personal commitment by each of you to adhere to strategies known to reduce the risk of COVID-19 transmission, specifically: Students will adhere to university campus-wide personal safety protocols. https://www.enmu.edu/covid-19-health-advisory/general-operations. Students will take personal responsibility to minimize the risk of infection by knowing how the virus spreads and employing best practices to protect themselves and others from infection. Review the Center for Disease Control's COVID prevention page for more information.

Academic Integrity Policy:
Plagiarism and Cheating of any kind on an examination, quiz, or assignment will result at least in an "F" for that assignment (and may, depending on the severity of the case, lead to an "F" for the entire course) and may be subject to appropriate disciplinary action. See the Student Handbook for further information. I will assume for this course that you will adhere to the academic creed of this University and will maintain the highest standards of academic integrity. In other words, don't cheat by giving answers to others or taking them from anyone else. I will also adhere to the highest standards of academic integrity, so please do not ask me to change (or expect me to change) your grade illegitimately or to bend or break rules for one person that will not apply to everyone. Plagiarism is a serious offense. When in doubt, please cite your sources! Please refer to the Catalog for information concerning plagiarism; action can include, but is not limited to failure of the assignment; failure of or a reduced grade for the course; suspension or dismissal from your program of study.

Disability Statement:
If you have, or believe you have a disability, you may contact the Accessibility Resources and Testing Center to coordinate reasonable classroom accommodations, access to technology or other academic assistance. The Accessibility Resources and Testing Center serves students with a wide range of disabilities including but not limited to medical or health impairment, vision or hearing disability, physical disability, learning disabilities, attention deficit disorder, or mental health impairment. All information will be treated confidentially.

Accommodations are not retroactive. They begin only after:
•Appropriate documentation has been received and accepted by the Coordinator of Disability Services
•Letters of Accommodation (LOA) have been prepared
•You have delivered your Letters of Accommodation to your instructors

Appropriate academic accommodations may then be provided for you. You may contact Accessibility Resources and Testing Center in room 186 Student Academic Services building, phone 575.562.2280.

FERPA and Privacy:

As a student, your educational records are considered confidential. Under FERPA (Family Educational Rights and Privacy Act), your records are confidential and protected. Under most circumstances your records will not be released without your written and signed consent. However, some directory information may be released to third parties without your prior consent unless a written request to restrict this is on file. You can learn more about student rights to privacy at enmu.edu/FERPA.

In this course, we will be working with third party applications online (i.e. wikis, blogs and other Web 2.0 applications). The different proprietors of these sites may or may not have privacy guarantees and the FERPA policy at ENMU does not apply to these sites. It will be your responsibility to read the privacy documentation at each site. There are many other options to protecting your information at these sites. If you have filed the paperwork and are classified as protected under the ENMU FERPA qualifications, it will be acceptable for you to use an alias when using the Web 2.0 sites required for this course. If you still have concerns, please e-mail me as soon as possible to discuss your options.

Copyright:
This course may contain copyright protected materials such as audio or video clips, images, text materials, etc. These items are either linked to or are being used with regard to the Fair Use doctrine in order to enhance the learning environment. Please do not copy, duplicate, download or distribute these items. The use of these materials is strictly reserved for this online classroom environment and your use only. All copyright materials are credited to the copyright holder.

Title IX:
ENMU is committed to fostering a safe, productive learning environment and we comply with all aspects related to Title IX of the Educational Amendments of 1972 and 34 C.F.R. Part 106. Title IX prohibits sex discrimination to include sexual misconduct defined as harassment, domestic and dating violence, sexual assault, and stalking. Incidents of harassment or assault can be reported to the Title IX Coordinator at (575)562-2991 or titleix.coordinator@enmu.edu . Reports can also go to the ENMU Police Department by calling 575-562-2392. If you wish to receive fully confidential support and victims advocacy you can contact Arise Sexual Assault Services at (575)226-7263.

Confidentiality and Mandatory Reporting:
As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility. I am required to share information regarding sexual misconduct or information about a crime that may have occurred on ENMUs campus with the Title IX Coordinator and/or the ENMU Police. Students may speak to someone confidentially by contact.