Course Syllabus

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Course Information

Course Number: CSCE 221
Course Title: *Data Structures and Algorithms*
Section: 500-509
Lecture Time:

Sections 500–502: MWF 8:00-8:50am, ZACH 244
Sections 503–505: TR 8:00-9:15am, ZACH 244
Sections 506–509: TR 9:35-10:50am, ZACH 244

Lab Time: see Canvas for details
Location: Lectures and labs are scheduled F2F
Credit Hours: 4

Instructor Details

Instructor: Dr. Teresa Leyk
Office: 106 PETR Bldg.
Phone: (979) 845-4456 (Office #)
E-Mail: teresa19@tamu.edu (mailto:teresa19@tamu.edu)
Office Hours: See course on Canvas

Course Description

Specification, analysis and implementation of abstract data types for lists, stacks, queues, trees, hash tables, graphs, and their associated algorithms. Performance trade-offs of different implementations; asymptotic analysis of running time and memory usage. Includes the execution of students programs written in C++; emphasis on adherence to good software engineering principles.

Course Prerequisites

- CSCE 121 or CSCE 120 "*Introduction to Program Design and Concepts"*
- CSCE 222 "*Discrete Structures*" or MATH 302 "*Discrete Mathematics*"

Course Learning Outcomes

At the end of this course students should be able to:

1. Design and implement diverse data structures that allow easy access and manipulation of data using C++ programming language.
2. Apply the Big-O asymptotic notation to analyze and select an efficient algorithm for solving a given problem with

respect to runtime and memory usage.

3. Identify the latest developments in the Computer Science area or be familiar with Turing award winners.

Textbook and/or Resource Materials

- **Required Textbook:** "*Data Structures and Algorithm Analysis in C++,*" 4th Edition, Mark A. Weiss, 2014, Pearson, ISBN-13: 978-0132847377 or ISBN-10: 013284737X. Also, you may need a textbook on C++ language from the previous semester, or any good C++ reference book(s).
- **Required: A computer with a web camera.** A computer that you need to use during the labs and lectures to take in-class quizzes and tests.
- **Required: Web, Zoom, and Canvas access.** The course material, assignments turn-in, and posting grades are handled through **Canvas**. The recommended browsers to access Canvas are Mozilla Firefox and Google Chrome.

Grading Policy

Grading Criteria	
Homework Assignments	9%
Programming Assignments	28%
Culture Assignment	3%
Quizzes	15%
Exam 1	15%
Exam 2	15%
Exam 3	15%

Grading Scale	
90–100	A
80–89.9	B
70–79.9	C
60–69.9	D
0–59.9	F

- Your final grade will be determined based on written homework, programming assignments, cultural assignment, quizzes, and exams.
- The assignment handout will provide points distribution. Each programming assignment will be graded focused on: algorithm design, usage of data structures and/or new user-defined types and their implementation, its correctness, tests, a typed report describing implemented algorithms and data structures, and results of computational experiments.
- **All grade appeals must be made no later than one week after the grade is posted.**

Graded Attendance

- The students lab attendance is required and will be taken on regular basis.
- The lecture attendance will be taken by pop quizzes. The students are responsible to learn all material covered in class, read the assigned text from the textbook and do homework assignments.
- The 2 bonus points will be added to your final score if you have a perfect lab attendance, or 1 point if you have only one lab absence.
- Make-up exams and quizzes will only be given with documented University-approved excuses, see **University Regulations (http://student-rules.tamu.edu/)** . The student **Rule 7 (http://student-rules.tamu.edu/rule07)** explains policies and excused absences. Please discuss unusual circumstances in advance with the instructor.

Notes about graded materials

- All homework assignments will be announced in class and posted on Canvas. See the link to the course calendar on Canvas for deadlines.
- The written part of homework assignments or programming reports, and the Cover Page should be typed preferably using LaTeX, overleaf.com (an online LaTeX text editor), or LyX (document processor based on LaTeX), see the class webpage for a tutorial. The homework (**in PDF format**) should be submitted to Canvas or Gradescope.
- All programming assignments should be implemented in C++ and transferred to Canvas or/and Gradeskope for grading.
- Culture assignments allow you to explore the latest developments in Computer Science and Engineering or learn about the famous computer scientists like Turing Award winners. The homework should be submitted to Canvas or/and Gradescope.
- Quizzes are over material covered during the lectures and assigned reading from the textbook.
- The Instructor and TAs can request oral exam to check student's knowledge over material covered by test or assignment.

Late Work Policy

A late homework assignment will be accepted up to 1 day with a 5% penalty. Once solutions have been discussed or handed out the assignments will not be accepted. Please discuss unusual circumstances in advance with the instructor. Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy. (See **Rule 7 (http://student-rules.tamu.edu/rule07)**)

Course Tentative Schedule

No.	Week	Day	Topic
Module 1	Jan. 17	M	Introduction to Data Structures Pointers, Arrays, Vectors
Module 2	Jan. 24	M	Introduction to Analysis of Algorithms Complexity of Search and Sort Algorithms Algorithms – Best, Worst, Average Cases The Lower Bound Theorem
Module 3	Jan. 31	M	Linear Sort Algorithms Stack ADT – Array Based Implementation Amortized Analysis
Module 4	Feb. 07	M	Queue ADT – Array Based Implementation Stack and Queue Applications. Parser

Module 5	Feb. 14	M	Linked Lists in C++ Linked List Based Stack and Queue **Exam 1**
Module 5	Feb. 21	M	Linked List Based Stack and Queue Dequeues
Module 6	Feb. 28	M	Recursive Algorithms Analysis of Divide-and-Conquer Algorithms
Module 7	Mar. 07	M	Iterating and Master Methods Trees I Binary Search Trees
Module 8	Mar. 21	M	AVL Trees Red-Black Trees 2–4 Trees
Module 9	Mar. 28	M	Skip Lists I Hashing **Exam 2**
Module 10	Apr. 04	M	Heap I Huffman Trees Priority Queues
Module 11	Apr. 11	M	Graphs I BFS I DFS Digraph Algorithms
Module 12	Apr. 18	M	Shortest Path Algorithms Dijkstra's Algorithm
Module 13	Apr. 25	M	Minimum Spanning Trees Prim's & Kruskal's Algorithms

Module 13	May 02	M	Kruskal's Algorithm Implementation using Disjoint sets ADT
	May 05 & 06		**Final Exams:** **500-502, 05/05/22 10:00 am-12:00 pm** **506-509, 05/05/22 12:30-2:30 pm** **503-505, 05/06/22 1:00-3:00 pm**

The topics and related chapters from the textbook:

Introduction	
C++ Overview: Arrays, Vectors, Strings, Matrices	Chap. 1
Introduction to Analysis of Algorithms	Chap. 2
Lists, Stacks, and Queues	Chap. 3
Trees and Search Trees	Chap. 4
Balanced Search Trees	Chap. 12.2
Hashing	Chap. 5
Priority Queues. Heaps.	Chap. 6
Sorting	Chap. 7
Disjoint Sets	Chap. 8
Graphs	Chap. 9
Algorithms Design	Chap. 10

All changes in the schedule will be announced in class and at the class calendar. Please see also **University Academic Calendar (http://registrar.tamu.edu/Catalogs,-Policies-Procedures/Academic-Calendar)** .

Use Canvas to get access to the lecture notes, quizzes and tests, to submit your assignments, and check your grades during the semester.

Additional Course Information

Learning Resources

- You may have noticed from the syllabus that this course focuses on obtaining a computer science background and developing programming skills. Programming is not something you can learn overnight by reading a textbook or lecture notes; it requires a lot of practice. The TAs assigned and I are willing to help you to learn and

understand the course material, and help you to master your programming skills so please see us during our office hours. A few hints about how to succeed in this course:

- attend class and lab meetings regularly
- read lecture notes and related material in the textbook, and feel free to ask questions
- study for quizzes and tests
- retype and implement in C++ examples from the lecture notes and textbook
- complete all labs and projects
- if you have any course related questions please visit us during our office hours
- use the online Campuswire to ask questions and participate in discussions

In general, Computer Science is not an easy subject but it will pay off after graduation.

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to **Student Rule 7 (https://student-rules.tamu.edu/rule07/)** in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to **Student Rule 7 (https://student-rules.tamu.edu/rule07/)** in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (**Student Rule 7, Section 7.4.1 (https://student-rules.tamu.edu/rule07/)**).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (**Student Rule 7, Section 7.4.2 (https://student-rules.tamu.edu/rule07/)**).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (**See Student Rule 24 (https://student-rules.tamu.edu/rule24/)**.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (**Section 20.1.2.3, Student Rule 20 (https://aggiehonor.tamu.edu/Rules-and-Procedures/Rules/Honor-System-Rules)**).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at **aggiehonor.tamu.edu (https://aggiehonor.tamu.edu/)** .

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit **disability.tamu.edu (https://disability.tamu.edu/)** . Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

*Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit **disability.tamu.edu (https://disability.tamu.edu/)** .*

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see **University Rule 08.01.01.M1 (https://rules-saps.tamu.edu/PDFs/08.01.01.M1.pdf)**):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with **Counseling and Psychological Services (https://caps.tamu.edu/)** (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's **Title IX webpage (https://titleix.tamu.edu/)** .

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency

help is also available through the National Suicide Prevention Hotline (800-273-8255) or at ***suicidepreventionlifeline.org*** **(https://suicidepreventionlifeline.org/)** *.*

COVID Syllabus Statement for Spring 2022

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.