COSC 2336 01W Data Structures and Algorithms

COURSE SYLLABUS: Fall 2024

INSTRUCTOR INFORMATION

Instructor: Derek Harter, Ph.D.
Office Location: Science 355
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Preferred Form of Communication**:**   e-mail

COURSE INFORMATION

Materials – Textbooks, Readings, Supplementary Readings

Textbook(s) Required

Malik, D. S. "C++ Programming: From Problem Analysis to Program Design", 8th edition (or higher), Cengage Learning, 2018.

Shaffer, C.A. "Data Structures and Algorithm Analysis", Dover Publications. http://people.cs.vt.edu/~shaffer/Book/

Software Required

You will be given a virtual class development box for this class. You are required to have a computer with at least 4GB of memory, running Windows, MacOS or Linux operating systems. You will need to install git, Docker and VSCode software (see getting started instructions).

Course Description

This course continues with the concept of abstract data structures (classes) begun in COSC 1437 Programming II and concentrates on building programming tools known as container classes which can be used to store and manipulate data. Topics covered include address variables (pointers), dynamic memory management, linked lists, stacks,

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queues, recursion, analysis of algorithmic efficiency, binary search trees, and hashing and dictionary data structures.

Student Learning Outcomes

After completion of this course, you will be able to use classes to implement basic data structures (stacks, queues, linked lists, trees, and hash tables and dictionaries) and to use predefined classes from the Standard Template Library (STL). You will be able to design and code a program for application areas in which these data structures would be useful. Given multiple algorithms to solve the same problem, you will be able to estimate which algorithm would be more efficient in terms of time and memory required.

1. Use address variables (pointers and dynamic memory management).
2. Use and understand performance of linked list data structures.
3. Use and understand performance of stack data structures.
4. Use and understand performance of queue data structure.
5. Design, code, and use recursive functions.
6. Understand Big-O notation (algorithmic efficiency): what it means, how it is determined, and why it should be considered in effective programming.
7. Use and understand performance of binary tree data structure and hashing techniques.
8. Integrate the use of container classes (user-created or STL) into a moderately complex program solution.

COURSE REQUIREMENTS

Minimal Technical Skills Needed

- Must be familiar with creating programs in a C++ IDE, using a debugger, and able to write simple programs in C/C++ (declaring variables, loops, condition statements, functions, etc.)
- CSCI 152 or COSC 1437 minimum grade C

Instructional Methods

All materials, assignments and tests will be conducted through the D2L MyLeo Online learning system. We will have weekly programming assignments, quizzes and tests delivered online through our course learning management system. Please check MyLeo Online regularly. All assignments and tests will be uploaded and submitted online through the D2L MyLeo Online system.

Student Responsibilities or Tips for Success in the Course

1. Read all assigned textbook and supplemental materials.
2. Check D2L regularly. During a the semester you will need to check for announcements and submit materials multiple times each day.
3. Read the textbook before and after every lecture, and use the provided materials and videos as guidelines for your self-study.

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4. Start your homework and programming assignments early. There will be many assignments and you will not receive credit for late assignments.
5. Do your own work, unless you are otherwise working on an assigned team project or program. If you have difficulties in an assignment, ask the instructor. Do not copy other people's work.
6. Contact the instructor when you are confused.

GRADING

Final grades in this course will be based on the following scale:

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% or Below

Your weighted total grade will be computed using the following weights.
- Two exams (Midterm and Final Exams): 15% each (30% total for course)
- Online Quizzes: 10% (probably about 10-13, one each week).
- Programming Assignments: 60% (also probably about 10-13, one per week).

There will be weekly quizzes due on Wednesday of each week. Quizzes will consist of multiple choice and true/false questions, taken from the review and exercise questions from our textbook chapters. Part of the exams will also consist of similar questions, so quizzes are meant to be a practice for this portion of the class exams.

Likewise there will be regular programming assignments. Programming assignments will be due on Friday of each week. There will be some longer programming questions on the exams, so these programming assignments will serve as preparation for that portion of the exams. In addition, programming assignments are worth a significant portion of your total grade, so you must attempt all of the programming assignments and do moderately well on them in order to receive a good grade in this course. Most of the important course assessment comes from performance on the programming assignments.

The two tests will occur at the end of the 6th or 7th week and at the end of the class. Tests will be conducted online. The tests will be open starting in the morning, and will have to be completed sometime during the day when assigned. The tests will have a 2 hour time limit.

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Assessments

Assignments will be graded on the following:

- meet specification of assignment
- have good organization and logic
- demonstrate good form, including remarks and indentation
- on-time (Late submission subject to the penalty.)

Quizzes and exams are graded based on the correctness of the answers. All exams are comprehensive. The time of each exam will be announced one week before the exam. Exams will be timed, usually for 1 to 2 hours, but you will have usually a 24 hour period on MyLeo Online in which to start and attempt the exam. Quizzes are not comprehensive unless otherwise specified. Likewise quizzes will be short, and will usually be due on Tuesday and Thursday of the week for each unit.

All work is individual work unless a group project is specifically assigned. Plagiarism in code or in working together on tests or quizzes is a violation of university academic ethics, and if you are found guilty of inappropriate collaboration or copying of others work, you may be subject to failure of the class and possible university ethics violation proceedings.

Assignments

All work must be original and created this semester for this class. You must start all of your assignments without using past posted solutions or student submissions to refer to and/or make up parts or wholes of your assignments. This also includes that teams this semester should also work only with their own team members, and not share or show code with other students not in the team. Discussion of general approaches is fine, but people should not be looking at other peoples code from current or past attempts at the assignments.

Programming assignments this semester will be submitted through GitHub classroom repositories. Your commits and pushes to your assignment repositories will be used to review your work and give feedback and additional requirements or issues. Student teams have additional requirements for demonstrating all members are working on the assignment tasks. In short, teams are required to have roughly equal commits done by all team members, and trivial commits with little or no work just to satisfy this requirement will not be counted.

Quizzes and Tests

Quizzes and Tests will still be required to be individual efforts for this class. You may not work with others or see others answers to the tests before taking the test yourself.

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TECHNOLOGY REQUIREMENTS

LMS

All course sections offered by Texas A&M University-Commerce have a corresponding course shell in the myLeo Online Learning Management System (LMS). Below are technical requirements

LMS Requirements:
https://community.brightspace.com/s/article/Brightspace-Platform-Requirements

LMS Browser Support:
https://documentation.brightspace.com/EN/brightspace/requirements/all/browser_support.htm

YouSeeU Virtual Classroom Requirements:
https://support.youseeu.com/hc/en-us/articles/115007031107-Basic-System-Requirements

ACCESS AND NAVIGATION

You will need your campus-wide ID (CWID) and password to log into the course. If you do not know your CWID or have forgotten your password, contact the Center for IT Excellence (CITE) at 903.468.6000 or helpdesk@tamuc.edu.

Note: Personal computer and internet connection problems do not excuse the requirement to complete all course work in a timely and satisfactory manner. Each student needs to have a backup method to deal with these inevitable problems. These methods might include the availability of a backup PC at home or work, the temporary use of a computer at a friend's home, the local library, office service companies, Starbucks, a TAMUC campus open computer lab, etc.

COMMUNICATION AND SUPPORT

If you have any questions or are having difficulties with the course material, please contact your Instructor.

Technical Support

If you are having technical difficulty with any part of Brightspace, please contact Brightspace Technical Support at 1-877-325-7778. Other support options can be found here:

https://community.brightspace.com/support/s/contactsupport

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Interaction with Instructor Statement

Please use e-mail and through the MyLeoOnline course to ask questions and for help, and to set up additional appointments if needed. We may use some of the MyLeoOnline virtual classroom tools this semester for online class feedback sessions.

COURSE AND UNIVERSITY PROCEDURES/POLICIES

Course Specific Procedures/Policies

There will be no make up or extra credit for late assignments. You must turn in all assignments by the require due date, or notify the instructor with a valid reason for missing an assignment.

Syllabus Change Policy

The syllabus is a guide. Circumstances and events, such as student progress, may make it necessary for the instructor to modify the syllabus during the semester. Any changes made to the syllabus will be announced in advance.

University Specific Procedures

Student Conduct

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. The Code of Student Conduct is described in detail in the Student Guidebook.
http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.aspx

Students should also consult the Rules of Netiquette for more information regarding how to interact with students in an online forum:
https://www.britannica.com/topic/netiquette

TAMUC Attendance

For more information about the attendance policy please visit the Attendance webpage and Procedure 13.99.99.R0.01.
http://www.tamuc.edu/admissions/registrar/generalInformation/attendance.aspx

http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/academic/13.99.99.R0.01.pdf

Academic Integrity

Students at Texas A&M University-Commerce are expected to maintain high standards of integrity and honesty in all of their scholastic work. For more details and the definition of academic dishonesty see the following procedures/

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Texas A&M University-Commerce acknowledges that there are legitimate uses of Artificial Intelligence, ChatBots, or other software that has the capacity to generate text, or suggest replacements for text beyond individual words, as determined by the instructor of the course. Any use of such software must be documented. Any undocumented use of such software constitutes an instance of academic dishonesty (plagiarism). Individual instructors may disallow entirely the use of such software for individual assignments or for the entire course. Students should be aware of such requirements and follow their instructors' guidelines. If no instructions are provided the student should assume that the use of such software is disallowed.

In any case, students are fully responsible for the content of any assignment they submit, regardless of whether they used an AI, in any way. This specifically includes cases in which the AI plagiarized another text or misrepresented sources.

13.99.99.R0.03 Undergraduate Academic Dishonesty

https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf

13.99.99.R0.10 Graduate Student Academic Dishonesty

https://inside.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/13students/graduate/13.99.99.R0.10.pdf

Students with Disabilities-- ADA Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

Office of Student Disability Resources and Services
Texas A&M University-Commerce
Gee Library- Room 162
Phone (903) 886-5150 or (903) 886-5835
Fax (903) 468-8148
Email: studentdisabilityservices@tamuc.edu
Website: Office of Student Disability Resources and Services

http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

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Nondiscrimination Notice

Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

Campus Concealed Carry Statement

Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in Texas A&M University-Commerce buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and A&M-Commerce Rule 34.06.02.R1, license holders may not carry a concealed handgun in restricted locations.

For a list of locations, please refer to the Carrying Concealed Handguns On Campus document and/or consult your event organizer.

Web url:
http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/34SafetyOfEmployeesAndStudents/34.06.02.R1.pdf

Pursuant to PC 46.035, the open carrying of handguns is prohibited on all A&M-Commerce campuses. Report violations to the University Police Department at 903-886-5868 or 9-1-1.

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COURSE OUTLINE / CALENDAR

Unit	Topic	Textbook Reading
01	Review functions, enumerated types, arrays	Ch. 6, 7, 8
02	Structures and Classes	Ch. 9, 10
03	Pointers, dynamics variables and memory management	Ch. 12
04	Recursion	Ch. 15
05	Searching and Sorting	Ch. 16
06	Analysis of Algorithms	Supplemental material
T1	Midterm Exam	
07	Inheritance, Overloading and Templates	Ch. 11, 13
08	Linked Lists	Ch. 17
09	Stacks	Ch. 18
10	Queues	Ch. 18
11	Trees	Supplemental material
12	Hashing and Dictionaries	Supplemental material
13	Standard Template Library	Appendix H
T2	Final Exam	

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