Midwestern State University
Department of Computer Science
Fall 2025

Course Information
Course syllabus: Advanced Structures and Algorithms
Course number: CMPS 3013.
Course Section: 101.
Class hours: 2:00 pm to 3:20 pm, Tuesdays and Thursdays.
Classroom: Bolin 144.

Instructor Information
Instructor's Name: Doctor Eduardo Colmenares.
Instructor's office: Bolin Hall, office 124B
Instructor's email: eduardo.colmenares@msutexas.edu

Office Hours
Monday: 2:00 pm to 4:00 pm
Tuesday: 8:30 am to 9:30 am
Wednesday: 2:00 pm to 3:00 pm
Thursday: 8:30 am to 9:30 am
Friday: No Office hours

ZOOM information
Zoom Link

Course Description
In-depth study of complexity analysis and variety of advanced structures and related algorithms. Topics will be selected from trees, heaps, priority queues, graphs, hashing, sorting, pattern matching, recursion and others as appropriate.

Textbook
Is the textbook required? The answer is no, these books are recommended

1. Textbook name: Introduction to Algorithms
   - Textbook edition: Third Edition
   - Textbook Authors: Cormen et al.
   - Publisher: PHI Learning Pvt. Ltd. (Originally MIT Press); Third edition (February 2, 2010)
   - Paperback: 1312 pages
   - ISBN-10: 9788120340077
   - ISBN-13: 978-8120340077

2. Algorithms Illuminated: Omnibus Edition
   - Author: Tim Roughgarden
   - Publisher : SOUNDLIKEYOURSELF PUBLISHING; 1st edition (September 15, 2022)
   - Language : English
   - Hardcover : 690 pages

- ISBN-10 : 0999282980
- ISBN-13 : 978-0999282984

Required Software

Visual Studio, the most recent version. Please remember that visual studio is available to MSU students free of charge and available in multiple computer labs in the Bolin Building.
Students are allowed to use replit to develop their projects, however, all the projects/homeworks will be executed and subsequently graded based on their correctness and behavior when executed in visual studio 2022. It is the student responsibility to make sure that the project/homework that was successfully developed in replit will execute flawless in visual studio. Failure to comply with this requirement will not exclude you from a bad grade.

Required Hardware

- Regular traditional PC/Mac. Chromebooks are NOT allowed since they do not work really well with D2L.
- Access to a Printer, white Paper and a stapler.

Evaluation Process Summary Table

Category	Percentage
Test 1	20%
Test 2	20%
Final Exam	22%
Homework	22%
Participation (Quizzes)	10%
Attendance	6%

Grading Policy

90 to 100 points is an A.
80 to 89.99 points is a B.
70 to 79.99 points is a C.
60 to 69.99 points is a D.
0 to 59.99 points is an F.

Evaluation Process

The final grade for this course will be based on participation, projects and exams. A description is provided below:

- You will have two tests (T1 and T2), plus one final exam (FE). T1 is worth 20 percent, T2 is worth 20 percent and your final exam is worth 22 percent.
- You will have several programming assignments. All your programming assignments will count for 22 percent of final your grade. Students must be prepared to defend and properly explain any submitted code or homework at any time.
- The last category is participation, and this will count for ten percent of your final grade. Please be aware that this category includes in class activities and quizzes. Below you will find additional information about this category.
    - Assignments given in class, also known as in class activities (ICA) will be announced in nature.
    - Quizzes will be non-pop-up quizzes.

- No makeup participation assignments are given.
- Arriving late, leaving early to class voids the right to take a quiz or in class activity if it already started or it is about to start.

Attendance

- Attendance is a component of the course grade (six percent). Each student will begin with 100 points for their attendance grade. For each additional unexcused absence, 33.33 points will be subtracted from the attendance grade.
- Your instructor will go over the class roster at the beginning of class and will call the students by name, if the student is not present at that time, an absence will be given and not removed after arrival. Arriving late will be considered unexcused absence. The Attendance grade is 100% under the student's control.
- After five (5) unexcused absences the student will be dropped from the class. This can happen during any week of the semester in course (To be enforced).
- Additional class attendance related MSU Policies apply.

Tests

Tests are comprehensive in nature. No make-up exams will be given, except for the following cases:

- Properly documented Surgery, Medical Emergency, Death in the family, Presentation at a Conference, some others as determined by the instructor.
- If you miss an exam then you need to notify the instructor and demonstrate with the proper official documentation (signatures, seals, contact information) that an emergency that you could not circumvent existed. This documentation must be presented not later than 24 hours after the test. The date on the documentation must match the date of the exam that you missed.
  a. Students who miss an exam due to University business should notify the instructor in advance, and present the sponsoring university member's written justification.
  b. If your instructor cannot verify or validate the given documentation, then it will consider invalid and no make-up exam will be given.

If you do miss an exam and your case fall in one of the categories above this means that you have a properly documented case. Your instructor will proceed to assign a temporary grade of zero, which will be substituted for your excused test grade (Final Exam). However, this substitution can only be performed once during the semester. Exams are uniquely composed for each term.

Quizzes

- Quizzes are announced in nature and conducted to evaluate how well the students understand material explained and or assigned in class. There is no make up for quizzes.
- If you arrive to the classroom after a quiz has started, you will not be allowed to take it and an unexcused absence assigned. Please be on time.

Final Exam

- There is no make-up final exam. The final exam will take place in our regular classroom (unless decide otherwise by the University). It is the student's responsibility to keep track of the designated date, time. A complete list of all MSU exams (by time) can be found at Final Exam Schedule.
- The date of our final exam is Thursday, December 11th from 1:00 pm to 3:00 pm.

- There is no make up for the final exam.

No Procrastination Policy

Students are strongly encouraged to contact the instructor during office hours to clarify questions associated with lectures, exams, assignments, presentations, quizzes, homework, etc. Questions are more than welcome from the moment the assignments, projects, quizzes, exams are either released or announced, however, all questions stop the day before the assignment, exam, quiz, presentation is due. This rule is designed to promote responsible time management and personal organization.

Assignments - Late Policy & Deadlines

- Submitted work is due when specified, as specified (format) by the instructor. It is in the student's best interest to keep track of all deadlines.
- The instructor is not required to remind students of ANY date and/or deadline associated with tests, homework, reports, project assignment, etc.
- **Late assignments WILL NOT BE ACCEPTED. This rule will be enforced**
    - **What does it mean to be late?** Answer: for example, if your assignment is due today at 8:00 am and you attempt to deliver your report by 8:00:01 am (1 second late) then it will be considered late. There will not be exemptions of any kind.
    - **Assignments MUST be submitted to the corresponding Dropbox via D2L before it closes (deadline).** If the Dropbox has closed and you cannot upload your assignment to it, then you are late and your assignment will not be accepted.
    - Students will have more than enough time to complete their assignment on time.
    - Internet outage, computer problems, car problems, work, and several others are NOT a valid excuse for a late delivery.
- Very Important: Before you submit any file, take your time and double OR triple check that
    a. You are uploading the correct and ALL necessary files
    b. Your work is correct at the best of your abilities
    c. Failure to fulfill (a) and (b) ON TIME, WILL NOT excuse you from a bad grade.

Additional Grade Policy

Once the grades, have been either returned to the students, or published via D2L, the student will have one week to examine them and check for inconsistencies, errors, etc. After the one week window of opportunity all grades will become PERMANENT and WILL NOT change. It is not only the student's responsibility to check the accuracy of his/her grades, but also in his/her best interest to do it. This rule DOES NOT apply to the final exam because the final is exam triple checked by the instructor before publishing the grade.

Academic Misconduct Policy & Procedures

Cheating, collusion, and plagiarism (the act of using source material of other persons, devices, AI Generators, either published or unpublished, without following the accepted techniques of crediting, or the submission for credit of work not the individual's to whom credit is given). The Department of Computer Science has adopted the following policy related to cheating (academic misconduct). The policy will be applied to all instances of cheating on assignments and exams as determined by the instructor of the course. (See below for link to MSU definitions.)

- 1st instance of cheating in a course: The student will be assigned a non-replaceable grade of zero for the assignment, project or exam. *If the final grade in the course, does not result in a one letter grade reduction, the student will receive a one letter grade reduction in course.*
- 2nd instance of cheating in a course: The student will receive a grade of F in course & immediately be removed from course.
- All instances of cheating will be reported to the Department Chair and, in the case of graduate students, to the Department Graduate Coordinator.

Note: Letting a student look at your work is collusion and is academic misconduct!

Can I use AI to solve my homework and/or project: The answer is NO, this is also an academic misconduct!

See Also: MSU Student Handbook: Appendix E: Academic Misconduct Policy & Procedures *https://msutexas.edu/student-life/_assets/files/handbook.pdf*.

Policy on Testing Process

The Department of Computer Science has adopted the following policy related to testing.

a) All bags, purses, electronics (turned off), books, etc. will be placed in the front of the room during exams, or in an area designated by the instructor.
b) Unless otherwise announced by the instructor, nothing is allowed on the desk but pen/pencil/eraser and test papers.
c) You are not allowed to leave the classroom. Please take this seriously and into consideration before any test and the final. Prepare yourself to be in the classroom during the entire exam.
d) If you decide to leave the classroom during a test and/or the final exam, your exam will be collected, and you will not be allowed to continue.

Classroom Civility

All violations of classroom civility will be reported to the Dean of Students.
Students are expected to assist in maintaining a classroom environment that is conducive to learning. In order to ensure that all students gain from time spent in class, students are prohibited from engaging in any form of distraction, e.g. leaving the room for extended periods of time, reading newspapers (or other articles), working on other courses, and using cell-phones or laptops for calls or messages. If you indulge in any such inappropriate behavior (without explicit consent of the instructor), you will (at the very least) be asked to leave the classroom. MSU Dean of Students Website.

Student with Disabilities

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from disability support office during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Disability Support Office has been provided. For additional information you may contact the Disability Support Office in Clark Student Center 168 - Phone: (940) 397-4140.
Disability Support Services.

Dean of Students
The Dean of Students can assist in notifying the campus community of student illnesses, immediate family deaths and/or student death. Generally, in cases of student illness or immediate family deaths, the notification to the appropriate campus community members occur when a student is absent from class for four consecutive days with appropriate verification. It is the student's responsibility for missed class assignments and/or course work during their absence. MSU Dean of Students Website.

RECORDING OF CLASS LECTURES
Permission must be requested in writing & obtained from the instructor before recording of class lectures. If permission is granted, the recording may only be used by the student making the recording. Recordings may NOT be posted on any internet source without written permission of the instructor. Failure to adhere to the policy may result in removal from the course with a grade of F or other appropriate punishment.

Broadcasting of Lectures
Not a single lecture will be broadcasted or recorded unless

- The faculty members is instructed or required to work from home

University's Campus Carry
Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at Campus Carry.

Additional Office Hours & Meeting Policies
In order to protect your wellbeing and the one of those that you care about, the following preventive measurements will take place:

a) Office hours can be virtual via ZOOM. Check your syllabus for detailed office hours.
b) Your instructor will not touch any computer or USB Drive. NO Exemptions.
c) If at some point you need/want me to look at your programming assignment or class project, you can do it by sharing your desk via ZOOM (Virtually) during office hours.
d) Questions associated with ADVISING, degree plans, etc., will be addressed (Virtually-ZOOM) during office hours.
e) The faculty member is open and available to face to face meetings if the student is in good health condition and not showing symptoms of running nose, sneezing, coughing.

Covid Precautions
I encourage all those who wish to wear a mask to do so.

Research and Creative Activity Opportunities at MSU
Enhancing Undergraduate Research Endeavors and Creative Activities (EURECA) is a program that provides opportunities for undergraduates to engage in high-quality research and creative activities with faculty. EURECA provides incentives and funding through a system that supports faculty and students engaged in collaborative research and creative works. For more information contact the Office of Undergraduate Research at (940) 397-6274 or by email at

eureca@msutexas.edu or better yet, stop by the UGR office located in the atrium of the Clark Student Center, room 161. Information and resources are also available at Eureca's website

Undergraduate Research Opportunities and Summer Workshop (UGROW)
Like EURECA, UGROW provides opportunities for students to conduct research with faculty. However, the research occurs in the summer. For five weeks UGROW students experience the authenticity of scientific research as well as research and creative activities in art, music, theater education, business, health and social sciences, English, history, etc. in a highly interdisciplinary environment. Students work on projects of their choice and present their findings at the end of program and the MSU Undergraduate Research and Creative Activity Forum. Faculty members will introduce their research ideas February 13th, 2019, at 5:00 p.m., Comanche Suites, Clark Student Center. A break-out session with individual faculty members will follow. If you have any questions, contact the Office of Undergraduate Research at (940) 397-6274 or by email at eureca@msutexas.edu. More information and resources are available at ugrow's website

Council on Undergraduate Research
To support undergraduate research and creative activities, Midwestern State University holds an enhanced institutional membership with the Council on Undergraduate Research (CUR). This institutional membership includes unlimited memberships for any interested faculty, staff, and students. Students find information on benefits and resources at the council for undergraduate research website and sign up at no cost at this website.
I would like to personally invite you to become a member of CUR so that you benefit from all the opportunities CUR offers to you.
CUR Undergraduate Resources Webpage contains:

- Research Opportunities;
- Presentation Opportunities;
- Undergraduate Research Journals;
- CUR-Sponsored Student Events;
- The Registry of Undergraduate Researchers;
- And more!

ScholarBridge
Midwestern State University is excited to announce a new resource designed to address a commonly expressed student need—the creation of a centralized searchable database of faculty research interests and opportunities. We have entered into a partnership with ScholarBridge, is a website designed to help students participate in undergraduate research and creative activities. I strongly encourage you to join ScholarBridge at your earliest convenience.

Pregnant and Parenting Students

To support the academic success of pregnant and parenting students and students with pregnancy related conditions, the University offers reasonable modifications based on the student's particular needs. Any student who is pregnant or parenting a child up to age 18 or has conditions related to pregnancy, may contact MSU's designated Pregnancy and Parenting Liaison to discuss support available through the University. The Liaison can be reached by emailing ruby.garrett@msutexas.edu or calling 940-397-4500. Should a student communicate

with me that they are pregnant or have a pregnancy related condition or may need additional resources related to pregnancy or parenting, I will communicate that student's information to the Title IX Coordinator, who will work with the student and others, as needed, to ensure equal access to the University's education program or activity.

A pregnant student, a parenting student, or a student with pregnancy related conditions may be provided with supportive measures, based on the student's individualized needs, analogous to those provided to a student with a temporary medical conduction, and provided such supportive measures do not fundamentally alter the nature of an education program or activity.

Tentative Agenda

The instructor reserves the right to add, remove, reorder topics, as he considered convenient towards the benefit of the class.

1) Course Information; Specifications; Expectations
2) Opening Files
3) Recursion Review
4) Pointer Review
5) Dynamic Linked List Structures
6) Stack Review
7) Queue Review
8) Analysis
9) More on Analysis
10) Recurrence Relations
11) Trees (spec and basic operations)
12) Trees (implementation)
13) Binary Search Tree
14) AVL Trees
15) Red-Black Trees
16) B-Trees
17) Review O(n2) Sorts
18) Merge Sort
19) Quick Sort
20) Radix and Counting Sort;
21) Heaps
22) Heapsort
23) Intro to Graphs
24) Graphs (spec and basic operations)
25) Graphs (complex operations); Graph implementation 1
26) Graph Implementation 2
27) DFS
28) BFS
29) A* Search
30) Topological Sort
31) Hash Tables