

SYLLABUS

CS5350/6350: Advanced Algorithms Fall 2024

COURSE DESCRIPTION:

This course provides a review of mathematical techniques for analysis of computer algorithms, techniques for design of efficient algorithms, description and analysis of both well-established and recently developed algorithms.

Learning objectives:

The objective of this course is for students to become aware of the appropriateness of algorithms as solutions to given problems, of their efficiency, and to be able to discuss and justify solving techniques. Students will be able to implement algorithms adapted to the problems at hand. They will know how to communicate to team members the features of a given problem along with the solution they propose with its justification.

COURSE LOGISTICS: MW from 9AM to 10:20AM in CCSB1.0202

This course is planned to be in person. Nevertheless, we will be using a few tools as follows:

- **Microsoft Teams:** for sharing all announcements (we will NOT be making use of EMAIL), holding some office hours when convenient for students, providing access to resources relevant to lectures, providing access to assignments, etc. Our team is called **Advanced Algorithms 2024** and, by now, you should all have received an invitation to join the team. *Please let me know if you did not, so I can fix that.*
- **Gradescope:** for all quizzes and exams (you should have received or will soon receive a notification from Gradescope as well).

All students are expected to attend and actively participate in all sessions of this course. Students' Drop-In hours will be held regularly, see below for details.

FINAL EXAM: Wednesday December 11 from 10AM to 12:45PM, in CCSB1.0202

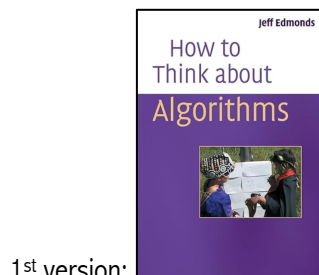
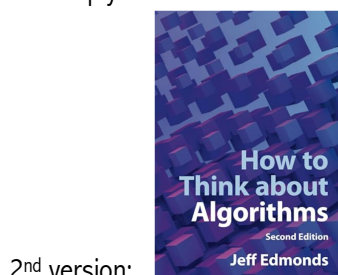
INSTRUCTOR

Dr. Martine Ceberio (she, her) mceberio@utep.edu (use MS Teams chat to contact me)

Student Drop-in hours: MW 11AM to 12PM in A147.

REQUIRED TEXTBOOK:

How to Think about Algorithms, by Jeff Edmonds – paperback or eVersion, 2nd edition (left image). If you get the 1st edition, your version will not be as complete; you will be able to follow along for most of the content but just be aware that you may have difficulty with some chapters and exercises assigned as practice, which are simply not included in the 1st version.



COURSE ASSIGNMENTS AND GRADING

There will be 4 types of assignments / assessments:

1. Homework assignments (not graded)
2. Quizzes (heavily based on homework assignments and on lecture concepts)
3. Exams (one midterm exam, one final exam – both are comprehensive)
4. Projects (two projects)

1. Homework assignments (not graded)

There will be regularly scheduled reading assignments and practice assignments. **Reading assignments** will be assigned to complement what's covered in class and support you as you work on your practice assignments. Some reading assignments will be given ahead of the lecture on that topic while some will be given as reinforcement, to be read after attending the lecture on that topic. Reading assignments' completion may be checked with quizzes. **Practice assignments** will be provided, either as a list of exercises to work on or exercises or questions given during the lecture for you to complete at home.

These assignments will be given a due date but will not be graded. However, it is essential to your success in this class that you complete them and seek help from your instructor if you experience any difficulty completing them. Quizzes (see below) will be used to check completion and understanding of the homework.

2. Quizzes

The purpose of each quiz is to ensure that you are staying current with the topics covered in class, the reading assignments, and the practice assignments. Quizzes are unannounced.

IMPORTANT GRADING INFORMATION: 1/ Students who demonstrate effort in their assignments (through hand-written notes that they can explain) but are missing the point or simply struggling in quizzes, will be allowed to retake their quizzes after working with their instructor. 2/ I understand that life happens. As a result, each student will be given 2 free passes for resubmission within a week of grade return, i.e., each student is allowed to resubmit despite no effort shown in assignments, twice during the semester.

3. Exams

There will be **1 midterm exam** and **1 final exam**.

The midterm exam will be assigned to be completed outside of class (by a specified deadline) on Gradescope.

IMPORTANT GRADING INFORMATION: Students, whose work shows effort and is submitted on time, will have a chance to make up their grade as follows: once the grades are released, students who can demonstrate their effort and who wish to improve their grade will be allowed (by a given deadline) to work with the instructor to understand their mistakes and resubmit once the instructor allows them (which is, when the exam is satisfactory to both the student and the instructor) or when the time is up. Making sure that you fully understand the material tested at the midterm will be extremely valuable in ensuring that you succeed at the final exam.

The final exam will be comprehensive and will be made of two parts (one in class, and one at home to submit on Gradescope). You must score 70% or better on the final exam to pass this course.

Note: we all struggle at some point. Seeking the proper accommodation or help is crucial to your success. If you have test-taking difficulties in general, or if you have difficulties with our tests in particular, please request appropriate accommodation from UTEP's Center for Accommodation and Students' Services (see below for more details).

4. Projects

You will work on **2 projects**. Both projects are “Algorithm 360” projects, that is, projects in which you conduct a thorough analysis of your assigned algorithm (motivation, description, time / space complexity, correctness). Project 1 is a GROUP project. Project 2 is an INDIVIDUAL project.

Note: Projects’ assessment rubrics will be different whether you are enrolled in CS5350 or CS6350. Groups will be formed during class by the instructor.

Please see below the Course Calendar section for a tentative list of deadlines: details for the corresponding assignments will be accessible within our course MS Team (Advanced Algorithms 2024) with plenty of time to complete them. Just make sure to consult our MS Team regularly for updates.

GRADES:

Grades will be available in a timely manner to students on Gradescope along with feedback on submitted work (quizzes, exams, projects). In case of any doubt, you are encouraged and welcome to contact me for clarification. Your semester grade will be based on a combination of the performance you demonstrated on each of the above types of assignments, as shown below:

Quizzes	10%*
Exams	40%*
Projects (20% each)	40%
Professionalism	10%

The nominal percentage-score-to-letter-grade conversion for CS 5350/6350 is as follows:

- 90% or higher is an A
- 80-89% is a B
- 70-79% is a C
- 60-69% is a D
- Below 60% is an F

Important Note: Regardless of your standing in the class at that time, you need to earn a **C or better at the final exam to pass the course.**

** These percentages will not necessarily be an average of all your grades in that category. The average will be the lower bound of your grade. However, I grade for mastery, so any improvement will be reflected in your grade and lower/previous grades will be dropped in favor of a later and improved performance of same topics.*

COURSE POLICIES AND EXPECTATIONS

Course conduct: I am committed to creating a **safe learning environment**. I request that all of you work with me to create a class culture based on open communication and mutual respect, where we approach all discussions with respect and civility. I strive to ensure an open and welcoming classroom for all of you. If I ever miss the mark, please don’t hesitate to come and talk to me. We are all learning together.

Expectations: The bottom line about my expectations of you all for this semester is that I expect all of you to **behave professionally** (as would be expected in the workplace – more on this below) and to **be engaged**. This is a graduate course and whether you take it as part of a core requirement or by personal choice, you should look forward to the essential skills you will build from participating in this course.

Attendance and participation: in all lecture sessions are critical factors of your success in this course. You should strive to be **on time for all scheduled sessions** and attend the entire session. Although attendance is not part of the grade, my experience shows that lack of attendance is a strong sign of lack of engagement and leads almost all the time to failure. If you must miss a lecture, it is your responsibility to catch up by asking your peers and me, as well as by checking our MS team. In any case, it is expected of you that if you are not going to attend a course, come late, or leave early, you should **inform me as soon as practical**. I will take attendance to get to know you and not to miss any time management struggle you may go through. This way, we can work together to help you stay on track. My role this semester is to help and support you. To be able to do that, I need you to communicate with me (I cannot guess the struggles you are going through, and I also need you to get back to me when I reach out to you).

School-Life Conflict: Many students face obstacles to their education as a result of work or family obligations or unforeseen personal difficulties. If you are experiencing challenges throughout the term that are impacting your ability to succeed in this course, please reach out to me immediately so that we can work together to form a plan for your academic success. If you are unable to attend my student drop-in hours, please contact me on teams to set up a time that works for you or arrange a virtual meeting.

Drop policy: If you are absent more than 4 times and do not communicate with me promptly and/or do not reply to my messages as I am trying to touch base with you, you will be dropped from the class within a week.

Professionalism: You are expected to **comport yourself professionally** in this course. In addition to communicating with me as mentioned above, you should strive to submit your work on time, seek help when needed, and meet all deadlines. During lectures, you should be on task: you are expected to direct your attention to the current task / activity. For instance, lecture sessions are certainly not places for social-networking, working on homework, checking other courses / goldmine / etc. You are also expected to seek help from me as often as needed. Please do make use of MS Teams messages and Students Drop-In Hours (see top of this document for more details).

More specifically, 10% of your grade will acknowledge your professionalism in this class. Were you on time in class (or if not, did you notify me in a timely manner)? Were you on task when in class? Did you participate (in class or, if you prefer to keep to yourself, outside of class during student drop-in hours)? Did you seek help when needed? Did you reply my messages? Did you submit your work on time and following instructions?

Work outside of class: You should expect to spend at least six hours per week outside of lecture on reading, practice, and/or project completion.

Communication: You are expected to consult your emails and MS Teams (chat, posts, and oneNote) every business day, ideally twice on these days, and to promptly answer – within 1 business day. As your instructor, I apply the same rule to myself in my communication with you. Use of proper Netiquette (see below) is expected in all communications. *Now, life happens. If you or I fail to reply to a message in due time, let's agree to resend our messages to gently nudge the message recipient. Of course, it is expected that missing messages should be the exception, not the norm.*

LATE WORK POLICY:

Late work is penalized through the professionalism grade (see Grades section). In addition, regardless of any penalties for submitting late work, it is important to note that, in order to pass the class, you need to have **submitted all assignments** by the end of the semester.

UNIVERSITY POLICIES AND MORE

INCOMPLETE POLICY:

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements. Talk to me immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

NOTE ON STUDENTS' DROPPING THIS COURSE:

Every semester, some students drop courses. We, instructors, completely understand and respect that. We only hereby ask students to inform us, ideally before, but in the worst-case right after, of their intention to drop the course. This is really important for us as it possibly informs us of ways in which to better serve our students. To drop this course, please contact your academic advisor and then the [Registrar's Office](#) to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course.

Fall Semester Drop/Withdrawal Deadline: November 1.

ACCOMMODATION POLICY:

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#). If you have a disability and need classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) at 747-5148 or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. CASS' staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.

SCHOLASTIC INTEGRITY:

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. Scholastic dishonesty includes, but not limited to cheating, plagiarism, collusion, and submission for credit of any work or materials that are attributable to another person.

Cheating may involve:

- Copying from the test paper of another student
- Communicating with another student during a test to be taken individually
- Giving or seeking aid from another student during a test to be taken individually
- Possession and/or use of unauthorized materials during tests (i.e. crib notes, class notes, books, etc.)
- Substituting for another person to take a test
- Falsifying research data, reports, academic work offered for credit

Plagiarism is:

- Using someone's work in your assignments without the proper citations
- Submitting the same paper or assignment from a different course, without direct permission of instructors
- To avoid plagiarism, see this [website about avoiding plagiarism](#).

Collusion is: Unauthorized collaboration with another person in preparing academic assignments

Undue AI use is: Using Generative AI at any stage of the work to be turned in (whether it is to brainstorm, draft, edit, enhance, etc.) when AI use is strictly and explicitly prohibited.

Important! When in doubt on any of the above, please contact me to check if you are following authorized procedure. [Also, please check the UTEP's Handbook of Operating Procedures at: hoop.utep.edu.](#)

I expect you to comply with University policies on academic integrity. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Any student who commits an act of scholastic dishonesty is subject to discipline. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Community Standards \(OCS\)](#) for possible disciplinary action. To learn more [HOOP: Student Conduct and Discipline](#).

However, the bottom line is the following: you are all able to meet my expectations in this course. If you are concerned about how well you are doing in this course or about your ability to complete an assignment, please come speak to me immediately instead of considering academic misconduct.,

COURSE CALENDAR:

CS5350/6350 Fall 2024 Tentative Schedule			
MW 9AM to 10:20AM CCSB 1.0202			
Week #	Date	Topic/Focus	Projects
1	26-Aug	Intro to the course	
	28-Aug	Review of simple algorithms and problem solving	
2	2-Sep	LABOR DAY	
	4-Sep	How should we think about algorithms?	
3	9-Sep	Correctness -- (loop invariants)	
	11-Sep		
4	16-Sep		Project 1 Team Membership Due
	18-Sep	Performance -- (time complexity and recursion analysis)	
5	23-Sep		Project 1 Topic Due
	25-Sep		
6	30-Sep	Problem-solving strategies	Project 2 Topic Due
	2-Oct	dynamic programming, greedy algorithms, combination of strategies, constraints and optimization	
7	7-Oct		
	9-Oct		
8	14-Oct		
	16-Oct		
9	21-Oct		
	23-Oct		Project 1 Due
10	28-Oct	REVIEW of EXAM 1	
	30-Oct	EXAM 1 on everything so far Take-home exam but time given today to work on it	--
11	4-Nov	Applications of what we learned to graph problems	
	6-Nov		
12	11-Nov	Presentations "Algorithm 360" Projects	
	13-Nov		Project 2 Due
13	18-Nov		
	20-Nov		
14	25-Nov		
	27-Nov		
15	2-Dec	GENERAL REVIEW	
	4-Dec	Presentations if time allows	
16	11-Dec	FINAL EXAM from 10AM to 12:45PM	

ADDITIONAL SUPPORT AND RESOURCES

ACADEMIC SUPPORT: Everybody struggles at some point. It is important to reach out to your instructor if you feel that you are not on track. Most likely, your struggle is completely normal and part of your learning ("If you are not confused, you are not paying attention" – Tom Peters). However, if you need any help, it is best to run it by me and I can point you out to useful resources.

In the meantime, below are some resources I think you'll find useful:

OTHER RECOMMENDED READINGS:

IMPORTANT NOTE ABOUT COURSE CONTENT: This is an advanced algorithms' course. What that means is that you should all be familiar with computer science undergraduate foundations' algorithms and design strategies (search, sort, iteration, recursion, basic time complexity analysis). Now, I understand that you may come from different backgrounds. In case you feel that you need to upskill yourself, or even simply refresh material you have to worked on for a while, here are essential recommended readings. As a graduate student, it is important that you learn how to assess your current standing and seek resources and support to improve.



- Algorithms Unlocked, MIT Press, by Thomas Cormen
- Nine Algorithms that Changed the Future, Princeton Science Library, by John McCormick
- Algorithms and Complexity, CRC Press, by Herbert Wilf
- Introduction to Algorithms, MIT Press, by Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein

UTEP STUDENT RESOURCES:

UTEP provides a variety of student services and support:

- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the [Helpdesk](#) via phone (915-747-4357), email (helpdesk@utep.edu), [chat](#), or [website](#).
- [University Writing Center \(UWC\)](#): Submit papers to [UWC](#) for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [Military Student Success Center \(MSSC\)](#): UTEP welcomes military-affiliated students to its degree programs. The Military Student Success Center and its dedicated staff (many of whom are veterans and students themselves) are there to help personnel in any branch of service to reach their educational goals.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

[More complete and updated information can be accessed at this address.](#)

NETIQUETTE:

Finally, as we work together this semester and at times interact online (on teams), please check below UTEP's [rules for online courses](#). Here is also a link where you can access [the core rules of netiquette](#).

NETIQUETTE GUIDE FOR ONLINE COURSES

It is important to recognize that the online classroom is in fact a classroom, and certain behaviors are expected when you communicate with both your peers and your instructors. These guidelines for online behavior and interaction are known as netiquette.

SECURITY

Remember that your password is the only thing protecting you from pranks or more serious harm.

- Don't share your password with anyone
- Change your password if you think someone else might know it
- Always logout when you are finished using the system

GENERAL GUIDELINES

When communicating online, you should always:

- Treat instructor with respect, even in email or in any other online communication
- Always use your professors' proper title: Dr. or Prof., or if you in doubt use Mr. or Ms.
- Unless specifically invited, don't refer to them by first name.
- Use clear and concise language
- Remember that all college level communication should have correct spelling and grammar
- Avoid slang terms such as "wassup?" and texting abbreviations such as "u" instead of "you"
- Use standard fonts such as Times New Roman and use a size 12 or 14 pt. font
- Avoid using the caps lock feature AS IT CAN BE INTERPRETTED AS YELLING
- Limit and possibly avoid the use of emoticons like :) or ☺
- Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken seriously or offensive
- Be careful with personal information (both yours and other's)
- Do not send confidential patient information via e-mail

EMAIL NETIQUETTE

When you send an email to your instructor, teaching assistant, or classmates, you should:

- Use a descriptive subject line
- Be brief
- Avoid attachments unless you are sure your recipients can open them
- Avoid HTML in favor of plain text
- Sign your message with your name and return e-mail address
- Think before you send the e-mail to more than one person. Does everyone really need to see your message?
- Be sure you REALLY want everyone to receive your response when you click, "reply all"
- Be sure that the message author intended for the information to be passed along before you click the "forward" button

MESSAGE BOARD NETIQUETTE AND GUIDELINES

When posting on the Discussion Board in your online class, you should:

- Make posts that are on topic and within the scope of the course material
- Take your posts seriously and review and edit your posts before sending
- Be as brief as possible while still making a thorough comment
- Always give proper credit when referencing or quoting another source
- Be sure to read all messages in a thread before replying
- Don't repeat someone else's post without adding something of your own to it
- Avoid short, generic replies such as, "I agree." You should include why you agree or add to the previous point
- Always be respectful of others' opinions even when they differ from your own
- When you disagree with someone, you should express your differing opinion in a respectful, non-critical way
- Do not make personal or insulting remarks
- Be open-minded