



## **CSCI532.01W** **Algorithm Design**

COURSE SYLLABUS: SPRING 2024

1/10 - 5/10, 2024

WEB-BASED

FIRST MEETING TIME: 4PM, FRIDAY JAN. 12

Meetings days/times will be discussed and decided in  
the first meeting.

### **INSTRUCTOR INFORMATION**

**Instructor:** Dr. Abdullah N. Arslan

**Office Location:** JOUR 122

**Office Hours:** MTW 9:45am-11:30am

**University Email Address:** Abdullah.Arslan@tamuc.edu

**Preferred Form of Communication:** e-mail

**Communication Response Time:** 24 hrs

### **COURSE INFORMATION**

***Materials – Textbooks, Readings, Supplementary Readings***

***Textbook(s) Required***

"Introduction to Algorithms", second edition by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Second (or later) Edition, Mc Graw-Hill

The professor will make supplementary information for the course available in D2L Brightspace. These include class notes, assignments, PowerPoint slides, class announcements, the course syllabus, test dates, etc. The professor will notify class when tests and assignments become available in D2L. It is the student's responsibility to follow the announcements.

### ***Software Required***

### ***Optional Texts and/or Material***

### ***Course Description***

Algorithm Design. Three semester hours. This course provides an introduction to the design analysis of algorithms. Topics include correctness of algorithms, asymptotic notation, time complexity of algorithms, and NP-completeness. Several algorithm design techniques will be discussed in detail including divide and conquer algorithms, dynamic programming algorithms and greedy algorithms. Algorithms based on these techniques will be studied for solving a wide variety of problems in networks, graph theory, optimization, sorting, string processing, mathematical applications, and other areas. Prerequisite: CSCI 515 (either by earning at least 'B', or passing the screening exam).

The main objective of this course is to teach students how to analyze practical problems in order to identify and develop best algorithms (in terms of time complexity and memory usage) for their solutions.

### ***Student Learning Outcomes***

- 1) To teach students how to analyze algorithms in order to determine their calculation complexity in the terms of Big Oh, Big theta and Omega. Recursions.
- 2) To teach sorting algorithms (such as mergesort and quicksort) and their applications.
- 3) Probabilistic Analysis and Randomized algorithms for sample problems from the following list (not limited to, and not necessarily including all): CS- Hiring, Longest Streaks, Bins and Balls problem, the Birthday paradox, and randomized quicksort.
- 4) Binary search trees and optimal binary search trees, and their applications.
- 5) Dynamic programming algorithms for problems such as line scheduling, matrix chain multiplication, longest common subsequence, and their practical applications.
- 6) Greedy algorithms for problems such as the activity selection problem and its application to resource planning.
- 7) If time permits, Graph Algorithms such as Minimum Spanning Tree algorithms and Dijkstra's shortest path algorithm.

# COURSE REQUIREMENTS

## ***Minimal Technical Skills Needed***

Students must know using the learning management system. They need to know how to program in at least one programming language.

## ***Instructional Methods***

The instructor will cover the topics by the on-line lectures in remote meetings. He will prepare a relevant programming assignment, and practice questions. Answers to practice questions and exams, and approaches to assignment will be discussed.

## ***Student Responsibilities or Tips for Success in the Course***

Students must regularly log into the course website, and participate in discussions in lectures. They need to deliver the assignments on time.

# 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

Final score will be out of 100, and the above percentages will be applied to student's total score to determine the letter grade.

## ***Assessments***

Two midterm exams	
Exam 1	25%
Exam 2	25%
Programming Assignment	15%
Comprehensive final test	35%

Programming assignment, and tests will include questions on each of the student learning outcome listed earlier. There will be practice questions students will be asked to answer. These will not be graded but used as preparation for exams.

The professor reserves the rights to reward students for continuous hard work or for an exceptional novel scientific work (as judged by the instructor) relevant to the topics covered.

## 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](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](mailto: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>

### Interaction with Instructor Statement

The instructor will respond to your questions within 24 hrs unless there are exception situations such as sickness.

## COURSE AND UNIVERSITY PROCEDURES/POLICIES

### *Course Specific Procedures/Policies*

**Tests:** Two tests will be given roughly at regular intervals. Students will be informed of the test dates around a week in advance.

**Makeup:** Except extreme cases (as judged by the instructor), no individual makeup test will be permitted.

**Programming Assignment:** One programming assignment will be given. The programs must be students' own work. The student is supposed to explain his/her work and to answer all questions about the work. All tests are closed book, closed notes, and closed all other materials.

### **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.

### **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.a).

<http://www.tamuc.edu/Admissions/oneStopShop/undergraduateAdmissions/studentGuidebook.a>  
[spx](#)

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>

### **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:

#### [Undergraduate Academic Dishonesty 13.99.99.R0.03](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/undergraduates/13.99.99.R0.03UndergraduateAcademicDishonesty.pdf>

#### [Graduate Student Academic Dishonesty 13.99.99.R0.10](#)

<http://www.tamuc.edu/aboutUs/policiesProceduresStandardsStatements/rulesProcedures/13students/graduate/13.99.99.R0.10GraduateStudentAcademicDishonesty.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](mailto:studentdisabilityservices@tamuc.edu)

Website: [Office of Student Disability Resources and Services](#)

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

### **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.

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>

## COURSE OUTLINE / CALENDAR

### TOPICS BY WEEKS

WEEK	TOPIC
1-2	Time complexity analysis, algorithm correctness, recursion, recurrences
3	Sorting algorithms
4	Probabilistic analysis of algorithms
5	Binary search trees, Quiz 1, and review
6	Exam 1
7-8	Dynamic programming algorithms, Programming Assignment 1 is due
9	Quiz 2, and Review
10	Exam 2
11-12	Greedy algorithms, graph algorithms, Programming Assignment 2 is due.
13	Quiz 3, Review
14	Final Exam

From the textbook, Chapters 1, 2, 3, 4, 5, 12, 15 (.1, .2, .4), 16.1, 16.2, and 24.3 will be covered. If time permits some additional selected topics may also be covered.

There can be some modifications to the schedule based on agreements between the instructor and the students.

*The syllabus/schedule are subject to change.*