# CSCI532.01W
# Algorithm Design

COURSE SYLLABUS: SUMMER II 2022

7/11 - 8/11, 2022

WEB-BASED (MEETING TIMES WILL BE ANNOUNCED)

## INSTRUCTOR INFORMATION

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

**Office Location:** JOUR 206
**Office Hours:** W: 3:30pm-6pm

**Office Phone:** 903 468 3097
**Office Fax:** 903-886-5404

**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 Materials*

## *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 relevantprogramming 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

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

## 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*

**Practice Questions:** are to be solved independently during the allocated time. Sample answers will be discussed.

**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.

## 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.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

## 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

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.

# COURSE OUTLINE / CALENDAR

TOPICS AND ACTIVITIES BY WEEKS

| WEEK | TOPIC |
| --- | --- |
| 1 | Time complexity analysis, algorithm correctness, recursion, recurrences, divide and conquer long integer and matrix multiplication algorithms |
| 2 | Sorting algorithms, probabilistic analysis of algorithms, binary search trees and review, Practice Questions, Exam 1 |
| 3 | Dynamic programming algorithms. Programming Assignment is posted, Practice Questions, greedy algorithms, Exam 2 |
| 4 | Programming Assignment is due; Practice Questions, other graph algorithms, review, 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 on the schedule based on agreements between the instructor and the students.

The *syllabus/schedule are subject to change.*