University of North Texas
Department of Computer Science and Engineering

CSCE 5150 – Analysis of Computer Algorithms

Session: Spring/2024

Class:

5150-003 (9574) - Tu 5:30 PM - 8:20 PM- **Gab 105**

Instructor:
Dr. Moawia Eldow
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Office hours: **TuTh 12:30-2:00 PM**

IAs/TAs:
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Description:
The study of efficient algorithms for various computational problems. Topics include advanced techniques of algorithm design: divide-and-conquer, the greedy method, dynamic programming, graph algorithms, and selected advanced topics. Other topics include NP-Completeness theory, including approximation algorithms and lower bound theory.

Course Objectives:
By the end of this course, students will be able to:
1. know the fundamentals of computer algorithms.
2. know how to analyze a computer algorithm.
3. know how to frame a problem and specify its solution with an appropriate algorithm.
4. have a good understanding of computer programming, data structures, and computer algorithms.
5. understand the key ideas behind divide and conquer, greedy algorithm, dynamic programming, and graph algorithms.
6. understand the theories behind NP-Completeness.

Prerequisites:
Programming with one of the high-level languages such as Python, C++, or Java; Introductory courses on data structures and algorithms.

Textbook:

Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stien, MIT Press, **Third Edition**.

Grades and grading policy:

Participation	**5%**
Homework Assignments	**35%**
Programming Assignments	**20%**
Midterm Exam	**20%**
Final Exam	**20%**

The letter grade will be assigned based on the following scale:

Grade	5150
A	90 and Above
B	[80-90)
C	[70-80)
D	[60-70)
F	Below 60

Homework Assignments:

Written individual homework assignments/exercises ***will be due at 11:59 p.m. on Fridays.*** Assignments must be turned in using the dropbox on canvas.

Programming Assignments:

Programs may be written in any language as long as the TA/Grader and the instructor are able to build and execute from source code, and ***will be due at 11:59 p.m. on Fridays***. If in doubt, contact the instructor to verify that the programming environment is acceptable. Instructions will be provided in Canvas. Programs must be turned in using the dropbox on canvas.

Exams:

There will be one midterm exam (***The First Exam***) during the semester at the normal lecture time, which will cover ***the first half*** of the class topics. There will also be a final exam (***The Second Exam***) during finals week, which will cover ***the second half*** of the class topics.

Late Submission Policy:

Assignments may be turned in late, but not more than two weeks. All the late submissions **may lose a percentage of their graded point values** according to the following schedule:

On time : **0%,** 1-3 days : **10%,** 4-7 days : **20%,** 8-14 days : **40%,** > 14 days : **100%**

Announcements

Stay tuned and make sure to check Canvas frequently. Important announcements will be posted there.

Academic Policies

No cheating or plagiarism is allowed in assignments and exams. Academic dishonesty will result in a final course *grade of "F".* "Sharing/reuse" of solutions to assignment problems is strictly prohibited. All work turned in with your name on it must be your own work.

Other Policies:

Students should refer to any other polices from university, college and department.

<u>CSCE 5150 - Course Outline (*Tentative Schedule*):</u>

<u>Week</u>	**<u>Classes, Reading chapters and Topics</u>**	**<u>Homework (HW) & Programing Assignments (PA) – (due date)</u>**
Jan 15-19	Overview of Class, Algorithms in Computing (Ch1), and Getting started with Algorithms (Ch2)	
Jan 22-26	Growth of Functions (Ch3)	**HW1 (02/02)**
Jan 29-Feb 2	Divide and Conquer (Ch4)	
Feb 5-9	Divide and Conquer (cont.)	**HW2 & PA1 (02/16)**
Feb 12-16	Dynamic Programming (Ch15)	
Feb 19-23	Dynamic Programming (cont.)	**HW3 & PA2 (03/01)**
Feb 26-Mar 1	Sorting in Linear Time (Ch8)	**HW4 (03/08)**
<u>Mar 4-8</u>	**Mid-Term Exam (Online):** ***<u>Tuesday (03/06/2024), Available From 5:30 pm to 8:30 pm</u>***	
Mar 11-15	Spring Break – ***No classes***	
Mar 18-22	Greedy Algorithms (Ch16)	**HW5 & PA3 (03/29)**
Mar 25-29	Elementary Graph Algorithms (Ch22), and Minimum Spanning Trees (Ch23)	
Apr 1-5	Single-Source Shortest Paths (Ch24)	**HW6 & PA4 (04/12)**
Apr 8-12	All-Pairs Shortest Paths (Ch25)	
Apr 15-19	NP-Completeness & Approximation Algorithms (Ch34 & Ch35)	**HW7 (04/26)**
Apr 22-26	String Matching Algorithms (Ch32)	
Apr 29-May 3	Review week	
<u>May 6-10</u>	**Final Exam (Online):** ***<u>Tuesday (05/07/2023), Available from 5:30 pm to 8:30 pm</u>***	