University of North Texas
School of Computer Science

4110-002 Algorithms
Spring 2023

Course Outline (Syllabus)

Instructor: Dr. Abdelnasser Ouda
Office: F203 Discovery Park
Email: abdelnasser.ouda @ unt.edu (best way to contact me)
Office Hours: Monday 12:15 pm – 2:15 pm

Note: Only email originating from a valid University of North Texas student account will be accepted from students wishing to contact the instructor. Include your full name and student ID in your correspondence.

Prerequisites: CSCE 3110

Course TA(s): Akshat Khapra akshatkhapra@my.unt.edu
Naga Sai Reddy Tangirala nagasaireddytangirala@my.unt.edu

Lectures & Labs:
Monday 10:30 am – 11:50 am (Discovery Park Room: E265)
Wednesday 10:30 am – 11:50 am (Discovery Park Room: E265)

Course Description:
Time complexity of algorithms; algorithm design methodologies including divide and conquer, greedy, and dynamic programming; exposure to approximation algorithms for NP-hard problems; performance evaluation of algorithms.

Course Goals/Outcomes:
4110 surveys some important computer algorithms and related data structures used in object-oriented software engineering today. These algorithms and data structures are discussed using Java programming language. It covers the design, performance analysis and implementation of such algorithms in Java, stressing their practical use in large software applications or systems.

Upon successful completion of this course part, students will be able to:
1. Be able to analyze the time and space complexity of a nontrivial algorithm, using mathematical tools, and prove/justify the correctness.
2. Understand the Divide and Conquer, Greedy, and Dynamic Programming strategies for algorithmic design.
3. Be familiar with the algorithms for Matrix Multiplication (Strassen's), Activity Selection, Knapsack, Shortest Paths (single source, and all pairs), Minimum Spanning Tree (Prim's and Kruskal's), Matrix Chain, and Longest Common Subsequence problems.
4. Be exposed to approximation algorithms for solving NP-hard problems.
5. Be able to determine and measure the efficiency of a given algorithm, in practice, through different possible implementations, and by testing on suitable data sets.
6. Be able to communicate clearly and precisely in writing about the theoretical analysis of an algorithm and its efficiency in practice.

Reference Textbook:
- Introduction to Algorithms, 3rd; Triliteral MIT. ISBN 9780262033848

Other Textbook:

Supplements:
All course notes and course webpage are available through the Canvas Learning Management System (LMS) at https://canvas.unt.... (login with your UNT ID and password). Class slides will be posted before/after classes.

NOTE: Students must note that the Canvas content is certainly not a substitute for attending lectures, completing assigned readings, programming and general practice. Students must not rely on previous examinations as sole study aids – examinations are created anew for each semester. Finally, Canvas will be used for some announcements, but students are expected to attend lectures to stay fully informed about course related matter and materials.

Student Evaluation:
- 2 Quizzes 10% (5% each)
- 3 Assignments 30% (10% each)
- Exam1 (closed book) 20%
- Exam2 (closed book) 40%

Passing Grade
To obtain a passing grade in the course a mark of 50% or more must be achieved on each component. A final examination mark <50% will result in a final course grade of 48% or less. Assignment works are on time if sent in the course Canvas at the prescribed due date. 10% will be deducted from the available marks for each day late for up to a maximum of 3 days.

Syllabus Disclaimer:
Information contained in this syllabus is, to the best knowledge of the instructor, considered correct and complete when distributed to the students. The instructor reserves the right, acting within policies and procedures of the University of North Texas, to make necessary changes in course content or instructional techniques without prior notice or obligation to the student.

From the Registrar’s office:
You are not allowed to attend classes for this course unless you are officially registered, and your name appears on the current class list. Assignments will not be accepted, you will not be allowed to write tests or examinations, and credit will not be granted to any student who is not properly registered. "Financial Ineligibility" will not be accepted as a reason for non-registration in a course and will not be considered as a rationale to support a late registration.

CAUTION: This course assumes the student will allocate a significant amount of independent study and time spent on coding. You are strongly encouraged to ensure that sufficient time is allocated to succeed in this course. Each week a student is expected to spend at least: 2hrs for Independent Study and 3.5hrs for assessment (e.g. assignments, quizzes, projects, exams)

NOTE: Students need to be aware for all University of North Texas policies regarding course regulations.