CS435 – H02Spring 20253 CreditsAdvanced Data Structures and Algorithm Design

Course Description

Advanced topics in data structures and algorithms, involving sequences, sets, and graphs such as searching, sorting, order statistics, balanced search tree operations, hash tables, graph traversals, graph connectivity and path problems. Algebraic and numeric algorithms. Performance measures, analysis techniques, and complexity of such algorithms.

The honor's section is specifically designed for highly motivated students who seek to deepen their understanding and engage with the material at an advanced level. Students will participate in complex and comprehensive projects that demand innovative thinking and advanced problem-solving skills.

Course Prerequisites

- CS241 (Foundations of Computer Science I)
- CS288 or CS116 (Introduction to Computer Science II)

Instructor: Dr. Itani

Email:	itani@n	jit.edu
Office:	GITC 4317C	
Office Hours:	Μ	01:00pm-02:20pm
	R	01:00pm-02:20pm
	and by a	appointment.

YWCC Tutoring Program

The Ying Wu College of Computing at NJIT is committed to helping its students thrive and succeed academically. The YWCC tutoring program is a key part of that commitment. For more information, please visit undergraduate tutoring at: <u>https://computing.njit.edu/undergraduate-tutoring-1</u>

Grading Formula

- Projects: 12% of Total Grade
- Recitation: 10% of Total Grade
- Midterm 1: 16% of Total Grade
- Midterm 2: 26% of Total Grade
 Final: 36% of Total Grade

On Monday 02/24/2025 On Monday 03/31/2025 Between 05/10/2025 and 05/16/2025

Grades will be assigned as follows:

- A [80% to 100%) B+ [75% to 80%) B [70% to 75%) C+ [65% to 70%)
- C+ [65% to 70%)
- C [60% to 65%)
- D [50% to 60%)

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Textbook

Cormen, Thomas H., et al. Introduction to Algorithms. 4th edition, MIT Press, 2022. ISBN: 978-0-262-04630-5 (Hardcover).

Course Outline

- Complexity Analysis
- Review of Elementary Data Structures
- Recurrences
- Algorithm Design Techniques
- Review of Elementary Sorting Algorithms
- Advanced Sorting Algorithms
- Lower Bounds on Comparison-based Sorting
- Priority Queues
- Hashing
- Union-Find Algorithms
- Advanced Data structures
- Balanced Trees
- Graph Algorithms
- Number Theory and Cryptography

Policies

- Class attendance is mandatory. The final grade will be reduced by 1% for every unexcused absence.
- LockDown Browser and Respondus Monitor will be used to ensure the integrity of all exams. Students are required to have a working laptop with at least 150 minute battery life, webcam, and microphone to take an exam.
- You must bring a valid government or university issued Photo ID to all exams.
- There are no make-up exams. Students who fail to take an exam will receive a score of zero. If you miss the midterm because of a documented special circumstance you may, at the instructor's discretion, receive an imputed grade based on the final exam.
- Use of Generative AI, such as ChatGPT, is prohibited.

Statement on Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

http://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online site inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.