**CS430 INTRODUCTION TO ALGORITHMS - FALL 2023** Matthew Bauer [bauerm@iit.edu](mailto:bauerm@iit.edu)

Lecture: Mon/Wed 8:35-9:50am SB-104 Recitation: Fri 9-9:50am SB-104 Office Hours: post questions to [Discord cs430](https://discord.gg/TmyECrf)

TAs: Hao Ding [hding9@hawk.iit.edu](mailto:hding9@hawk.iit.edu) Fri 8:00-10:00pm online [ZOOM](https://iit-edu.zoom.us/j/85129441367?pwd=emFIYjBwYTNHTW9LcjJ1T2dpM1ZUUT09) Meeting ID: 851 2944 1367 Passcode: 050447

Gai Hao [ghao3@hawk.iit.edu](mailto:ghao3@hawk.iit.edu)

ARC SI: Elisha Maria Krista Orlina [eorlina@hawk.iit.edu](mailto:eorlina@hawk.iit.edu)

Required Textbook: Introduction to Algorithms, 4th edition (or 3rd), by Thomas Cormen, Charles Leiserson, Ronald Rivest, and Clifford Stein. MIT Press offers low-cost eTextbook rentals <https://mitpress.ublish.com/book/introduction-to-algorithms-4#purchase>

See the [CS430 Google Drive](https://drive.google.com/drive/folders/1SH2DMVWbeOtPbV7P-AyvhWy-0eoXrkXy?usp=sharing) for copies of all lecture handouts, recitation problems, and homework assignments. You have view and download access to everything in this drive.

Catalog Description: Introduction to the design, behavior, and analysis of computer algorithms. Searching, sorting, and combinatorial algorithms are emphasized. Worst case and average bounds on time and space usage. Prerequisites: ((CS 330 or MATH230) and CS 331) or CS401 or CS403. (3-1-3)

Learning Goals: Students will be able to:  
- Prove algorithm correctness and complexity.  
- Solve problems using data structures and algorithms and provide justification for your approach.  
- Apply algorithmic approaches to develop algorithms for new problems.

Attendance: In-person attendance is required for all lectures, recitations, and exams. In case of illness or emergency, you must contact me before the lecture, recitation, or exam for an excused absence and I will provide materials on the content you miss. There will be no materials provided by me for unexcused absences.

Lectures: Pre-reading the textbook, viewing the pre-lecture videos, and preparing your own notes on the lecture handouts are all essential to success. Ignore the references in the pre-lecture videos to what lecture number it is and the pre-lecture quizzes. The pre-lecture quizzes have been incorporated into the lecture handouts.

Lecture Participation: To earn the 5 lecture participation points, students are expected to be prepared and to actively participate in lecture, either by asking or answering questions (please say your name clearly to get credit), or when called upon randomly. Students can expect to be called on, or volunteer, once every 3 weeks. I will post updated lecture participation points in Blackboard after each exam. Up to 5 optional participation points can be earned by asking questions via Discord (include your name in the post). [Optional Participation](https://docs.google.com/spreadsheets/d/1gGFX07_u-nn1dP5V_X0EW9582ePJRcj8geFbftNfnto/edit?usp=sharing) points will reduce the dependence on exams for your final grade but will not replace the lecture participation.

Recitations: Recitations are problem solving sessions run by the TA. All recitation problems are taken from previous exams. There are multiple choice quizzes (open book, open notes, discussions with classmates allowed) in Blackboard at the end of all recitations. No unexcused absence make-up quizzes allowed. All homework assignments are submitted as a single PDF (typed or clear handwriting) in Blackboard by midnight on the recitation due date. No late homework accepted without notifying me before the deadline. One-day extensions can be granted if you contact me before the submission deadline. Homework answer keys will be emailed Monday noon following the due date of the homework.

Assignments: Homework (7)-20% LectureParticipation-5% Quizzes(12)-5% Exam#1-20% Exam#2-20% Exam#3-30%

A=90-100 B=80-89 C=70-79 D=60-69 E=0-59 No extra credit. Students with unexcused absences that are close to a letter grade boundary will receive the lower grade. Exams will be individual work, closed book, closed notes, no electronic devices, no questions answered, no bathroom breaks, and assigned seats.

Ethics: Any behavior on any homework or exam that could be considered copying or cheating will result in an immediate zero on the assignment for all parties involved and will be reported to academichonesty@iit.edu. See the IIT Code of Academic Honesty <https://web.iit.edu/student-affairs/handbook/fine-print/code-academic-honesty>

Reasonable accommodation will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources (CDR) located at 3424 S. State Street - 1C3-2, 312 567.5744 or disabilities@iit.edu

Illinois Tech’s Sexual Harassment and Discrimination Information: Illinois Tech prohibits all sexual harassment, sexual misconduct, and gender discrimination by any member of our community. This includes harassment among students, staff, or faculty. Sexual harassment of a student by a faculty member or sexual harassment of an employee by a supervisor is particularly serious. Such conduct may easily create an intimidating, hostile, or offensive environment. Illinois Tech encourages anyone experiencing sexual harassment or sexual misconduct to speak with the Office of Title IX Compliance for information on support options and the resolution process. You can report sexual harassment electronically at [iit.edu/incidentreport](about:blank), which may be completed anonymously.

You may additionally report by contacting the Title IX Coordinator, Virginia Foster at foster@iit.edu or the Deputy Title IX Coordinator at eespeland@iit.edu. For confidential support, you may reach Illinois Tech’s Confidential Advisor at (773) 907-1062. You can also contact a licensed practitioner in Illinois Tech’s Student Health and Wellness Center at student.health@iit.edu or (312)567-7550. For a comprehensive list of resources regarding counseling services, medical assistance, legal assistance and visa and immigration services, you can visit the Office of Title IX Compliance website at <https://www.iit.edu/title-ix/resources>.

**Communication is critical to the success and satisfaction of the learning experience. Please email me about any class issues.**

| Week | **Pre-Lecture Work (due before Monday Lecture)** | **Lecture (Monday/Wednesday)** | **Recitation (Friday)** |
| --- | --- | --- | --- |
| 1 - 8/21 | [Pre-Lecture 01 Video (9:25)](https://drive.google.com/file/d/1hTaA0cS4rdNlPtTMQxhSBEy38iajTx2M/view?usp=drive_link) CLRS 1, 2, 3 | Lecture01-Introduction to Algorithm Analysis  Lecture02-Asymptotic Analysis | Recitation01 |
|  |  |  |  |
| 2 - 8/28 | [Pre-Lecture 02 Video (7:41)](https://drive.google.com/file/d/1FkAWXnJ8P_aHAi07T0KDMozj7WQVgY_7/view?usp=drive_link)  CLRS 3, 4.3-4.5 | Lecture03-Asymptotic Analysis, Recursive Algorithms  Lecture04-Recurrence Relations, Divide & Conquer Algorithms, Inductive Proof | Recitation02 |
| 3 - 9/4 | [Pre-Lecture 03 Video (9:19)](https://drive.google.com/file/d/14Tte8dKokSsQJn7pxw50NUJEY1o7Ucv_/view?usp=drive_link)  CLRS 4.3-4.5, 7 | [Lecture05A-Solving Recurrence Relations-Inductive Proof Method (29:03)](https://iit.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=c29b3dfc-99f9-4c6f-bb11-b05701467bd5)  [Lecture05B-Solving Recurrence Relations-Iteration Method (13:56)](https://iit.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=bc0906d7-a2e2-4a7a-b432-b05701536e41)  [Lecture05C-Solving Recurrence Relations-Master Method (5:37)](https://iit.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=0ac70452-d353-4038-b8f1-b057015c995e)  Lecture06-Divide & Conquer Sorting Methods | Recitation03 HW #1 (lectures 01-05) due midnight in Blackboard |
| 4 - 9/11 | [Pre-Lecture 04 Video (5:45)](https://drive.google.com/file/d/1JPlpuGiccLgAIbhwV-EDbQw6W1ZphKsw/view?usp=drive_link)  CLRS 6, 8.1-8.3 | Lecture07-Divide & Conquer Sorting Methods  Lecture08-Lower bound on sorting | Recitation04 HW #2 (lectures 06-08) due midnight in Blackboard |
| 5 - 9/18 | CLRS 9, 12.1-12.3 | Lecture09-Medians and Order Statistics Lecture10-Binary Search Trees | EXAM #1 (lectures 01-08)  Friday 9/22, 8:35-9:50am, SB-104 |
| 6 - 9/25 | [Pre-Lecture 05 Video (7:07)](https://drive.google.com/file/d/1aAqwGEmdhYDADa1Tlgars19WCTvRxGlq/view?usp=drive_link)  CLRS 13 | Lecture11-Balanced Binary Search Trees  Lecture12-Balanced Binary Search Trees | Recitation06  HW #3 (lectures 09-10) due midnight in Blackboard |
| 7 - 10/2 | CLRS 17.1-17.2  [Pre-Lecture 06 Video (8:25)](https://drive.google.com/file/d/1-tn0DEvap0WdrDXWSJIetqO1SuRmc6z4/view?usp=drive_link)  CLRS 14.2-14.5 | Lecture13-Augmenting Data Structures  Lecture14-Intro to Dynamic Programming | Recitation07 |
| 8 - 10/9 | [Pre-Lecture 07 Video (7:25)](https://drive.google.com/file/d/1CYETzgrzA5drJBsttZs1ZfSWvJX09R_k/view?usp=drive_link)  CLRS 14.2-14.5 | [Lecture15A-Intro to Dynamic Programming-Optimal Parenthesization (17:18)](https://iit.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=f5177540-7962-4364-8418-b05900cb3514)  [Lecture15B-Intro to Dynamic Programming-Longest Common Subsequence (29:35)](https://iit.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=2a1dcb82-8b80-452c-b6a5-b05900ef9bff)  Lecture16-Intro to Dynamic Programming | Recitation08 HW #4 (lectures 11-13) due midnight in Blackboard |
| 9 - 10/16 | [Pre-Lecture 08 Video (9:17)](https://drive.google.com/file/d/1C3y4OZsQ3KAX6jCbljhX0vWwDELhn7u8/view?usp=drive_link)  CLRS 15.1-15.3 | Lecture17-Intro to Dynamic Programming, Intro to Greedy Methods  Lecture18-Intro to Greedy Methods | Recitation09 |
| 10 -10/23 | CLRS 15.1-15.3, 16.1-16.2 | Lecture19-Intro to Greedy Methods  Lecture20-Amortized Analysis | Recitation10  HW #5 (lectures 14-19) due midnight in Blackboard |
| 11 - 10/30 | [CLRS 2nd Edition - Binomial Heaps, Fibonacci Heaps](https://drive.google.com/file/d/1NtSA093dQv6-FxaFtts5zgNBuAW2CWPh/view?usp=sharing) | Lecture21-Binomial Heaps  Lecture22-Fibonacci Heaps | EXAM #2 (lectures 09-19)  Friday 11/3, 8:35-9:50am, SB-104 |
| 12 - 11/6 | [Pre-Lecture 09 Video (9:19)](https://drive.google.com/file/d/1UyOsgTNZz_fVw3H83eNEF6mOgDXGnabm/view?usp=drive_link)  CLRS 19.1-19.2, appendix B.4, 20 | Lecture23-Data Structures for Disjoint Sets Lecture24-Graphs, DFS, BFS, Topological Sort | Recitation12 |
| 13 - 11/13 | [Pre-Lecture 10 Video (6:21)](https://drive.google.com/file/d/1S1JQRWDyBehNX0VVXZeZXpQpJ27kZlLh/view?usp=drive_link)  CLRS 20, 21 | Lecture25-Graphs, DFS, BFS, Topological Sort Lecture26-Minimum Spanning Trees | Recitation13 HW #6 (lectures 20-23) due midnight in Blackboard |
| 14 - 11/20 | CLRS 22.1-22.3 | Lecture27-Shortest Paths No Lecture Wednesday | No Recitation Friday |
| 15 - 11/27 | CLRS 22.1-22.3, 23.1-23.2 | Lecture28-Shortest Paths Lecture29-Shortest Paths | Recitation15  HW #7 (lectures 24-29) due midnight in Blackboard |
| Final’s Week |  |  | EXAM #3 (lectures 20-29)  TBA |