

Schedule
Introduction to Graduate Algorithms.
Spring 2023.

- **WEEK 1 (Jan 9-13)** Dynamic Programming (Chapter 6 on the book).
First day of classes: Monday, January 9.
~~LIS, LCS (DP1 lecture video).~~
Homework 0 (*)
Logistic Quizzes released (graded).
Meet your team. Wednesday, 8pm EST via Teams.
- **WEEK 2 (Jan 16-20)** Dynamic Programming (Chapter 6).
Knapsack, Chain Multiply (DP2 lecture video)
Shortest paths (DP3 lecture video)
HW1 released. Poll 1 released.
- **WEEK 3 (Jan 23-27)** Divide and conquer I (Chapter 2).
Fast Multiplication, Recurrences. (DC1 and DC3 lecture videos)
HW2 released. Coding Project I Released. Poll 2 released.
Class Communication and Logistics is due.
- **WEEK 4 (Jan 30- Feb 3)** Divide and conquer II (Chapter 2).
Fast Fourier Transform (DC4-DC5 lecture videos)
Median of medians (DC2 lecture video)
HW3 released. Poll 3 released.
Academic Integrity Quiz is due.
- **WEEK 5 (Feb 6-10)** RSA cryptosystem (Chapter 1).
Modular Arithmetic (RA1 lecture video)
RSA protocol, primality testing (RA2 lecture video)
EXAM 1 Thursday, Feb 9 10am-Monday, Feb 13 8am. Will cover content from weeks 1 to 4.
- **WEEK 6 (Feb 13-17)** Graph algorithm I (Chapter 3 and 4).
Strongly Connected Components (GR1 lecture video)
2-SAT (GR2 lecture video)
HW4 released. Poll 4 released.
- **WEEK 7 (Feb 20-24)** Graph algorithm II and Max Flow I (Chapters 3, 5 and 7).
MST (GR3 lecture video)
Ford-Fulkerson algorithm for Max-flow (MF1 lecture video)
HW5 released. Poll 5 released.
- **WEEK 8 (Feb 27-March 3)** Max Flow II (Chapter 7).
Max-flow=min-cut (MF2 lecture video)
Image segmentation (MF3 lecture video)
Flow variant: demands (MF5 lecture video)
HW6: RSA released.
Coding Project II released.

- **WEEK 9 (Mar 6-10)** Max Flow III (Chapter 7).
Edmonds-Karp algorithm for max-flow (MF4 lecture video)
EXAM 2 Thursday, Mar 9 10am-Monday, Mar 13 8am. Will cover content from weeks 5 to 9.
- **WEEK 10 (Mar 13-17)** NP completeness (Chapter 8).
NP, Reductions (NP1 lecture video)
3-SAT (NP2 lecture video)
Graph problems (NP3 lecture video)
HW7 released. Poll 6 released.
- **WEEK 11 (Mar 20-24)** **Spring Break.**
- **WEEK 12 (Mar 27-31)** Linear programming (Chapter 7).
LP introduction (LP1 lecture video)
Duality and Geometry (LP2 lecture video and LP3 lecture video)
HW8 released. Poll 7 released.
- **WEEK 13 (Apr 3-7)** NP and LP (Chapter 7 and 8).
Max-SAT approximation algorithm. (LP4 lecture video)
Knapsack (NP4 lecture video)
Coding Project III released. Poll 8 released
- **WEEK 14 (Apr 10-14)** More on complexity (Chapter 8).
Halting problem (NP5 lecture video)
EXAM 3 Thursday, Apr 13 10am-Monday, Apr 17 8am. Will cover content from weeks 10 to 13.
- **WEEK 15 (Apr 17-21)** Markov Chains (*) (GR4 Lecture video)
- **WEEK 16 (Apr 24-28)** Final Week.
Last day of classes: Tuesday, April 25.
Final Exam. Cumulative. **Thursday, April 27 at 10am- Monday, May 1 at 8am.**

Material and assignments marked with (*) won't be graded. Please do not submit.