

Spring 2024

CS 506-852: Foundations of Computer Science

Adrian Ionescu

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CS 506 COURSE SYLLABUS – SPRING 2024

CS 506: Foundations of Computer Science

Number of Credits: 3

Course Description: The course assumes basic knowledge of a higher-level programming language. Introduction to the concepts of iteration, asymptotic performance analysis of algorithms, recursion, recurrence relations, graphs, automata and logic, and also surveys the main data models used in computer science including trees, lists, sets, and relations.

Course Objectives (what you are expected to know to complete this course)

1. Know set algebra, propositional logic, reasoning, and basic proof techniques.
2. Know basic mathematical tools and terminologies used in computer science such as lists, sets, and relations.
3. Know induction, recursion, recurrence equations.
4. Know the mathematical tools used to analyze efficiency of algorithms and implement simple programs to measure their time complexity.
5. Learn permutations/combinations, basic discrete probability.
6. Understand graphs, trees, basic automata.
7. Apply the concepts learned in class by implementing programs in a high-level language.

Textbook: R. Johnsonbaugh, "*Discrete Mathematics*," Pearson, 8th Ed

Instructor:

CS 506-852	Adrian Ionescu
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Grading Policy: The final grade in this course will be determined as follows:

▪ Homework & Programming Assignments	30%
▪ Midterm Exam:	35%
▪ Final Exam:	35%

Notes: Pictured NJIT ID required for all exams. Exams are on campus, if possible. A practice test will be posted on Canvas before each test.

Academic Integrity: Familiarize yourself with NJIT Honor Code. All Students should be aware that the Department of Computer Science takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code

on Academic Integrity, students are obligated to report any such activities to the instructor.

Drop Date: Please note that the University Drop Date **Monday, April 4, 2024**, deadline will be strictly enforced.

Homework and Programming Assignments: Homework assignments will be posted on Canvas. The problem sets may be either typed or handwritten (neatly) and uploaded in PDF format only. The programming assignments must be implemented and run, producing the desired results. The submission format of these assignments will be detailed for each assignment. Assignments must be done by you individually (teamwork not allowed.) We will use various programming source modules such as <https://techdevguide.withgoogle.com/paths/data-structures-and-algorithms/>

Makeup Exam Policy: There will be **NO MAKE-UP EXAMS** during the semester. In the event the Final Exam is not taken, under rare circumstances where the student has a legitimate reason for missing the final exam, a makeup exam will be administered later. In any case the student must notify the instructor that the exam will be missed and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice.

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at oars@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services office authorizing your accommodations will be required. For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at: <https://www.njit.edu/accessibility/>

Important Dates (See: [Spring 2024 Academic Calendar, Registrar](#))

Date	Day	Event
January 16, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Sunday	Spring Recess Begins

March 16, 2024	Saturday	Spring Recess Ends
March 29, 2024	Friday	Good Friday - No Classes
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Friday Classes Meet
April 30, 2024	Tuesday	Last Day of Classes
May 1, 2024	Wednesday	Reading Day 1
May 2, 2024	Thursday	Reading Day 2
May 3 - May 9, 2024	Friday-Thursday	Final Exam Period

COURSE OUTLINE

WEEK	Johnsonbaugh	Topics
1 -2	Chapter 1	Sets and Logic: Sets, Propositional Logic, Quantifiers
3-4	Chapter 2	Proof Techniques: Direct Proof, Counterexample, Contrapositive, Proof by Contradiction, Enumeration Proof, Proof by Induction; Strong Induction
5-6	Chapter 3	Functions and Relations: Functions Relations Properties: Reflexive, Symmetric, Transitive; Partial Order, Total Order, Equivalence Relations, Matrices of Relations Application: Relational Databases
7	Chapter 4	Algorithms: Analysis of Algorithms, Recursive Algorithms, Use of Recurrences to Analyze Algorithms
8	Midterm	PRACTICE TEST and MIDTERM
9-10	Chapter 7	Recurrence Equations: Divide-and-Conquer Recurrences, Master Theorem, Linear Recurrences
11-12	Chapter 6	Counting Methods: Permutations and Combinations, Principle of Inclusion/Exclusion, Pigeonhole Principle, Introduction to Basic Probability
13-14	Chapters 8-9,12	Introduction to Trees and Graphs, Automata
15	Review	PRACTICE TEST and FINAL EXAM

Prepared By: Prof. Adrian Ionescu

Last revised: January 10, 2024