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Spring 2023

CS 341: Foundations of Computer Science II

Adrian Ionescu

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CS 341 COURSE SYLLABUS – SPRING 2023

NJIT ACADEMIC INTEGRITY 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.

CS 341:   Foundations of Computer Science II

Number of Credits: 3

Course Description: This course provides an introduction to automata theory, computability theory, and complexity theory. Theoretical models such as finite-state machines, push-down stack machines, and Turing machines are developed and related to issues in programming language theory. Also, the course covers undecidability and complexity classes P, NP, and NPC. *Prerequisites*: (CS 241 or MATH 226) and CS 280.

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

1. Automata Theory: Regular Languages (Finite Automata, Regular Expressions), Context-Free Languages (Context-Free Grammars, Pushdown Automata), etc.
2. Computability Theory: Turing Machines, The Church–Turing Thesis, Decidability, Reducibility, etc.
3. Complexity Theory: Time Complexity (Complexity Classes P, NP, and NP-complete), etc.

Textbook: Textbook: Michael Sipser, *Introduction to the Theory of Computation*, Third Edition. Course Technology, 2012.ISBN:113318779X.

Instructor:

CS 341-002, CS 341-004	Adrian Ionescu, ionescu@njit.edu

Grading Policy: The final grade in this course will be determined as follows:

▪ **Quizzes (30%) includes Homework/ Projects (5%)**	30%
▪ **Midterm Exam:**	35%
▪ **Final Exam:**	35%

University-wide Withdrawal Date: Please note that the University Withdrawal Date **Monday, April 3, 2023**. deadline will be strictly enforced.

Homework Policy: Homework problems will be assigned in class. Please try to do as many as possible, and as time permits for everyone.

Attendance: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the Department's Attendance Policy. This policy will be **strictly** enforced. Absences from class will inhibit your ability to fully participate in class discussions and problem-solving sessions and, therefore, affect your grade. Tardiness to class is very disruptive to the instructor and students and will not be tolerated. Each student should have contact information of several fellow students to get homework assignments and class notes when absent. You are responsible for everything that happens in class whether you are present or not. All cellular phones must be switched off during class.

Makeup Exam Policy: There will be **NO MAKE-UP EXAMS OR QUIZZES** 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 by the Instructor / CS department. In any case the student must notify the **Dean of Students and 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, etc., clearly stating the date AND time of the mitigating problem.

Accommodation of Disabilities: Disability Support Services (DSS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT. If you need accommodations due to a disability, please contact Scott Janz, Associate Director, Office of Accessibility Resources and Services at 973-596-5417 or via email at scott.p.janz@njit.edu. The office is in Fenster Hall Room 260. For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at: https://www.njit.edu/studentsuccess/accessibility

Important Dates (See: Spring 2023 Academic Calendar, Registrar)

Date	Day	Event
January 17, 2023	Tuesday	First Day of Classes
January 23, 2023	Monday	Last Day to Add/Drop Classes
March 13, 2023	Monday	Spring Recess Begins
March 18, 2023	Saturday	Spring Recess Ends
April 3, 2023	Monday	Last Day to Withdraw

April 7, 2023	Friday	Good Friday - No Classes
May 2, 2023	Tuesday	Friday Classes Meet
May 2, 2023	Tuesday	Last Day of Classes
May 4 - May 5, 2023	Thursday and Friday	Reading Days
May 5 - May 11, 2023	Friday to Thursday	Final Exam Period

1	Chapter 0	**Introduction**: Automata, Notation, Definitions & Theorems, Types of Proofs (review of CS241)
2-4	Chapter 1	**Regular Languages:** Finite Automata (DFA), Nondeterminism (NFA), Regular Expr, Nonregular Lang
5-7	Chapter 2	**Context Free Languages:** Context Free Grammars (CFG), Pushdown Automata (PDA), Non-CFL, Chomsky
7	Chapter 3	**The Church-Turing Thesis:** Turing Machines
8	Midterm & Review	
9-10	Chapter 4	**Decidability**
10-11	Chapter 5	**Reducibility**
12-14	Chapter 7	**Complexity Theory**

Tutoring Link: HTTPS://COMPUTING.NJIT.EDU/TUTORING

Prepared By: Prof. Adrian Ionescu, Revised: January 11, 2023