Syllabus

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CSCI 26500 // 3 credit course

Summer Session 1 2022: 6 Week - Tue|Thur: 5:45-8:53 PM

In person sessions will meet in Hunter North C109 (in the basement)

Instructor: Ariel Avshalom

Email: csciprofessor+S22-26500 AT gmail DOT com

Office hours: Before or after class on Tuesday by request
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Prereqs:

CSCI 16000; MATH 15000

I strongly recommend reading chapter zero of our textbook before the semester begins.

Textbook:

Introduction to the Theory of Computation 3rd Edition by Michael Sipser

About the Course:

▼ Click to Read About the Course!
At this point, you've all taken some courses in computer science, often times challenging and fun courses like Intro to C++ or Discrete Math. This course is flavored with elements of discrete math and often ranges from interesting to tedious.

You'll learn about the ideas that brought about the computers in use today. From the simplest Finite Automata to Turing Machines, there's a lot to learn. We may also cover the basic principles behind algorithm analysis (when I say basic, I mean that you'll most likely never use the definitions from this course in a real algorithms course).

This course takes a deep dive into proofs, so I highly recommend you brace yourself. They may not seem important in the implementation of code, but they're the reason why everything works the way it does. Once you have a better picture of how a computer works behind the scenes, so much more of what you study in the future will make sense.

It's my hope that we can have fun this semester, studying computer science theory and also taking a deep dive in other more interesting topics when time permits.

See you all soon!

Ariel A.

Course Objectives

Automata, Computability and Complexity: the big picture

▼ Automata
- Regular Languages:
    - (Deterministic) Finite Automata (DFA)
    - Nondeterministic Finite Automata (NFA)
    - Regular Expressions
- Context-Free Languages:
    - Context-Free Grammars (CFG)
    - Pushdown Automata (PDA)

▼ Computability
- Turing Machines
    - What are Turing Machines
    - Variations in Turing Machines
- Algorithms
- Decidability
    - Decidable Languages
    - Undecidable Languages
        - The halting problem
        - *Gödel's incompleteness theorems (provided time permits)
        - Turing unrecognizable languages
- Reducibility

- o Mapping reducibility

▼ Complexity
- Time Complexity
  - o Big O
  - o The Class P
  - o The Class NP
  - o NP Completeness
- Space Complexity (provided time permits)

Grading

Material	Percentage of Grade
Final	35%
Quizzes	40%
Homework	15%
Participation	10%

Important Dates

There will be assigned readings and homework before each class and it's important to stay on top of it. This information will be available in the readme.md file.

Date	Detail
Monday June 20th 2022	College Closed
Wednesday June 22th 2022	Classes follow a Monday schedule
Monday July 4th 2022	**Fourth of July Weekend!**
Tuesday July 5th 2022	Classes follow a Monday schedule!
Tuesday July 12th 2022	**Final Exam**

Contacting Policy

Feel free to contact me regarding questions on homework or coursework. I try to respond to email in a timely manner and I can answer questions after the class as well. When emailing me please include your name and question in the subject line and please make sure that you email csciprofessor+S22-26500 AT gmail DOT com (the + at the end of the address is a cool way to filter mail for Gmail addresses. Gmail will ignore everything after and including the + so the message will still arrive to me.)

Academic Integrity:

"The faculty and administration of Hunter College support an environment free from cheating and plagiarism. Each student is responsible for being aware of what constitutes cheating and plagiarism and for avoiding both. The complete text of the CUNY Academic Integrity Policy and the Hunter College procedure for policy implementation can be found at http://www.hunter.cuny.edu/hr/policies/policies-page. If a faculty member suspects a violation of academic integrity and, upon investigation, confirms that violation, or if the student admits the violation, the faculty member MUST report the violation."

Disability Policy:

"In order to receive disability-related academic accommodations students must first be registered with the Center for Student Disability Services. Students who have a documented disability or suspect they may have a disability are invited to set up an appointment with the Director of the Center for Student Disability Services. If you have already registered with the Center for Student Disability Services, please provide your professor with the course accommodation form and discuss your specific accommodation."

Religious Observances:

State law regarding non-attendance because of religious beliefs can be found in p. 66 of the Undergraduate Bulletin or p. 40 of the Graduate Bulletin).

Online Disclosures:

Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.