Department of Computer Science, Queens College, CUNY
Theory of Computation
CSCI 320
Winter 2023
Instructor: Alex Ryba

Course Description. This is a course about the nature — and limits — of computation. Through the study of membership questions in the languages of several different automata (including Turing machines), we ultimately address the problem of decidability.

Prerequisites and/or co-requisites CSCI 111 and 220 or equivalent.

Required text. *Introduction to the Theory of Computation, 3rd edition, by Michael Sipser*

Class lectures will be given online, live, through Blackboard Collaborate Ultra. Exams will be in person at Queens College. Class meets Moday, Tuesday, Wednesday, Thursday, Friday from 9:00am - 11.50am with a 20 minute break.

Course Topics:

01-03-23	Class 1	Sets, products, functions, partial functions, alphabets, strings, N, finite and infinite sets
01-04-23	Class 2	Countable and uncountable sets, countable unions of countable sets, P(N), binary functions on N, R
01-05-23	Class 3	Regular operations, regular expressions
01-06-23	Class 4	Context free grammars, closure properties
01-09-23	Class 5	Finite automata: DFAs, NFAs
01-10-23	Class 6	Kleene's Theorem, closure properties of regular languages, finite automata
01-11-23	Class 7	Pumping lemmas for regular and context free languages
01-12-23	Class 8	Closure properties of context free languages, Kleene's Theorem, regular grammars
01-17-23	Class 9	PDAs
01-18-23	Class 10	Turing machines, halting, acceptance, recursive and recursively enumerable languages
01-19-23	Class 11	Simulations, non-determinism, universal Turing machine, the Halting Problem
01-20-23	Class 12	Rice's Theorem
01-23-23	Class 13	Algorithms, unsolvable problems

Course Website:

http://venus.cs.qc.edu/~ryba/cs320/

Instructor:
  Alex Ryba
  alexander.ryba@qc.cuny.edu
  Online office hours, by appointment only, immediately after class.

Requirements:
A midterm exam and a final exam.
The final counts for 50% of the course grade.
The midterm counts for 50% of the grade.

Exam Dates:

The midterm exam will be in person during class time on Friday January 13th, 2023.

The final exam will be in person during class time on Tuesday January 24th 2023.

Policy:

No make up exams will be given. If you miss the midterm, your final exam score will be used in its place. If you miss the final you will get a WU for the course, or only in the case of good, sufficient and unforeseen reasons you might qualify for an incomplete grade for the course.

Class lectures will be given online, live, through Blackboard Collaborate Ultra.

To access the lectures, log in to Blackboard, find/click on our class on the left side of the Home Page and then go to Tools and to Blackboard Collaborate Ultra and look for the (active) session. Click on the session and then Join the session. During class, you may write in the chat area on the right side of the page with questions. I will try to keep an eye out — but I will disable your mic's; I might be able to switch on one at a time. It would be nice if you turn on your computer webcam during class lecture so I can see you - but that's not a requirement.

Lectures will be recorded and saved so you should be able to view them through Blackboard after they are given —- for review or if you are unable to attend the live stream. To view a recorded lecture, go to Sessions to the drop down menu and to Recordings. If you want to ask a question (or otherwise appear) in a lecture, please be aware that your contribution will be part of the recorded lecture.

Make sure you can log in to Blackboard. If you cannot, please contact the Help Desk at 718-997-4444. Please familiarize yourselves with how Blackboard works. For example, you may wish to view

`https://keepteaching.qc.cuny.edu/i-need-help-with/video-conferencing`

If my internet connection fails during a lecture, please don't leave; I will reconnect as soon as I can.

Reminder:
  The class will not meet on:
  Monday, January 16, 2023

Class Announcements

All major class announcements will appear on Blackboard in Announcements and will also be posted on the course website:

`https://venus.cs.qc.cuny.edu/~ryba/cs320/`

Please regularly check the Announcements folder and the website. You are each responsible for all class announcements made in lecture and posted to Blackboard — whether or not you are in attendance in the live class lecture. Bulk email messages will be rare. (The email addresses I will use for you are the ones in Blackboard. Make sure your Blackboard email address is updated. You can update the address you have listed on Blackboard by clicking on *Update Email* in the *Tools* section of your homepage; do not confuse this with the Tools section on the course page. The Tools section for updating your email is on the main page where all your courses appear. If you are unsure which email is listed, under the same *Tools* section on your homepage, click on *Personal Information* then *Edit Personal Information*. In addition, you should check and update your CUNYFirst email address.)

Learning Goals. A solid understanding of the theory of computation. Successful students will be able to solve problems including some that require complete and correct mathematical proofs. Successful students will also complete similar exam questions.

Reasonable Accommodations For Students With Disabilities

Students with disabilities needing academic accommodation should register with the Special Services Office by emailing `QC.SPSV@qc.cuny.edu`. For more information about services available to Queens College students, visit the Office of Special Services website:

`https://www.qc.cuny.edu/studentlife/services/specialserv/Pages/default.aspx`

CUNY Policy On Academic Integrity

Academic Dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension, and expulsion as provided at

`https://www.cuny.edu/about/administration/offices/legal-affairs/policies-procedures/academic-integrity-policy/`.

Please read this document, paying careful attention to the sections on plagiarism and Internet plagiarism. If you are not sure how to cite work you have found on the internet, please review the APA Guidelines provided by the Purdue OWL.

Netiquette

Please maintain a professional demeanor when posting online. You can be respectful even when you have a difference of opinion. Treat others as you'd want to be treated yourself. Don't type in all caps, as that is the online equivalent of shouting. If you need to emphasize a word or phrase, use italics.

Statement on student wellness

As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. QC services are available free of charge. You can learn more about confidential mental health services available on campus at:

`https://www.qc.cuny.edu/StudentLife/services/counseling/counseling/`.

Use of Student Work

All programs in New York State undergo periodic reviews by accreditation agencies. For these purposes, samples of student work are occasionally made available to those professionals conducting the review. Anonymity is assured under these circumstances. If you do not wish to have your work made available for these purposes, please let the professor know before the start of the second class. Your cooperation is greatly appreciated.

Recording Consent

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.