CSCI 262: Introduction to Computer Science Theory

Course Syllabus

NOTE: The information presented in this syllabus is subject to change during the semester.

Course Description

This course provides an introduction to the theory of computation, including formal languages, grammars, automata theory, computability, and complexity.

Prerequisites are: MATH 190 and CSCI 141 (or equivalent).

Course Learning Outcomes

- Students should demonstrate an understanding of basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory.
    - *Evaluation: Assessed by homeworks, quizzes and exams.*
- Students should be able to relate practical problems to languages, automata, computability, and complexity.
    - *Evaluation: Assessed by homeworks.*
- Students should demonstrate an increased level of mathematical sophistication.
    - *Evaluation: Assessed by homeworks, quizzes and exams.*
- Students should demonstrate an understanding of and be able to apply mathematical and formal techniques for solving problems in computer science.
    - *Evaluation: Assessed by homeworks, quizzes and exams.*

Course Materials

Required Textbook

- Michael Sipser, *Introduction to the Theory of Computation*, ***Third** edition*, Cengage Learning, 2013.

Additional Resources

- JFLAP (Java Formal Languages and Automata Package), freely available from https://www.jflap.org
- "Introduction to Languages and the Theory of Computation", John Martin, 3rd edition
- "An Introduction to Formal Languages and Automata", Peter Linz, 6th edition
- "Introduction to Automata Theory, Languages and Computation", John Hopcroft et al, 3rd edition

Expectations

This is a 3-credit semester course. You should plan to spend 8 to 12 hours on course activities each week.

Important RIT Deadlines: For term dates, including add/drop and withdrawal deadlines refer to the the RIT Calendar

Instructor Contact Information

Aaron Deever
Principal Lecturer
Department of Computer Science
adeever@rit.edu

Zoom meeting room link:

https://rit.zoom.us/my/adeever

Zoom meeting room password: **aaabbb**

Golisano College of Computing and Information Sciences

Please feel free to contact me at any time with your questions or concerns.

- You can use the myCourses discussion board to post general course questions or homework questions. I will check myCourses during the week to monitor discussions.
- You may also contact me via email. I am usually good about responding to email within 24 hours, although I may not respond during the weekend.
- My office hours are Wednesday 1-2pm and Thursday 1-3pm in Room 3000 of Golisano Bldg 70. If these times don't work, you can contact me to set up an appointment.

Changes to the Course and Updates

If there are any changes to the Course Schedule, I will let you know in the Announcements on the course home page.

Feedback on Graded Assignments

I may have graders helping me to grade homework assignments. These assignments will normally be graded within one week of the due date. Be sure to check in the Assignments folder and gradebook for written feedback. Any questions about your grades should be directed to me.

Providing Feedback to Me

It's important for me to know how I'm doing as a teacher. Please feel free to give me feedback on my teaching during the course.

Additional Support

If you have any technical questions about using myCourses

- Click ***Help*** in the top menu to access the myCourses documentation, or
- Contact the Academic Technologies Support Desk

Course Schedule

See the Weekly Plans for details on readings and assignments. All times listed in the course are US Eastern time. Unless otherwise noted:

- Weeks start on the Monday listed.
- See SIS for class meeting times and location.
- The two Midterm Exams will likely be in Week 6 and Week 11. Details will be provided closer to the exam.
- Quizzes are on Wednesday and cover material from the previous week (and possibly the most recent Monday).
- Homework is assigned on Friday, and due the following Friday by 11:59pm unless otherwise noted. Homework questions will cover material from the week in which the homework was assigned.

Week	Topics	Assignments

Syllabus	• Course Orientation	• Syllabus • Schedule
Week 1: 8/28-9/1	• Discrete Math Review	• Reading: Sipser Ch. 0 • Homework 1 assigned
Week 2: 9/4-9/8 (no class on Monday)	• Discrete Math Review • Strings, languages • Deterministic Finite Automata	• Reading: Sipser Ch. 0, 1.1 • Homework 1 due • Homework 2 assigned • Quiz 1
Week 3: 9/11-9/15	• Regular Operations	• Reading: Sipser Ch. 1.1 • Homework 2 due • Homework 3 assigned • Quiz 2
Week 4: 9/18-9/22	• Nondeterministic Finite Automata	• Reading: Sipser Ch. 1.2 • Homework 3 due • Homework 4 assigned • Quiz 3
Week 5: 9/25-9/29	• Regular Expressions • Kleene Theorem	• Reading: Sipser Ch. 1.3 • **Career Fair on campus** • Homework 4 due • Quiz 4
Week 6: 10/2-10/6	• Kleene Theorem	• Reading: Sipser Ch. 1.3 • **Midterm Exam 1** • Homework 5 assigned

Week 7: 10/9-10/13 (no classes Monday or Tuesday: Fall Break)	● Myhill-Nerode Theorem ● DFA Minimization	● Homework 5 due ● Homework 6 assigned ● Quiz 5
Week 8: 10/16-10/20	● Pumping Lemma ● Context-Free Grammars	● Reading: Sipser Ch. 1.4, 2.1 ● Homework 6 due ● Homework 7 assigned ● Quiz 6
Week 9: 10/23-10/27	● Context-Free Grammars	● Reading: Sipser Ch. 2.1 ● Homework 7 due ● Homework 8 assigned ● Quiz 7
Week 10: 10/30-11/3	● Pushdown Automata ● Pumping Lemma	● Reading: Sipser Ch. 2.2, 2.3 ● Homework 8 due ● Quiz 8
Week 11: 11/6-11/10 (Daylight Savings Time has ended)	● Turing Machines	● Reading: Sipser Ch. 3.1 ● **Midterm Exam 2** ● Homework 9 assigned
Week 12: 11/13-11/17	● Turing Machines ● Turing Machine Variants	● Reading: Sipser Ch. 3.1-3.3 ● Homework 9 due ● Homework 10 assigned ● Quiz 9
Week 13: 11/20-11/24 (no class Wednesday through Friday: Thanksgiving Break)	● Decidability	● Reading: Sipser Ch. 4.1 ● Homework 10 due ● Homework 11 assigned ● Quiz 10

Week 14: 11/27-12/1	• Decidability • Undecidability	• Reading: Sipser Ch. 4.2-5.1 (up to page 220)
Week 15: 12/4-12/8	• Undecidability • Complexity	• Reading: Sipser Ch. 4.2-5.1 (up to page 220), 7.1 • Homework 11 due • Quiz 11
Week 16: 12/11-12/15 (last day of class is Monday)	• Complexity	• Reading: Sipser Ch. 7.1 • Final Exams begin later in the week.

Course Organization and Activities

Course Organization

The Weekly Plans list on the course homepage link to the overview for each week. The overview lists the topic(s) for the week, the resources and activities, as well as reminders for upcoming assignment deadlines.

Within each weekly content folder, there are sub-modules for:

- Lecture Videos
- Readings
- Assignments
- Additional Resources
- Reminders

Quizzes

There is an (almost) weekly quiz on Wednesday. Quizzes must be completed independently.

There will be 11 total quizzes. There will be no quiz during the week of a midterm exam. There will be no quiz Week 1. There will be no quiz the week of Thanksgiving.

Quizzes will be short (typically 10 minutes) and cover material primarily from the previous week.

Quizzes can not be made up. The two lowest quiz grades will be dropped and the remaining quiz grades will contribute equally to the overall quiz grade. A zero for cheating will not be dropped.

Assignments

There are 11 homework assignments. Each one will be due approximately 1 week after it is assigned. Unless it is specifically stated otherwise, you may work on and submit your homework in groups of 1 or 2. If you choose to work as a group of 2, both of you should contribute significantly to the solution for every question. You should submit only one copy of the homework with both your names on it. All authors have to be able to explain all solutions.

Whether you submit on your own or with a partner, discussing homework with your fellow students is encouraged. However, after such discussions, all notes must be discarded, whiteboards erased, and every partnership must write up their solutions in private without further consultations with your classmates.

Each homework must be submitted by the deadline specified on the assignment (and equally indicated by the myCourses Assignment due date). Homework must be submitted as a pdf document. You may take photos of work done on paper, and convert those to pdf as long as the work is clear and legible. Submissions that are not legible will not receive any credit.

Clearly state your name(s) on your homework.

Late assignments will not be accepted for any reason.

The two lowest homework grades out of the 11 assignments will be dropped. However, a zero for cheating will not be dropped.

Exams

There will be two midterm exams (likely in week 6 and week 11), as well as a Final Exam. More details will be provided closer to the date of the exams.

Exams must be completed independently.

Grading Policy

Your grade for this course will be based on these assessments:

Component	Weight	Notes

Quizzes	22.5%	11 quizzes of equal value; 2 lowest scoring will be dropped; each of 9 remaining worth 2.5%
Assignments	31.5%	11 assignments of equal value; 2 lowest scoring will be dropped; each of 9 remaining worth 3.5%
Midterm Exams	26%	Each exam will count 13% of overall grade
Final Exam	20%	
Attendance	0%	Small bonus possible on exams for perfect (or near) attendance
Total	**100%**	

Grade Scheme

Grade	Percentile		Grade	Percentile
A	91% or above		C+	73%–77%
A-	88%–91%		C	69%–73%
B+	84%–88%		C-	66%–69%
B	80%–84%		D	55%-66%
B-	77%–80%		F	Below 55%

Late Work/Extension Requests

Late work will not be accepted. If you believe you will miss a deadline due to an unforeseen event, contact me as soon as possible to see if we can come to a resolution. *Assignments emailed to me after the Assignment folder is closed will not be accepted.*

Course Policies

Academic Integrity

As an institution of higher learning, RIT expects students to behave honestly and ethically at all times, especially when submitting work for evaluation in conjunction with any course or degree requirement. RIT encourages all students to become familiar with the RIT Honor Code and with RIT's Academic Integrity Policy. The Department of Computer Science adheres to these policies.

ChatGPT and other Generative AI tools

Students are strongly encouraged to complete assignments on their own, without attempting to locate solutions online. Success on quizzes and exams is predicated on learning the course material, and the assignments are part of that learning process. I will not prohibit you from using online resources (generative AI tools or otherwise). If you do use online resources to attempt to answer any question on an assignment, you must clearly cite the resource utilized and where it was used. Note that standard academic integrity applies with respect to interactions with other students. While you may discuss problems and approaches with other students, you must write up your homework solutions independently (or with your homework partner).

Title IX

Title IX violations are taken very seriously at RIT. RIT is committed to investigate complaints of sexual discrimination, sexual harassment, sexual assault and other sexual misconduct, and to ensure that appropriate action is taken to stop the behavior, prevent its recurrence and remedy its effects. Please view the Title IX Rights & Resources at RIT.

Academic Adjustments

RIT is committed to providing academic adjustments to students with disabilities. If you would like to request academic adjustments such as testing modifications due to a disability, please contact the Disability Services Office. Contact information for the DSO and information about how to request adjustments can be found at www.rit.edu/dso. After you receive academic adjustment approval, it is imperative that you contact me as early as possible so that we can work out whatever arrangement is necessary.

Use of Copyrighted Material

Certain materials used in this course are protected by copyright and may not be copied or distributed by students. You can find more information at http://www.rit.edu/academicaffairs/policiesmanual/sectionC/C3_2.html.

Emergencies

In the event of a University-wide emergency, course requirements, classes, deadlines and grading schemes are subject to changes that may include alternative delivery methods, alternative methods of interaction with the instructor, class materials, and/or classmates, a revised attendance policy, and a revised calendar and/or grading scheme.

University Guidance for Health/Safety in the Classroom

Faculty will provide details about information specific to specialized classrooms or labs in alignment with overall University policies. Any concerns with these policies should be addressed to faculty or department offices.

Student Support Availability

Student Learning, Support & Assessment offers a wide range of programs and services to support student success including the Academic Support Center, College Restoration Program, Disabilities Services, English Language Center, Higher Education Opportunity Program, Spectrum Support program, and TRiO Support Services. Students can find out about specific services and programs at https://www.rit.edu/academic-support.

Rescheduling an Exam

Exams can not be made up except for real emergencies. If at all possible, you should contact me prior to the exam.

See RIT's Final Examination Policies for related questions.

Course Withdrawal

During the add/drop period, you may drop this course and it will disappear from your transcript. After that time, you can only withdraw from the course; the course will appear on your transcript with a grade of W. See the institute's calendar regarding the add/drop period and latest withdrawal date.

Other Policies

Other RIT policies may be found at the provost's governance library.