CPSC 219: Theory of Computation — Spring 2025

Course information and policies

Time and location:	MW 8:30–9:45 a.m. in 232 Nutt MECC
URL:	https://www.cs.trincoll.edu/~miyazaki/cpsc219/
Instructor:	Takunari Miyazaki
Office:	133 Nutt MECC
Phone:	(860) 297-4041
E-mail:	takunari.miyazaki@trincoll.edu
Office hours:	MWF 11:00 a.m.–noon or by appointment

Course description. A selection of topics intended to serve as an introduction to automata theory, languages and computation. The topics will be chosen from among finite automata, regular expressions and languages, context-free grammars and languages, pushdown automata, Turing machines, undecidability and intractable problems.

Prerequisite. C– or better in CPSC 115L and C– or better in CPSC 203.

Required materials. There is one required textbook:

- M. Sipser, *Introduction to the theory of computation*, 3rd ed., Cengage, Boston, 2013.

Exams. There will be three exams:

- Exam 1 on Monday, February 24, in class.
- Exam 2 on Monday, April 7, in class.
- Final exam on Tuesday, May 6, at noon in 232 Nutt MECC.

No early or late exam will be offered. These exams will be closed-book exams, but you may bring one 8.5″ × 11″ page (or two sides) of notes. You must prepare your own set of notes. These notes must be written or typed by you. These notes may not be photo-copied or electronically transferred from another source. You may write, or use a font, as small as you like.

Homework assignments. There will be weekly homework assignments involving problem solving. These assignments are to be completed *individually*. Your solutions must be neatly handwritten or typed and submitted in paper. Some problems will be challenging, so be sure to start early. Every assignment is due at the *beginning* of the class period on the date specified. No late nor e-mail submission will be accepted; however, your lowest homework grade will be disregarded at the end of the term.

Guidelines for writing solutions in exams and homework assignments. In this course, problems will usually require descriptions of formal models of computation. In all such cases, you must explain clearly, in complete English sentences, how your models work and justify correctness. A diagram, table or formula may be useful to describe your solution, but such a brief description alone is usually *insufficient* without accompanying commentary.

Attendance and late policies. You are required to attend every class, arriving on time and not leaving before the end of the class period, and you will be responsible for knowing about all announcements made in class. You should also check your e-mail at least once a day for course-related announcements. As stated above, all exams must be taken on the dates specified, and all assignments must be submitted by the due dates. Only in an extenuating circumstance (e.g., serious illness or injury, a family emergency), you may request for an excused absence, an extension for an assignment or an early/late exam, but such a request must be made *in advance* in writing with justification to the instructor.

Grading. Your overall course grade will be evaluated according to the following weights for the total of 100%.

Two in-class exams:	2 × 15%
Final exam:	30%
Homework assignments:	35%
Class participation:	5%

Plagiarism and academic dishonesty. You are encouraged to consult with one another when you work on homework assignments, but, in the end, everyone must do one's own work to hand in. In particular, discussion on homework assignments should be limited to brainstorming and verbally going through strategies, but it must not involve one student sharing written solutions with another student. In the end, *everyone must write up solutions independently*. If you have discussed with classmates or used any outside source (i.e., anything other than the course materials), you must clearly indicate so on your solutions and provide all complete references. Turning in another person's work under your name is plagiarism and qualifies as academic dishonesty. Academic dishonesty is a serious intellectual violation, and the consequences can be severe. For more details, read the *Student Handbook* 2024–2025, pp. 13–22.

Special needs. Trinity College is committed to creating an inclusive and accessible learning environment consistent with the Americans with Disabilities Act. Students with disabilities who may need some accommodation in order to fully participate in this course are urged to contact the Student Accessibility Resource Center (SARC) at (860) 297-4025 or `sarc@trincoll.edu`, as soon as possible, to explore what arrangements need to be made to assure access. If you already have SARC's approval for academic accommodations, please notify the instructor during the first two weeks of the term. For those students with accommodations approved after the term begins, a minimum of ten days' notice is required. Please meet with the instructor privately to discuss implementation.

CPSC 219 home page

Computer Science Department
Trinity College
300 Summit Street
Hartford, Connecticut 06106-3100

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CPSC 219: Theory of Computation

Spring 2025

Course schedule

The topics and reading assignments are tentative and subject to change. The reading assignments are from Sipser.

Week	Date	Topics	Reading	Homework
1	Jan. 22	Introduction	§§0.1–0.4	Homework 1
2	Jan. 27, 29	Finite automata	§1.1	
3	Feb. 3, 5	Nondeterminism	§1.2	
4	Feb. 10, 12	Regular expressions	§1.3	
5	Feb. 17, 19 Feb. 20, 21	Nonregular languages *Trinity Days*	§1.4	
6	**Feb. 24 (Mon.)** Feb. 26	**Exam 1, in class** Context-free grammars	§2.1	
7	Mar. 3, 5	Chomsky normal form	§2.1	
8	Mar. 10, 12	Pushdown automata	§2.2	
	Mar. 17–21	*Spring vacation*		
9	Mar. 24, 26	Non-context-free languages	§2.3	
10	Mar. 31, Apr. 2	Turing machines	§§3.1, 3.2	
11	**Apr. 7 (Mon.)** Apr. 9	**Exam 2, in class** Turing machines and algorithms	§3.3	
12	Apr. 14, 16	Decidability and undecidability	§§4.1, 4.2	
13	Apr. 21, 23	Undecidable problems	§5.1	
14	Apr. 28	Reducibility	§5.3	
	May 6 (Tue.)	**Final exam**		

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