

CSCI-561: Theoretical Foundations of Computer Science (I)

Fall 2017

Instructor:	Neil Dantam	Time:	Tue./Thu. 12:30-13:45
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Office:	BB 249	Office Hours:	Tue. 15:00-16:00 / Thu. 11:30-12:30

1 General Course Information

Textbook *Introduction to Automata Theory, Languages, and Computation*. John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman. 3rd Edition.

Alternate References

- *Introduction to the Theory of Computation*. Michael Sipser.
- *Compilers: Principles, Techniques & Tools*. Alfred V. Ah, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman.

Lisp References

- *Practical Common Lisp*. Peter Siebel. <http://www.gigamonkeys.com/book/>
- *ANSI Common Lisp*. Paul Graham.
- *Common Lisp HyperSpec*. <http://www.lispworks.com/documentation/HyperSpec/Front/>
- *On Lisp*. Paul Graham. <http://www.paulgraham.com/onlisp.html>

2 Grading and Evaluation

The final course grade will be computed as follows:

Midterm Exam	20%
Final Exam	30%
Homeworks	15%
Projects	35%

Midterm Exams A midterm exam will be take place around the middle of the semester.

Final Exam A cumulative exam will take place during finals week.

Homeworks There will be several homeworks and exercises.

Projects There will be two or three projects

Letter Grades Letter grades will be based on a *rough* curve. It is expected (but not required) that course grade distributions will correspond to university and department norms.

Written Work

- Handwritten work must be *clearly legible* to receive credit.
- Write your name on *every page* of all written work. If the work cannot be matched to you, you cannot receive credit for it.
- Include page numbers and total page count in written reports to ensure pages are properly ordered and no pages are overlooked.
- Submit electronic reports, homeworks, etc. and PDF format. Do not submit word processor files and these are inconsistently formatted by different software.

3 Possible Projects

Project 0 Warm-up project covering programming environment and mathematical preliminaries.

Project 1 Text processing, automata manipulation, parser generation.

Project 2 Satisfiability. Propositional logic symbolic manipulation, DPLL algorithm.

Final Project Applications of CS Theory

4 Tentative Schedule

(updated 2017-09-19)

Week	Date	Topic(s)
Week 1	Aug 22	Intro., Math Preliminaries, Finite Automata
Week 2	Aug 29	Regular Expressions
Week 3	Sept 5	Regular Decision Properties
Week 4	Sept 12	Regular Closure Properties
Week 5	Sept 19	Application: Discrete Event Systems
Week 6	Sept 26	Grammars
Week 7	Oct 3	Pushdown Automata, CFL Properties
Week 8	Oct 10	Application: Parser Generation
Week 9	Oct 17	Turing Machines
Week 10	Oct 24	Decidability
Week 11	Oct 31	Time and Space Complexity
Week 12	Nov 7	SAT and SAT Solving
Week 13	Nov 14	Temporal Logics
Week 14	Nov 21	Application: Model Checking / SATPlan
Week 15	Nov 28	Review / Catchup / Research Survey
Week 16	Dec 5	Project Presentations
Week 17	Dec 12	Finals Week

5 CS Department Course Policies

Academic Integrity All students are advised to be familiar with university policy on Academic Integrity. In addition, the following Collaboration Policy exists for all CS@Mines courses. This policy is a minimum standard; your instructor may decide to augment this policy.

1. If the project is an individual effort project, you are not allowed to give code you have developed to another student or use code provided by another student. If the project is a group project, you are only allowed to share code with your group members.
2. You are encouraged to discuss homework and final project assignments with other students in the class, as long as the following rules are followed:
 - (a) You view another student's code only for the purpose of offering/receiving debugging assistance. Students can only give advice on what problems to look for; they cannot debug your code for you. All changes to your code must be made by you.
 - (b) Your discussion is subject to the empty hands policy, which means you leave the discussion without any record (electronic, mechanical or otherwise) of the discussion.
3. Any material from any outside source such as books, projects, and in particular, from the Web, should be properly referenced and should only be used if specifically allowed for the assignment.
4. To prevent unintended sharing, any code stored in a hosted repository (e.g., on github) must be private. For group projects, your team members may, of course, be collaborators.
5. If you are aware of students violating this policy, you are encouraged to inform the professor of the course. Violating this policy will be treated as an academic misconduct for all students involved. See the Student Handbook for details on academic dishonesty.

Violations of this policy result in one of a range of punitive measures, from a zero score for an assignment, up to and including a course letter grade drop for all students involved. All issues of misconduct are reported to the Dean of Students. Academic misconduct associated with an exam grade will likely result in course failure.

Student Absences All students are advised to be familiar with university policy regarding the make-up of work missed due to excused absences. This policy may be found in the Bulletin.

Disabilities Accommodations The website <http://disabilities.mines.edu> outlines the university's disability services. Any student requiring accommodations must request Student Disability Services deliver each professor a *Confidential Letter of Required Accommodations* to ensure accommodations are met.

Discrimination & Harassment This course and all learning opportunities at Mines require a safe environment for everyone to be productive, develop professional practices, and to be able to share and learn without fear of discrimination or harassment. Discrimination or harassment of any type will not be tolerated. Sometimes harassment is unintentional, but regardless of intent the

instructor will address any language or behaviors that might discriminate, stereotype, or promote harassment. If you witness discrimination or harassment of others, please bring it to the attention of Mines faculty so it can be addressed immediately.

Title IX is a federal law that protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes its Title IX obligations seriously and is committed to providing a campus community free from gender-based discrimination. Gender-based discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited within the Mines campus community. If these issues have impacted you or someone you know, you can appropriate resources here: <http://inside.mines.edu/POGO-Title-IX>. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303.384.2558 or krcurran@mines.edu for more information.

Learning Environment Fundamentally, I expect and require respect in this course for yourself, your classmates, and your instructor and TAs.

- Respect for yourself includes taking care of yourself physically and mentally and advocating for an environment that facilitates learning for you.
- Respect for your classmates includes recognizing and appreciating the diversity of backgrounds and experiences of your classmates and making it your interest to foster a learning environment for everyone; all are welcome.
- Respect for your instructors (as well as your classmates) includes not participating in disruptive or distracting behavior: talking, playing games, or web surfing during lecture, for instance, make it difficult for others to focus on the reason we are all here.
- Respect must be mutual to be effective; we (your instructors) and your TAs will be held to the same standards of respect.

Please let your instructor know if you become aware of an issue with the classroom (or out-of-classroom) environment with regards to these policies.