
Course Information

Instructor	Room	Phone	Email	Office Hours
Dr. Sofya Raskhodnikova	IST 343F	x3-0608	sofya@cse.psu.edu	Wed 9:30–11:30am
TA Youngtae Youn	IST 346D	x3-4886	ytyoun@cse	Mon 11-12pm; Wed 3-4pm
Grader TBA				TBA

Webpage: <http://www.cse.psu.edu/~sofya/cmpsc464/>

Honors Credit: If you want to get honors credit for this course, contact the instructor.

Prerequisites: courses on discrete math (equivalent to COMPSC360) and algorithms (equivalent to COMPSC465). You need to be comfortable with mathematical proofs. Most of the assignments in this course require proving some statement and some creativity in finding the proof will be necessary.

Lectures: TR 2:30–3:45pm (220 Hammond).

Textbook: Michael Sipser. *Introduction to the Theory of Computation, 2nd edition*, Course Technology, 2005.

Syllabus: An introduction to the theory of computation. Topics include automata, formal languages, computability, complexity and reducibility among computational problems.

Course outline: I **Automata and Language Theory (3-4 weeks)**. Finite automata, regular expressions, push-down automata, context-free grammars, pumping lemmas.

II **Computability Theory (5-6 weeks)**. Turing machines, Church-Turing thesis, decidability, halting problem, reducibility, recursion theorem.

III **Complexity Theory (5 weeks)**. Time and space measures, hierarchy theorems, complexity classes P, NP, L, NL, PSPACE, complete problems, P versus NP conjecture, quantifiers and games, provably hard problems, probabilistic computation.

Homework: There will be an assignment due every Thursday **strictly before** the lecture. Assignments will be posted on the course web page, usually one week in advance. Solutions will be posted on Angel on Fridays after the corresponding assignments are due.

You can hand in your homework up to 20 hours late (until 10:15am on Friday) in Youngtae's office with 20% penalty. Homework assignments that are more than 20 hours late will generally not be accepted. If there are extenuating circumstances, you should make arrangements at least 48 hours in advance with the instructor or TA. Only serious excuses will be considered in cases where prior arrangements were not made.

You should be as clear and concise as possible in your write-up of solutions. Understandability of your answer is as desirable as correctness, because communication of technical material

is an important skill. A simple, direct analysis is worth more points than a convoluted one, both because it is simpler and less prone to error and because it is easier to read and understand. Points might be subtracted for illegible handwriting and for solutions that are too long. Incorrect solutions will get from 0 to 30% of the grade, depending on how far they are from a working solution. Correct solutions with possibly minor flaws will get 70 to 100%, depending on the flaws and clarity of the write up.

“I go for 15%” option: Understanding whether a solution is correct is an important skill. If you realize that you cannot solve a problem, you have an option of writing “I go for 15%” instead of your answer. In this case, you will get 15% for this problem (or part of the problem). If you do write an answer, however, that answer will be graded and your score will be 0 if your solution is completely wrong. “*I go for 15% option*” is not available for exams and optional homework problems.

Optional problems: Some homework assignments will include optional problems, marked by *. Later, if you ask me for a recommendation or express an interest in working on a research project with me, I will definitely check how well you did on the optional problems.

Collaboration and Honesty Policy: Collaboration on homework problems is permitted. If you choose to collaborate on some problems, you are allowed to discuss each problem with at most 3 other students currently enrolled in the class. Before working with others on a problem, you should think about it yourself for at least 45 minutes. Finding answers to problems on the Web or from other outside sources (these include anyone not enrolled in the class) is strictly forbidden.

You must write up each problem solution by yourself without assistance, even if you collaborate with others to solve the problem. You must also identify your collaborators. If you did not work with anyone, you should write “Collaborators: none.” It is a violation of this policy to submit a problem solution that you cannot orally explain to an instructor or TA.

No collaboration whatsoever is permitted on optional problems and exams.

Violations of this policy will be dealt with according to University regulations (see Senate Policy 49-20 on Academic Integrity).

Exams and Grading: The grade will be calculated as follows:

Homework	weekly	35%
Midterm 1	Wed, Sep 30, 8:15-10:15pm, 112 Walker	20%
Midterm 2	Wed, Nov 4, 8:15-10:15pm, 112 Walker	20%
Final exam	finals week	20%
Class participation		5%

Graduate and undergraduate students will be graded on different curves.

Illness: To prevent the spread of the swine flu virus, please do NOT attend lectures when you have influenza symptoms.