

CS 374: Algorithms and Models of Computation

Mahesh Viswanathan
vmahesh@illinois.edu
3232 Siebel Center

University of Illinois, Urbana-Champaign

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Instructional Staff

- **Instructor:** Mahesh Viswanathan
- **Teaching Assistants:**
 - Qian Cheng
 - Antoine Dejong
 - Spencer Gordon
 - Eric Huber
 - Mark Idleman
 - Shweta Patwa
 - Alexander Steiger
 - Tana Wattanawaroon
- **Office Hours:** See course webpage
- **Contacting Staff:** Use “private note” in Piazza.

Course Aides

- Osayd Abdu
- Robert Andrews
- Surya Bakshi
- Edward Chou
- Sebastian Conybeare
- Matthew Faust
- Jingwen Jiang
- Tong Li
- Roy Young Li
- Kevin Lin
- Maida Lin
- Nishad Phadke
- Sachin Ravichandran
- Sushan Jiang
- Madeleine Walstad
- Yizhi Zhu

Electronic Bulletin Boards

- **Webpage:** General information, course policies, lecture notes
`courses.engr.illinois.edu/cs374`
- **Piazza:** Announcements, online questions and discussion,
contacting course staff. Sign up at
`piazza.com/illinois/spring2016/cs374`.
- **Moodle:** Everything related to homeworks, quizzes, grades,
announcements
`https://learn.illinois.edu/course/view.php?id=14935`

Resources for class material

- **Prerequisites:** All material in CS 173, and CS 225
- **Lecture Notes:** Available on course web-page
- **Video Recording of Lectures:** See course website for link.
- **Additional References**
 - Introduction to the Theory of Computation: Michael Sipser
 - Algorithms: Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani
 - See website for more sources

Grading Policy: Overview

Total Grade and Weight

- **Homeworks:** 24%
- **Quizzes:** 6%
- **Midterms:** 40% (2×20)
- **Finals:** 30%

Homeworks

- One homework every week: Due on Tuesdays at midnight on Moodle. Assigned at least one week in advance.
- **No late homeworks.** Lowest 6 homework problem scores will be dropped.
- Homeworks may be solved in groups of size at most 3 and each group submits **one** written solution on Moodle.

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- For the other homeworks, read Homework Guidelines and Academic integrity policies on course website.

Quizzes

- The day before every class on Moodle.
- About 25 to 26 in total.
- We will drop the 5 lowest scores.

Examinations

- First Midterm: Monday February 22, 7pm to 8:30pm
 - Conflict exam on Tuesday February 23.
- Second Midterm: Monday April 4, 7pm to 8:30pm
 - Conflict exam on Tuesday April 5.
- Final Exam: Monday May 9, 8am to 11am

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- **No conflict exam offered unless you have valid excuse.**
- Midterms will only test material since the previous exam
- Final Exam will test **all** the course material

Advice

- Attend lectures and discussion sessions
- Make use of office hours/Piazza
- Study regularly and keep up with the material
- Ask plenty of questions, and promptly. Don't delay getting doubts cleared
- This course is on problem solving. Solve as many as you can
- This course about writing rigorous proofs. Review 173 material on writing proofs, especially induction.

Part I

Course Overview

High-Level Questions

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- How can one come up with a way to solve a problem computationally?
- What are the limits of computation?

Course Overview

The course can be roughly divided into three parts.

- **Models of Computation:** Regular languages, finite state machines, context-free grammars, and Turing machines
- **Algorithms:** Algorithm design techniques illustrated through specific algorithms for certain problems
- **Lower Bounds:** Undecidability and NP-completeness

Skills

- Comprehend mathematical definitions
- Write mathematical definitions
- Comprehend mathematical proofs
- Write mathematical proofs
- Learn algorithmic techniques that help solve problems computationally