

# COMP 409/509 Logic in Computer Science

Fall 2021

<http://www.cs.rice.edu/~vardi/comp409/>

## Background

Logic has been called “the calculus of computer science”. The argument is that logic plays a fundamental role in computer science, similar to that played by calculus in the physical sciences and traditional engineering disciplines. Indeed, logic plays an important role in areas of Computer Science as disparate as artificial intelligence (automated reasoning), architecture (logic gates), software engineering (specification and verification), programming languages (semantics, logic programming), databases (relational algebra and SQL), algorithms (complexity and expressiveness), and theory of computation (general notions of computability).

COMP 409/509 provides the student with a thorough introduction to mathematical logic, covering in depth the topics of syntax, semantics, decision procedures, formal systems, and definability for both propositional and first-order logic. The goal is to prepare the students for using logic as a formal tool in computer science.

## Basic Information

**Instructor:** Moshe Y. Vardi  
Duncan Hall 3057 (ext. 5977), [vardi@cs.rice.edu](mailto:vardi@cs.rice.edu)  
Office Hours: by request

**TA:** Yi Lin  
[yl182@rice.edu](mailto:yl182@rice.edu)  
Office Hours: by request

**Textbook:** Schönning: *Logic for Computer Scientists*, Birkhauser, 2008  
(the book is optional; lecture notes will be posted on the course website).

**Prerequisites:** COMP 182, COMP 280, or instructor’s permission

## Recommended Reading

M. Gardner: *Logic Machines and Diagrams*, 1982

A. Feferman: *Politics, Logic, and Love: the life of Jean Van Heijenoort*, 1993

M. Davis: *The Universal Computer: The Road from Leibniz to Turing*, 2011.

## Attendance

All students who live three or fewer time zones away are expected to attend every class synchronously via Zoom. All students who are living where the time zone is > 3 hrs from Central

Time Zone are expected either to attend class synchronously via Zoom or to work out in advance with the instructor a suitable solution for asynchronous attendance. Students attending class synchronously via Zoom are expected to arrive to class on time (e.g., within five minutes of start time). This is essential because links/docs posted in the Chat window are only available to students who are present at the time the links are posted. Links will not be reposted to accommodate students who arrive late.

All lectures will be recorded and available on Canvas for review. In line with FERPA REQUIREMENTS, recorded classroom discussions involving students are to be available only to students officially registered and enrolled in the class.

## Participation

Participation: Students are expected to be actively engaged during lectures. When joining class remotely, please keep your video camera on and microphone muted. Use the chat, raise hand, unmute, and the like when you have questions or would like to participate. Students needing an accommodation for using their camera or microphone should contact the instructor at the beginning of the semester to discuss and work out needed adjustments. Online discussions and activities are an integral portion of the course. You may be asked to engage in an offline dialogue with colleagues throughout each session as indicated in session directions.

## Grading

There will be two take-home, open-book exams: a mid-term exam and a final exam, as well as periodical problem sets, and a programming project (for those taking COMP 509). Each exam accounts for 35% of the final grade, the problem sets account for 20% of the final grade, and the programming project accounts for 10% of the final grade (project required for COMP 509 only). Exams and assignments are graded on a curve.

All problem sets will be assigned to pairs of students; you will learn more that way. Effort counts more than success on the problem sets. Without, however, doing the problem sets diligently, you have little chance of doing well on the tests. Problem sets and final project must be typeset in LaTeX.

**Make-ups:** There will be no make-ups for missed coursework, assignments, and examinations unless you receive the permission of the instructor prior to the date of the assignment or exam.

## Honor Code

Students are expected to adhere to Rice's Honor Code. Joint work is allowed when explicitly required. Using the course website is encouraged, but searching for solutions on the Internet is not allowed. Using solution sets from previous years is not allowed.

## Time

Class starts at 9:40am, but watch for Canvas announcements.

## **Special Accommodations**

Any student with a disability requiring accommodations in this class is encouraged to contact me. Alternatively, students could contact the Coordinator for Disabled Student Services.

## **Title IX Responsible Employee Notification**

Rice encourages any student who has experienced an incident of harassment, pregnancy discrimination or gender discrimination or relationship, sexual, or other forms interpersonal violence to seek support from The SAFE Office. At Rice University, unlawful discrimination in any form, including sexual misconduct, is prohibited under Rice Policy on Harassment and Sexual Harassment (Policy 830) and the Student Code of Conduct. As the instructor and a responsible employee, I am required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to the Title IX Coordinator on campus. Although responsible employees are required to make this notification, it is the students choice to pursue a formal complaint. The goal is to make sure that students are aware of the range of options available and have access to the resources when in need. For more information, please visit [safe.rice.edu](http://safe.rice.edu), [titleix.rice.edu](http://titleix.rice.edu), or email [titleixsupport@rice.edu](mailto:titleixsupport@rice.edu).