

# COMP 409 Logic in Computer Science

Fall 2022

<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 architecture (logic gates), software engineering (specification and verification), programming languages (semantics, logic programming), databases (relational algebra and SQL), artificial intelligence (automatic theorem proving), algorithms (complexity and expressiveness), and theory of computation (general notions of computability).

COMP 409 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:** Alexis Le Glaunec  
Duncan Hall 3060, [sd33@cs.rice.edu](mailto:sd33@cs.rice.edu)  
Office Hours: Thursdays 11:00am-noon, DH, 3rd Fl. conversation area

**Textbook:** Schönig: *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.

## 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. Each test accounts for 35% of the

final grade, the problem sets account for 20% of the final grade, and the programming project (for COMP 509) accounts for 10% of the final grade. Class attendance is not required, but classroom participation will be used to determine boundary cases. 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. Students are expected to adhere to Rice's Honor Code.

## **Device Policy**

A closed-laptop rule during lecture will be enforced. All other communication devices will need to be on "silent" mode and stashed away during class.

## **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 in the RMC Cloisters.

## **Honor Code**

You can always use the course website when doing coursework (assignments or tests), but using other web pages is not allowed. All course material is copyrighted, and uploading course material to websites such as CourseHero or GradeBuddy is not allowed.