Mathematical logic provides the foundation for a rich set of tools for reasoning about systems and discovering whether their behavior meets our expectations. In spite of how it is often presented, logic is not only good for describing the state of Socrates and rain, but also the state of buffers and caches and the other difficulties that everyday practicing computer scientists wrestle with. In this course, we will use modern, logic-based tools to describe and analyze program designs, algorithms, data-structures, and other artifacts—learning the logical frameworks we need as we go along.

**Course Format:** Lecture and Discussion.

**Prerequisite:** CSCI 016, CSCI 018, or CSCI 019.

**Preferred but not required:** CSCI 022 and CSCI 051.

**Required Text:** Software Abstractions (2nd edition) by Daniel Jackson (MIT Press)

**Assignments and Grading**

There will be no final and no exams. Your course grade will depend on:

- 70%: 10 Assignments and 1 Required Lab (6.36% each)
- 6%: Case-study reviews
- 24%: Course project

**Assignments** Assignments will come in two flavors: exercises that use tools we explore in class (Alloy, Z3, Spin, ...), and programming assignments. Each assignment will be due at 11:59pm on Thursday nights and go out after class the preceding Friday. We will accept one late assignment, within 24 hours, for full credit. Further late assignments will receive no credit.

**Case-Study Reviews:** Our text contains several detailed case-studies of software modeling. Students will each pick a partner and then select two different case studies by Feburary 25th. The presentation will be code-review style, so be prepared to explain (as well as constructively criticize) the case-studies you picked.

**Course Project** Students each pick a different partner by March 17th. Project topics can be anything touching on modeling and verifying software or systems and should use either Alloy, Z3, or Spin (other tools allowed with instructor permission). Prior topics have included data-structures, protocols, user-interfaces, and more. Project proposals are due on March 24th, and must be discussed with the course staff prior to approval. Projects (source, along with a short 1 page writeup) are due electronically on May 9th. Each group will then present their final project, in a format similar to the case-study reviews, by appointment during May 10th–12th.

More details on each assignment, project, etc. will be provided closer to the appropriate dates.

**Policies and Schedule** See the course webpage: http://cs.brown.edu/courses/cs195y/2016/