University of Windsor - School of Computer Science

60-354 Theory of Computation - Fall 2014

Instructor: Dr. Asish Mukhopadhyay
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Off. Hrs.: TR, 04:00 pm - 05:00 pm or by appointment

Lectures

(TR) 08:30-09:50 in DH 265

Prerequisites

You should have a D- in 214, 231, 254 or my permission in order to take this course.

Textbook

Introduction to Automata Theory, Languages and Computation, by John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, 3rd. Edition, Addison Wesley, 2007.

Supplementary material

A set of course-notes, prepared by me, is available for purchase from Document and Imaging Services. My lectures will be based on these course-notes.

Course Goals

The primary goal of this course is to lead you to an answer to the question: "What problems can be solved by a computer? " Towards this, we shall seek answers to the following questions: "What is a problem ? " "What does it mean to solve a problem ?" "What is a reasonable yet comprehensive model of a computer ?"

While the theory of NP-completeness classifies problems into those that can be solved in "reasonable " time (polynomial time) versus those that take an "unreasonable" amount of time (exponential time), the theory here (which preceded the theory of NP-completeness) shows that there are "problems" that a "computer" simply cannot "solve", even if we allow an "unreasonable" amount of time.

We will start with the simplest computing machines, called Deterministic Finite Automata (or DFAs), determine their computing power and go on to show that adding non-determinism does not increase their computing power. We next introduce another class of computing device known as Pushdown Automata (or PDA) and show that their computing power is "greater" than that of DFAs. Finally, we introduce the famous computational model known as Turing Machine, and show that their power is strictly greater than that of PDAs. We then use this to show that there are problems which are inherently "undecidable", which means that there are no algorithms to solve these problems.

Evaluation scheme

3 Quizzes	5% each
2 Midterms	20% each
Final Exam	45%

Tentative Midterm and Quiz dates

Quiz 1: Thursday, 18 Sept., 2014 (in class)
Quiz 2: Thursday, 02 Oct., 2013 (in class)

Quiz 3: Tuesday, 04 Nov., 2014 (in class)
Midterm 1: Thursday, 9th Oct., 2014 (in class)
Midterm 2: Thursday, 13th Nov., 2014 (in class)
Final Exam: 09 December, 2014, Time 8:30am - 11:30am, Place ?

Policies

Quizzes and midterm tests which are missed for any reason whatsoever cannot be made up. In such cases, where a student has missed a test for a valid reason, supported by appropriate documentation, e.g. a doctor's note, the mark for this test will be carried over to the final. **A doctor's note must specifically say that you were not fit to write the test on the particular day**. Along with the doctor's note, please provide a covering letter providing details of the exam missed, your name and SID. This is for my records. The final exam must be written in order to obtain a grade for the course. If you are not able to write the final exam for medical reasons you must contact me immediately to let me know so that a make-up final exam can be arranged as soon as possible.

Cases of cheating and plagiarism will be dealt in accordance with University by-laws.

SET (Student Evaluation of Teaching) will be conducted in the last week of class.

No student is allowed to take this course for the third time without permission from the Dean.

Tentative Lecture Schedule

Chapter	# of Lectures
1	1
2	3
3	2
4	3
5	3
6	3
7	2
8	2
9	3