CS486 Course Syllabus
Winter 2012
M,W: 1:30PM – 3:10PM

Instructor
Valentino Crespi
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Office location: E&T A318
Office hours: TR: 4:30PM-5:50PM. Outside those hours by appointment.

Course number CS 486

Course name Computability and Intractability

Credits 4 units

Contact hours 4 hours/week

Coordinator Valentino Crespi

Text book Michael Sipser. *Introduction to the Theory of Computation*. Course Technology, second edition, 2005.

Other texts:

- Arto Salomaa. *Computation and Automata.* Cambridge University Press.
- J. Hopcroft, R. Motwani, J. Ullman. *Introduction Automata Theory, Languages and Computation*. Addison-Wesley.
- Peter Linz. *An Introduction to Formal Languages and Automata*. Jones and Barlett Publishers.
- Hartley Rogers, Jr. *Theory of Recursive Functions and Effective Computability*. The MIT Press.
- Michael Sipser. *Introduction to the Theory of Computation.* Thomson.
- Michael R. Garey and David S. Johnson. *Computers and Intractability: A Guide to the Theory of NP-Completeness.* W.H. Freeman & Company (June 1979).
- Christos H. Papadimitriou. *Computational Complexity*. Addison-Wesley.

Course Information

a) Course Description: Theory of Computing; nondeterminisms, decidability and unsolvable problems; NP completeness and intractable computations.
b) Prerequisites: CS386 Introduction to Automata Theory.
c) This course is elective in the BS program.

Course Goals The Student Learning Outcomes that are addressed by the course are:

SLO #1. *Students will be able to apply concepts and techniques from computing and mathematics to both theoretical and practical problems.*

Other outcomes of instruction:

- Understand the rigorous notion of algorithm and study the decidability of computational problems. In particular students will learn to distinguish between recursive, recursively enumerable and non recursively enumerable problems.
- Understand the role of nondeterministic computations and characterize the class of problems NP. In particular students will learn the concept of NP-completeness and its importance in the P vs NP question.

Brief list of topics to be covered

- Turing Machines. Decision problems and languages. The Halting Problem. Recursive, Recursively Enumerable and non Recursively Enumerable languages. Reductions. Rice's Theorem and the Recursion Theorem.
- Time and Space Complexity of a Turing Machine. Nondeterministic Turing Machines.
- The classes P and NP. Polynomial time many-one reductions.
- Cook's Theorem. NP-completeness and the P vs NP question.

Laboratory Projects

This class does not possess a laboratory module. Class projects are at the discretion of the instructor. Projects range from weekly assignments to a couple of class projects over the course of the term.

Grading Policy

Quizzes/HW: 20%, Midterm: 40%, Final: 40%.
A 90 – 100
B 80 – 90
C 60 – 80
D 50 – 60
F below 50

Academic Integrity

Cheating will not be tolerated. All parties involved will receive a grade of F for the course and be reported to the proper authorities.

General Policies

- No makeup exams.
- No cell phones.
- No internet during lecture.
- Students arriving 30 minutes after the beginning of class will be admitted at the discretion of the instructor in order to prevent any disruption of the lecture.
- Students are warmly invited to visit the instructor during office hours for questions and clarifications. Meetings outside office hours are possible by appointment.