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Fall 2010

CS 740: Algorithms, Complexity and the Theory of Computability

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CS 740 – ALGORITHMS, COMPLEXITY AND THE THEORY OF COMPUTABILITY
FALL, 2010

- Instructor:** Dr. Michael Raymer
391 Joshi
775-5110
michael.raymer@wright.edu
- Time/Place:** Monday & Wednesday, 8:00 – 9:15 pm, 154 Russ Engineering Ctr.
- Office Hours:** Monday & Wednesday, 4:00 – 6:00 pm, *or by appointment.*
- Textbook:** Sudkamp, T. *Languages and Machines, 3rd Ed.* ISBN 0-321-32221-5.
Required.
- Objectives:** We will use the formal algorithm system provided by Turing machines as a tool to understand the complexity of decision and optimization problems, and the algorithms that solve them. The topics to be covered include:
- Definition of space and time complexity of a deterministic algorithm
 - Classes of deterministic polynomial-time and non-polynomial time languages
 - Complexity of nondeterministic algorithms
 - The P=NP question, and its implications
 - Classes of NP complete problems
 - Identifying NP complete problems and techniques for approximate solutions

Tentative Lecture Schedule:

Week	Topics	Reading
1	Introduction, analyzing algorithms	Notes
2	Big-O notation, computational complexity	14.2, notes
3	Turing machines and computation	8.1 – 8.5
4	Variations of Turing machines	8.6 – 8.7
—	Midterm Exam – Date will be announced	—
5	Time complexity and Turing machines	14.3 – 14.6
6	Nondeterminism and NP	15.1 – 15.7
7	Cook's Theorem	15.8
8	NPC and reductions	16.1 – 16.4
9	Approximation algorithms	16.5 – 16.6
10	Advanced topics and final exam review	—
—	Final Exam: Mon. Nov. 15, 8:00 – 10:00 pm	—

Grading:	Midterm Exam = 30%	90 – 100 = A; 80 – 89.9 = B;
	In-class Final Exam = 30%	70 – 79.9 = C; 60 – 69.9 = D;
	Take-home Final Exam = 20%	< 60 = F
	Graded Homework Assignments (2) = 20%	I <i>may</i> curve the final letter grades based on the overall distribution of scores.

Homework assignments are due in class on the assigned due date. There will be no make-up exams except for documented emergencies. The exams will be open book and open notes.

Additional homework and reading assignments will be given regularly. Successful completion of these assignments will help to prepare you for the exams. Class time will be taken to answer questions related to ungraded homework assignments regularly.

Attendance: Attendance at the lectures is strongly recommended. If you miss a class, it is your responsibility to obtain notes and assignments from other students and to come prepared for subsequent topics.

Academic Integrity: It is expected that graded homework assignments, exams, and other course assignments will be completed **on an individual basis**. Students may discuss general concepts with one another, but may not, under any circumstances, work together on the actual implementation of any course assignment. Significant collaboration on any graded assignment will be considered a violation of the university guidelines for academic honesty. If the same work is turned in by two or more students, **all parties involved will be held equally accountable for violation of academic integrity**. You are responsible for ensuring that other students do not have access to your work.

Web Page: <http://wisdom.wright.edu> – Login using your CATS username and password. *Check this page often for announcements, assignments, and other important information.*

Other notes: Students with disabilities or any additional needs are encouraged to set up an appointment with me at their convenience to discuss any classroom accommodations that may be necessary.