Course Description

Instructor: Prof. Richard Chang
Office: ITE 326
Office Hours: Tuesday & Thursday, 2:30pm – 3:30pm
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Time and Place. Tuesday & Thursday 10am – 11:15am, ITE 240.

Textbook. *Introduction to the Theory of Computation* (second edition), Michael Sipser. Thompson Course Technology, ISBN 0-534-95097-3.

Objectives. There are two objectives for this course: 1) to introduce the student to the concepts in automata theory and formal languages, which form the foundations of theoretical computer science; and 2) to continue the development of the student's skills in reading, writing and understanding mathematical proofs.

Grading. Final grades will be based upon homework assignments (39% total), quizzes (35% total) and the final exam (26%). The syllabus lists 13 homework assignments and 5 quizzes. However, if a homework assignment or quiz is canceled and not made up (e.g., because school is closed for snow or hurricane), the proportion of your grade from homework, quizzes and the final exam will remain the same. That is, homework will still count for 39% of your grade and quizzes 35% of your grade (each homework or quiz will have greater weight).

Your final letter grade is based on the standard formula:

$$0 \le F < 60, \quad 60 \le D < 70, \quad 70 \le C < 80, \quad 80 \le B < 90, \quad 90 \le A \le 100$$

Depending upon the final distribution of grades in the class, there may be a curve in your favor, but under no circumstances will grades be curved downward.

Grades are given for work done *during* the semester; incomplete grades will only be given for medical illness or other such dire circumstances.

Undergraduate vs Graduate Course Requirements. The graduate students taking this course will have a different set of homework assignments, quizzes and final exam. Graduate students are expected to achieve a higher level of mastery of the material.

Quizzes. In-class quizzes are scheduled for Thursday 9/29, 10/13, 10/27, 11/10 and 12/06. Please make every effort to attend — unexcused absences will result in a grade of zero for that quiz. Each quiz will be held during the last 30 minutes of the class period. The quiz will consist of one or two questions (possibly with multiple parts) on a pre-announced topic.

Lecture and Homework Policy. You are expected to attend all lectures. You are responsible for all material covered in the lecture as well as those in the assigned reading. However, this subject cannot be learned simply by listening to the lectures and reading the book. In order to master the

material, you need to spend time outside the classroom, to think, to work out the homework and understand the solutions.

Assignments are due at the *beginning* of lecture — this is to allow for timely grading and discussion of the homework solutions. Reasonable provisions will be made for students who are delayed by traffic, who are on travel, ... *Late homework will be rejected from students who have obviously been working on homework instead of attending lecture*.

Partial credit will be given for serious attempts on the homework problems. So you should simply turn in whatever you have accomplished by the beginning of class. If you cannot attend lecture when homework is due, for some honorable reason, you must make arrangements to submit your homework directly to the instructor. Do not ask another student to submit your homework for you. This is to reduce the temptation to cheat (see below).

Academic Integrity. You are permitted to work with other students on the homework problems. If you do collaborate with other students, you must acknowledge your collaborators by listing them on the last page of your homework. Also, you must write up your homework *independently*. This means you should only have the textbook and your own notes in front of you when you write up your homework — not your friend's notes, your friend's homework or other reference material.

You should not have a copy of someone else's homework *under any circumstance*. For example, you should not let someone turn in your homework. Cases of academic dishonesty will be dealt with severely. At the very least, ***students who submit copied homework assignments will receive a grade of 0 for that assignment — this applies both to the person who copied the homework and to the person who allowed the his/her homework to be copied.***

The UMBC academic integrity policy for undergraduates and graduate students are available, respectively, at:

`http://www.umbc.edu/undergrad_ed/ai/`
`http://www.umbc.edu/gradschool/essentials/proc_academic_integrity.html`

Final Exam. The final exam scheduled for Tuesday, December 20, 10:30am –12:30pm.

We will follow the textbook *Introduction to the Theory of Computation* (second edition) by Michael Sipser. The following schedule outlines the material to be covered during the semester and specifies the corresponding sections in the textbook.

Date	Topic	Quiz	Reading	Homework	
				Assigned	Due
Thu 09/01	Introduction		0.1–0.4		
Tue 09/06	Deterministic Finite Automata (DFA)		1.1	HW1	
Thu 09/08	Nondeterministic Finite Automata (NFA)		1.2		
Tue 09/13	Equivalence of DFAs & NFAs			HW2	HW1
Thu 09/15	Regular Expressions		1.3		
Tue 09/20	Equivalence of Regular Expressions			HW3	HW2
Thu 09/22	Regular Language Pumping Lemma		1.4		
Tue 09/27	Context-free Grammars (CFG)		2.1	HW4	HW3
Thu 09/29	Context-free Grammars (CFG)	**Quiz 1**			
Tue 10/04	Chomsky Normal Form			HW5	HW4
Thu 10/06	Pushdown Automata (PDA)		2.2		
Tue 10/11	PDAs for CFGs			HW6	HW5
Thu 10/13	CFGs for PDAs	**Quiz 2**			
Tue 10/18	Context-Free Pumping Lemma		2.3	HW7	HW6
Thu 10/20	Turing Machines		3.1-3.2		
Tue 10/25	Decidable Properties		4.1	HW8	HW7
Thu 10/27	The Halting Problem	**Quiz 3**	4.2		
Tue 11/01	Undecidability		5.1-5.2	HW9	HW8
Thu 11/03	Reductions		5.3		
Tue 11/08	Reductions			HW10	HW9
Thu 11/10	Kleene Hierarchy	**Quiz 4**			
Tue 11/15	Time & Space Hierarchy		7.1	HW11	HW10
Thu 11/17	P vs NP		7.2-7.3		
Tue 11/22	NP-Completeness		7.4		HW11
Thu 11/24	*Thanksgiving Break*				
Tue 11/29	NP-Completeness		7.5	HW12	
Thu 12/01	Recursion Theorem		6.1		
Tue 12/06	Kolmogorov Complexity	**Quiz 5**	6.4	HW13	HW12
Thu 12/08	Kolmogorov Complexity & HeapSort				
Tue 12/13	Review				HW13
Tue 12/20	**Final Exam 10:30am – 12:30pm**				