CSE 260
Sec 1 - 3
Discrete Structures in Computer Science
Spring 2014
http://www.cse.msu.edu/~cse260

Instructor: Dr. Juyang Weng
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Teaching Assistant 1 (Sec 2 and shares Sec 1):
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Teaching Assistant 2 (Sec 3 and shares Sec 1):
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Lectures: Mon. & Wed. 4:10 pm – 5:30 pm, 1345 Engineering Building. Bring with you I>Clicker available from MSU Bookstore from Monday Sept 1, for class interactions and participations

Recitations: Fri. 2400 Engineering Building
Sec 1: 10:20am-11:10am
Sec 2: 3:00pm- 3:50pm
Sec 3: 4:10pm- 5:00pm

Course Description:
Propositional and first order logic. Equivalence, inference and method of proof. Mathematical induction, diagonalization principle. Basic counting. Set operations, relations, functions. Grammars and finite state automata. Applications to computer science and engineering.

Prerequisite: One of MTH 133, MTH 126, MTH 153H, or LBS 119.

Course Objective:

The role of discrete mathematics in computer science is analogous to the role of calculus in physics and in engineering: it provides the mechanisms that allow computer scientists to define and reason about complex systems. Complex systems of interest include software, algorithms, data structures, and hardware. The objectives of this course are to introduce the mathematical concepts that provide the basis for much of computer science and to develop the ability to describe and analyze problems in a logical and systematic fashion. This course focuses primarily on:

- Logic and mathematical reasoning
- Set theory and functions
- Induction and recursion
- Mathematical relations
- Grammars and finite state machines (also, Turing Machines, if time permits)

To achieve these objectives, we study broad, general concepts in these areas; and discuss applications of these concepts in computer science and in computer engineering. (Current ABET/CAC accreditation requirements (http://www.abet.org/) for CS programs specify a half-year of mathematics courses, including Discrete Structures)

Textbook: ***Discrete Mathematics and its Applications***, 7th edition (Kenneth H. Rosen; 2012). Required for the course.

Examinations and Quizzes

Exams will be closed book and closed notes, except for ***one*** 8½ ×11 (letter size) page of notes that you may prepare by your own and bring to the exams. You cannot copy from other's.

You are ***not*** allowed any notes for recitation quizzes.

No digital devices (e.g., calculators, music players, phones, translators) are allowed during quizzes or exams. There will be ***no*** make-up exams and quizzes. For documented emergency or illness, you must notify the instructor well in advance or as early as possible under the context so as to accordingly change the weights for the composite score.

Exam and quiz dates are scheduled on the syllabus. Exam 1 will cover all topics discussed through the previous week, inclusive. Exam 2 will cover all topics discussed from the previous through the previous week, inclusive. The final exam will cover all course topics. Quizzes will cover topics discussed in the 3 weeks prior to the quiz date.

Class exercises are conducted interactively through I>Clicker (student remote, Gen1). Get your I>Clicker from the MSU bookstore or elsewhere. Each I>Clicker student remote registers one unique CSE260 student. You should not use an I>Clicker registered for another student. Get your I>Clicker as soon as possible but not later than the class of 1/13. We will begin using the I>Clicker during the class of 1/13.

Graded work will be weighted to count:

Exam 1	15%
Exam 2	15%
Final exam	35%
Quizzes (Fridays)	15%
Class exercises	5%
Homework	15%

Grading: Your final course score will be calculated as follows:

4.0	90% or above
3.5	85% or above
3.0	80% or above
2.5	75% or above
2.0	70% or above
1.5	65% or above
1.0	60% or above
0.0	< 60%

We may decide to shift the score thresholds downwards if circumstances warrant doing so (e.g., score distribution) but not upwards.

Recitation

You are expected to attend recitation every Friday. The instructor may lecture in some of the recitations to make up for a shortage of lecture classes to keep the class on schedule. Other recitations will be led by the teaching assistant. These will be devoted to problem solving and answering your questions about course material. The quizzes will be given in recitation.

In-Class Cooperative Exercises

In-class exercises make up 5% of your grade, which can affect your letter grade by up to two levels. These exercises are designed to help you solidify concepts that have been presented in lecture or that you have read about. You will work on these problems in small groups and key in your own solution via your I>Clicker remote. This grade is also a measure of your class attendance. In-class exercises cannot be made up.

Homework/Problem Solving

The surest way to succeed in this course is to work a lot of problems. Homework will therefore be assigned and collected, although some of the problems will not be graded. Some will be discussed in class or during recitation, and you will have the opportunity to ask questions. Collaboration and discussion on homework is encouraged in groups of up to three students. However, each student must write down his own work independently after the collaboration and discussion is over on each problem without looking at other's work. Copying other's work is strictly prohibited. It is important that you take advantage of peer collaborations to learn from and teach one another because exams and quizzes will ***not*** be collaborative. You will need to demonstrate individual mastery of course concepts on exams and quizzes. Solutions to the odd numbered exercises can be found in the back of your textbook. There is also a Student Solutions Guide available for

purchase, which has explanations in addition to solutions. We recommend that you use these to check your work or and understanding. You should not look up the answers before working the problems since otherwise you are likely to have difficulty solving problems when you do not have access to a solutions manual, e.g., on the exams and quizzes.

No Late Work

No late work is acceptable. In case of documented schedule crisis (e.g., university team competition) provide formal signed documents with contact information (telephone number and email address) for verification well in advance. The corresponding due will be taken out from the composite score for verified and approved documented cases. No consideration will be given for a petition about documented crisis that is submitted to the instructor a week or more after the work due date.

Piazza Discussion Forum

We will use Piazza for a discussion and notification forum for this class. You will receive an invitation to join Piazza in the first week of class. The instructor and TAs will monitor Piazza and respond to questions posted to it; other students may also do so. If you have a question, you will often find that it has already been asked and answered on Piazza—so check. Important class notifications will be sent via Piazza. Be sure that you accept the invitation to join. If you do not receive an invitation to join in the first week of class, notify your TA. However, Piazza is not always effective for asking technical questions. See the instructors and TA to interactively understand the questions and answers.

Academic Honesty

Michigan State University adheres to the policies on academic honesty as specified in General Student Regulations 1.0, Protection of Scholarship and Grades and in the All-University Policy on Integrity of Scholarship and Grades. These policies are included in *Spartan Life: 1999 Student Handbook and Resource Guide*. See https://www.msu.edu/~ombud/academic-integrity/. Any student found guilty of academic dishonesty may receive a 0.0 for the course. In all such cases, a letter will be sent to the dean of the college in which the student is enrolled.

Drops and Adds

The last day to add this course is Fri. 1/10. The last day to drop this course with a 100% refund and no grade reported is Fri 1/31. The last day to drop this course with no refund and no grade reported is Wed 2/26. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.

Campus Emergencies

If an emergency arises in this classroom, building or vicinity, your instructor will inform you of actions to follow to enhance your safety. As a student in this class, you are responsible for knowing the location of the nearest emergency evacuation route or shelter. These directions appear on the maps posted on the walls throughout this building. If police or university officials order us to evacuate the classroom or building,

follow the posted emergency route in an orderly manner and assist those who might need help in reaching a barrier-free exit or shelter. Enter the classroom with your phone in silent mode which receives emergency messages. If you observe or receive an emergency alert, immediately and calmly inform your instructor. (See also http://www.alert.msu.edu.)

Tentative Schedule of Topics

Week	Mon.	Wed.	Fri.	Topic	Chapter
1		8/27		Intro & Propositional Logic	1.1
		9/3		Propositional Logic	1.1, 1.2
			9/5	Discussion of problems	
2	9/8		9/24/20	Propositional Equivalences	1.3
		9/10		Predicates and Quantifiers	1.4, 1.5
			9/12	Problems & Quiz 1 (20 min)	
3	9/15			Martin Luther King Day, no class	
		9/17		Rules of Inference	1.6
			9/19	Discussion of problems	
4	9/22			Proof Methods and Strategy	1.7, 1.8
		9/24		Sets & set operations	2.1, 2.2
			9/26	Discussion of problems	
5	9/29			Functions	2.3
		10/1		Sequences and Summation	2.4
			10/3	Review for Exam 1	
6	10/6			EXAM 1	
		10/8		Cardinality	2.5
			10/10	Discussion of Exam 1 & Problems	
7	10/13			Matrices	2.6
		10/15		Divisibility and Modular Arithmetic	4.1
			10/17	Discussion	
8	10/20			Integer Representation, Primes, GCD	4.2, 4.3
		10/22		Mathematical Induction	5.1, 5.2
			10/24	Discussion of problems	
9	10/27			Recursive def., Structural Induction	5.3
		10/29		Recursive algorithms	5.4
			10/31	Discussion & Quiz 2 (20 min)	
10	11/3			Counting Basics & PHP	6.1, 6.2
		11/5		Permutations, Combinations, Binomial Coefficients & Identities	6.3, 6.4
			11/7	Discussion of problems	
11	11/10			More on permutations & combinations	6.5, 6.6
		11/12		Intro to Probability	7.1

Homework #2 1.2 - 1.4

Home Work 1

Cardinality

HW #5 2.3, 2.4, 2.5 | Sequences | Functions

Growth Rate of Function

HW #6 2.6 + 3.2 → MATRIX MATH

HW #7 Chapter 4 - Number Theory

HW #8 4.4 - Congruences; 5.1 - Induction; 5.2 - Strong Induction, Well-ordering; 5.3 - Recursive

HW #3 1.5 - 1.7

HW #4 2.1 - 2.3

HW #5 2.3 - 2.5

~ Half-Way Thru!

Week

Week 2

~ Week

HW #9 6.2 - Pigeonhole; Counting: 6.3 - Permutation + Combination; 6.4 - Binomial; [illegible] Permutation + Combination

HW #10 - 7.2: Probability Theory - 9.1: Binary relation

4 Videos

6.3 - Gen...
7.1 - Intro to discrete Probability

			11/14	Review for Exam 2	
12	11/17			Exam 2	
		11/19		Probability Theory	7.2
			11/21	Discussion & Quiz 3 (20 min)	
13	11/24			Binary relations & their representation	9.1, 9.3
		11/26		Closure of relations, Equivalence Relations	9.4, 9.5
			11/28	Vacation	
14	12/1			Languages and grammars	13.1
		12/3		Finite State Automata	13.3
			12/5	Discussion of problems & review	
FINAL EXAM				**Thursday, Dec. 11, 5:45-7:45pm in the lecture classroom**	

The instructors reserve the right to modify the schedule, as necessary, during the semester. Students will be notified of all modifications in class and by updating the website.