MATH 320 – DISCRETE MATHEMATICS

Fall 2018

General Information

Description

This course introduces students to fundamental algebraic, logical, and combinational concepts in mathematics that are needed in upper division computer science courses. Topics include sets, mappings, and relations; elementary counting principles; proof techniques with emphasis on mathematical induction; graphs and directed graphs; Boolean algebras; recursion; and applications to computer science.

As in any mathematics course, in order to truly understand the concepts and master the techniques, you will need to get involved with the material. The only way to learn math is to do math. It is not enough to read the textbook and look at the examples and explanations. Hopefully, those will make sense to you, but that is not the same as being able to work the problems or create the proofs or apply the concepts yourself.

Practice Exercises have been identified in each section for you to complete as homework. These exercises will help you learn the procedures and identify which aspects you need to study further or ask for some help on. Additional exercises in each section have been specified as Group Homework assignments. You should work on these after you finish the Practice Exercises. You will complete the Group Homework exercises on your own and then compare your answers with those of a group of classmates, come to consensus on what are the correct answers, and, finally, submit the group's answers for a grade.

Tutorials are available to demonstrate how to use the Equation Editor and Draw tools in Microsoft Word. The Equation Editor and Draw tools are useful in composing the solutions to the Graded Exercises. The Word Symbol menu is also useful in creating necessary mathematical notation.

- Office 2007
  - Microsoft Word Equation Editor Tutorial
  - Microsoft Word Draw Tutorial
- Office 2000 or 2003
  - Microsoft Word Equation Editor Tutorial
  - Microsoft Word Draw Tutorial

On three occasions throughout the term, you will be asked to write a brief Discuss Board posting in which you comment on how one of the topics you have been studying applies to or is used in your work setting or in another aspect of your daily life. Hopefully, these exercises will encourage you to be alert to applications of the concepts being studied and will also give you some insight into how these concepts apply in your classmates' environments.

You should expect to spend about 8 to 12 hours a week, reading, studying, and completing assignments for this course.

You will take two quizzes, a midterm, and a comprehensive final exam. The final exam will address some of the big ideas assessed on the quizzes and midterm, as well as the new material covered after the last quiz. Each quiz consists of problems very similar to the ones you work on in the "Practice Exercises" and "Group Homework." Study guides to help you prepare for each quiz and exam are provided. You will take the exams in a proctored setting.

Prerequisites

- MATH 160, PF 321

Course Outcomes

- Upon successful completion of this course, students will be able to:
    1. Demonstrate various methods of proof, including direct and indirect proof and proof by induction.
    2. Solve basic counting problems, including some involving permutations and combinations.
    3. Apply the concepts of recurrence to algorithms and counting problems.
    4. Apply the concept of growth of functions to compute the complexity of simple algorithms.
    5. Identify specific types of graphs and trees.
    6. Apply several classic algorithms related to applications of graphs and trees.

Course Materials

Required Materials

- Rosen, K. (2012a). Discrete mathematics and its applications. (7th ed.). New York, NY: McGraw-Hill. ISBN (print): 9780073383095

Obtaining Course Materials

- A digital copy of the textbook (e-textbook) for this course is accessible via VitalSource, an online platform for digital instructional materials. Clicking on any link to the book from within the course will direct you to an object from which a digital copy of the textbook can be opened in a new browser tab. For a detailed walkthrough on accessing digital copies of textbooks, please refer to this tutorial.

Course Outline

Course Topics

Module 1: Logic, Functions, Sequences and Matrices	**Week 1**	Propositional Logic
	Week 2	Sets, Functions, and Sequence and Summations
Module 2: Algorithms, Induction, Recursion and Basic Counting Principles	**Week 3**	Algorithms and Complexity of Algorithms
	Week 4	Methods of Proof and Mathematical Induction
	Week 5	Recursion, Basic Counting Principles
	Week 6	Midterm, Combinatorics
Module 3: Advanced Counting Principles	**Week 7**	Combinatorics, Number Bases
	Week 8	Recurrence Relations
Module 4: Graphs and Trees	**Week 9**	Introduction to Graphs
	Week 10	Trees
Module 5: Boolean Algebra	**Week 11**	Boolean Functions and Logic Circuits
	Week 12	Final Exam Week