CompST 701: Mathematical and Computing Fundamentals for IT Professionals

Fall 2017 (online)

Instructor: Dr. Amol D. Mali, EMS 1055, mali@uwm.edu

Office Hours: 2-4 pm on Sept. 11, Sept. 25, Oct. 9, Oct. 23, Nov. 6, Nov. 27, Dec. 4, and Dec. 11 (these are Mondays). You are welcome to e-mail questions at any time.

Introduction

CST 701 covers important discrete mathematics topics and their applications. The material serves as a foundation to many courses in the computing field. There is no required or recommended textbook. Lectures, homeworks, and examinations will be available in D2L (d2l.uwm.edu). Homeworks and examinations will be made available as Microsoft Word files with questions and blank spaces for answers and students are expected to use these spaces for answers and upload the modified files in D2L for grading. The dropbox in D2L is an individual submission folder which means that a student can see the work only he/she submitted. If there are problems in uploading your work in D2L by the deadline, e-mail it to mali@uwm.edu by the deadline and upload the exactly same version in D2L later.

The class has four major themes:

1. Mathematical Reasoning. You will learn logic and reasoning techniques that will enable you to show that a mathematical statement is true or an algorithm is correct.

2. Discrete Structures. You will learn important mathematical structures that are used to represent objects and their relationships. These discrete structures include sets, functions, graphs, etc.

3. Counting and Probability. Yes, you will learn how to count! Once you know how, you will be able to compute the probabilities of many events. Both skills are important for designing good algorithms.

4. Basic Algorithm Design and Analysis. You will learn the basics of designing and analyzing efficient algorithms.

Topics

1. Logic, Propositional equivalences

2. Rules of Inference, Applications of logic to knowledge bases, puzzles and satisfiability problems

3. Sets and Set Operations

4. Functions

5. Mathematical Induction

6. Basics of counting
7. Counting: Permutations and Combinations without repetition
8. Counting: Permutations and combinations with repetition
9. Basics of Probability
10. Graphs and Graph Models, Trees
11. Graph Connectivity and Basic Graph Traversals
12. Review of logarithms, exponentials, and summations, Growth of functions, Complexity of Algorithms
13. Recursive Algorithms
14. Shortest Path Algorithms

**Grading**

Homeworks: 60%
Exams (midterm and final): 20% each

(The midterm will be based on the first seven topics. The final examination will be based on topics 8-14.)

Midterm: Oct. 27, 3-5 pm (online)
Final exam: Dec. 22, 3-5 pm (online)

**Academic Misconduct**

Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources and for respect of others’ academic endeavors. A more detailed description of Student Academic Disciplinary Procedures may be found at http://uwm.edu/academicaffairs/wp-content/uploads/sites/32/2015/02/uws14facdoc1686.pdf

Notes In case of an emergency, contact the instructor at the earliest possible opportunity via e-mail. No arrangements will be made for missed exams unless these rules are followed, and an acceptable evidence of legitimate emergency is submitted. Please also be aware of the standard University policies: www4.uwm.edu/secu/news events/upload/Syllabus-Links.pdf.