CS 3333
Mathematical Foundations of Computer Science
Syllabus

Instructor: Ali Şaman Tosun
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Class Time: Monday, Wednesday, Friday 11:00 am - 11:50 am
Class Location: BB 3.03.02
Office Hours: Monday, Wednesday, Friday 12:00 pm - 1:00 pm
TA/Grader: Olumide Kayode, olumide.kayode@utsa.edu

Textbook: Discrete Mathematics and Its Applications, 8th ed. by Kenneth H. Rosen

Objectives: In this course you will learn
1. Integer functions, division theorem, greatest common divisor, prime numbers and modular arithmetic to describe number systems and cryptography techniques
2. Properties of matrices, matrix operations, and applications of matrices to model and solve computer science problems
3. Basic counting techniques including pigeonhole principle, permutations, combinations, and binomial theorem and their applications to computer science problems
4. Basics of probability theory including conditional probability, Bayes’ theorem, random variables, expectation and variance and their applications to model and solve problems
5. Statistical techniques to summarize measured data such as mean, median, mode, variance, percentiles, and confidence intervals

Topics:
- Integers, Division (sec. 4.1.1-4.1.3)
- Modular Arithmetic (sec. 4.1.4, 4.1.5)
- Number Systems (sec. 4.2 (skip 4.2.3))
- Primes (sec. 4.3, 4.4.3, 4.4.4)
- Cryptography (sec. 4.6.1-4.6.5)
- Introduction to matrices (sec. 2.6)
- Matrix multiplication (sec 2.6)
- Determinants and Inverses
- Eigenvectors and Eigenvalues
- Basics of counting (sec. 6.1)
- Pigeonhole principle (sec. 6.2)
- Permutations and combinations (sec. 6.3)
- Binomial theorem (sec. 6.4)
Generalized permutations and combinations (sec. 6.5)
Principle of inclusion-exclusion (sec. 8.5-8.6)
Classical probability (sec. 7.1)
Probability theory (sec. 7.2)
Bayes theorem (sec. 7.3)
Random variables (sec. 7.2)
Properties of random variables (sec. 7.4)
Probability distributions
Statistics: summarizing experimental data
Confidence intervals
Regression

Prerequisites: CS 1713: Computer Programming II
             MATH 1224: Calculus II

Grading:  Homeworks 16% (9 homeworks, lowest one dropped)
          Midterm 1 20%, Friday February 14
          Midterm 2 20%, Friday March 27
          Midterm 3 20%, Friday April 17
          Final 20%, Thursday May 7, 9:45 am - 12:15 pm
          Attendance 4%

Letter Grades:  90+ (A,A-), 80-90 (B+,B,B-), 70-80 (C+,C,C-), 60-70 (D+,D,D-), 0-60 (F)

Exam Policy:  Exams are in-class, closed-book and closed notes.
              Make-up exams are given only under certain extenuating circumstances.
              Make-up exams are generally more difficult than the regular exams.

Homework Policy:  Homeworks must be submitted in pdf form using blackboard.
                  No late homeworks will be accepted.

Attendance Policy:  Attendance is required.

This Syllabus is provided for informational purposes regarding the anticipated course content and schedule of this course. It is based upon the most recent information available on the date of its issuance and is as accurate and complete as possible. I reserve the right to make any changes I deem necessary and/or appropriate. I will make my best efforts to communicate any changes in the syllabus in a timely manner. Students are responsible for being aware of these changes.