Course: Math4328, Discrete Mathematics II


Course Description:

This course is a continuation of MATH2305, Discrete Structures I. As such, this course concerns selected mathematical ideas having significant applications to computer science. We will study different aspects of the same general topics as in MATH2305.

Course Prerequisites: MATH2305, Discrete Mathematics, I

Student Learning Outcomes:

- The student will become familiar with relevant terminology, theorems, and examples.
- The student will be able to solve problems relating to the course material.
- The student will have been exposed to the need for mathematics in computer science.
- The student will have been provided with the opportunity to practice reading mathematics.

Major Course Requirements:

Course grades will be determined by three examinations whose contents will be guided by the previously described learning outcomes. The examinations will consist of problems and examples selected from the course textbook, definitions, theorem statements, and related material. A detailed list of examination topics will be distributed in class the week before each examination.

Each examination will contribute equally towards the final grade. The examination average score will be used to assign grades using a traditional 90, 80, 70, 60 percent distribution for “A”, “B”, “C”, and “D”, respectively. The examinations will occur approximately during the fifth week, the tenth week, and during the University-determined final examination period.
Course Outline:

We will proceed guided by the following approximate outline. Familiarity with topics listed under the heading “Prerequisite Material” will, by in large, be assumed. Topics in parenthesis may be covered in summary only.

0. General Introduction (1 meeting)

1. Logic of Compound Statements (Chapter 2; reading only, 0 meetings)
   **Prerequisite Material:**
   2.1 Logical Form and Logical Equivalence
   2.2 Conditional Statements
   2.3 Valid and Invalid Arguments

   **Course Material:** None

2. Logic of Quantified Statements (Chapter 3; reading only, 0 meetings)
   **Prerequisite Material:**
   3.1 Introduction to Predicates and Quantified Statements I
   3.2 Introduction to Predicates and Quantified Statements II
   3.3 Statements with Multiple Quantifiers
   3.4 Augments with Quantified Statements

   **Course Material:** None

3. Elementary Number Theory and Methods of Proof (Chapter 4; 2 meetings)
   **Prerequisite Material:**
   4.1 Direct Proof and Counterexample I: Introduction
   4.2 Direct Proof and Counterexample II: Rational Numbers
   4.3 Direct Proof and Counterexample III: Divisibility
   4.6 Indirect Proof Contradiction and Counterexample

   **Course Material:**
   4.7 Two Classical Theorems: Irrationality of $\sqrt{2}$ and infinitude of primes

4. Sequences and Mathematical Induction (Chapter 5; 4 meetings)
   **Prerequisite Material:**
   5.1 Sequences
   5.2 Mathematical Induction

   **Course Material:**
   5.3 Mathematical Induction II
   5.4 Strong Mathematical Induction and the Well-Ordering Principle
   5.6 Defining Sequences Recursively
   5.7 Solving Recurrence Relations by Iteration
   5.8 Second Order Linear Recurrence Relations with Constant Coefficients
   5.9 General recursive Definitions
5. Graphs and Trees (Chapter 10; 5 meetings)

Prerequisite Material:
10.1 Graphs
10.5 Trees

Course Material:
10.2 Paths and Circuits
10.3 Matrix Representation of Graphs
10.4 Isomorphisms of Graphs
10.6 Spanning Trees

6. Regular Expressions and Finite-State Automata (Chapter 12; 3 meetings)

Prerequisite Material:
None

Course Material:
12.1 Formal Languages and Regular Expressions
12.2 Finite-State Automata

7. Functions (Chapter 7; 1 or 2 meeting/s)

Prerequisite Material (overview provided):
7.1 Functions Defined on General Sets
7.2 One-to-one and Onto, Inverse Functions

Course Material:
7.3 Application: The Pigeonhole Principle
7.5 Cardinality and Applications to Computability

8. Relations (Chapter 8; 6? meetings)

Prerequisite Material:
None

Course Material:
8.1 Relations on Sets
8.2 Reflexivity, Symmetry, Transitivity
8.3 Equivalence Relations
8.4 Modular Arithmetic and Application to Cryptography
8.5 Partial Order Relations

9. Counting and Probability (Chapter 9; 2 meetings)

Prerequisite Material:
9.1 Introduction
9.2 Possibility trees and the Multiplication Rule
9.3 Counting Elements of Disjoint Sets: the Addition Rule
9.4 Counting Subsets of Sets: Combinations

Course Material:
9.8 Probability Axioms and Expected Value
(9.9 Conditional Probability, Bayes’ Formula and Independent Events?)

10. Other Topics (? meetings)
Russell’s Paradox and the Halting Problem)
Some Notes Concerning Various University and College Procedures:

- **Course Withdrawal:**
The student is responsible for the paperwork associated with registration in this course. In the unlikely event that you decide to withdraw from this (or any) course you must submit the required documents prior to any University deadline date(s).

You should initiate the course withdrawal process by going to the Student Services Center and filling out a course drop form. Please be certain that you properly submit this paperwork. Should my signature be required you may obtain it either at a class meeting, during my regularly scheduled office hours, or by appointment. Failure to properly complete this course withdrawal procedure will result in your receiving a course grade based on the work you have actually completed.

- **Academic Integrity/Plagiarism.**
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to disciplinary action includes all forms of cheating, such as illicit possession of examination materials, falsification of records, forgery, and plagiarism. (Plagiarism being the presentation of the work of another as one’s own work.)

- **Accommodations for Students with Disabilities:**
Texas A&M University-Corpus Christi complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. If you suspect that you may have a disability (physical impairment, learning disability, psychiatric disability, etc.), please contact the Services for Students with Disabilities Office, located in Driftwood 101, at 825-5816. If you need disability accommodations in this class, please see me as soon as possible.

- **Requirements for Academic Advising:**
The College of Science and Technology requires that students meet with an Academic Advisor in order to declare a major field of study. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the Department chair. The College of Science and Technology Advising Center is located in Faculty Center Room 178, and may be reached at (361) 825-6094.

- **Appeals of Course Grades:**
As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University
Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.