TCSS 321 Master Syllabus
Version: April 2011
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Catalog Description

Introduces definitions and tools for reasoning about discrete mathematical objects useful for computer professionals. Includes set theory, propositions and predicates, Boolean algebra, sequences, enumeration, algorithms, methods of proof, permutations, combinations, probability, with applications in computing. Prerequisite: a minimum grade of 2.0 in either TCSS 143 or CSE 143.

Preconditions

- Apply algebraic manipulations to simplify a mathematical expression.
- Apply general mathematical skills and abstractions (e.g., translating an English problem description into an appropriate mathematical operation).
- Recognize and use fundamental programming constructs (e.g., iteration, selection, arrays).

Student Learning Goals (to be added to syllabus handed out to students)

By the end of the course, students should be able to:

- Recognize and use mathematical formalisms (e.g., sets, logic, summations, proof).
- Translate problem descriptions into mathematical formalisms.
- Manipulate (procedural knowledge) and apply mathematical formalisms to solve problems.

CSS Degree Student Learning Outcomes that this course contributes to (to be added to syllabus handed out to students)

a. an ability to apply knowledge of computing and mathematics appropriate to the discipline

UWT Student Learning Goals that this course contributes to (to be added to syllabus handed out to students)

Inquiry and Critical Thinking
Students will acquire skills and familiarity with modes of inquiry and examination from diverse disciplinary perspectives, enabling them to access, interpret, analyze, quantitatively reason, and synthesize information critically.

Topics covered

1. Logical foundations
    a. sets
    b. logic
    c. quantification

    d. functions
2. Numbers
    a. sequences and summations
    b. growth of functions
    c. integers and algorithms
    d. modular arithmetic
    e. matrices
3. Methods of proof
    a. rules of inference
    b. direct and indirect proof, proof by induction
    c. constructive and nonconstructive proofs
    d. refutation by counterexample
4. Relations
    a. Relations, *n*-ary relations
    b. Closures
    c. Equivalence relations
    d. Partial orderings

Additional Information

This course introduces students to some of the mathematical abstractions used in later courses (such as data structures, algorithms, and databases). Not only are students expected to be able to understand the abstractions, they are also expected to be able to choose and apply them when appropriate. The textbook that has been used is Rosen's *Discrete Mathematics and Its Applications* (whichever the current edition is, 6th as of March 2011).