Master Syllabus for TCSS 321
Version: September 2009

The **primary goals** of the course are:
1. Knowledge of mathematical formalisms (e.g., sets, logic, proof).
2. Ability to translate problem descriptions into mathematical formalisms.
3. Ability to manipulate (procedural knowledge) and apply mathematical formalisms to solve problems.

Prerequisites: one quarter of calculus, and one quarter of calculus-based physics, programming experience (at least TCSS 142, preferably TCSS 341).

Topics covered
1. Logical foundations
    a. sets
    b. logic
    c. quantification
    d. functions
2. Numbers
    a. sequences and summations
    b. integers and algorithms
    c. modular arithmetic
    d. 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

General Student Preconditions:
1. Knowledge of basic math language: expressions, notation
2. Knowledge of basic algebra, variables, equations, identities, power, logarithm
3. Knowledge of basic abstraction
4. Knowledge of sets, notation basic operations
5. Some programming experience (know loops, branching, arrays)

General Student Postconditions
1. Knowledge of, understanding of, and ability to apply discrete mathematical concepts.