

CSE 215

Foundations of
Computer Science

www.cs.sunysb.edu/~leo/cse215.html

Prof. Leo Bachmair

Course Objectives

1. Introduce discrete structures such as functions, relations, and sets, and methods for constructively defining them.
2. Introduce recursion as a basic paradigm for computing with functions.
3. Provide a rigorous introduction to logic and basic proof techniques, such as mathematical induction.

Course Topics

1. Propositional Logic [Chapter 1]
 - (a) Logical form and logical equivalence
 - (b) Conditional statements
 - (c) Valid arguments
 - (d) Application: Digital logic circuits
2. Predicate Logic [Chapter 2]
 - (a) Predicates and quantifiers
 - (b) Arguments with quantified statements
3. Proof Methods [Chapter 3]
 - (a) Direct proofs and counterexamples
 - (b) Contradiction and contraposition
4. Mathematical Induction [Chapter 4]
 - (a) Standard mathematical induction
 - (b) Strong mathematical induction
5. Set Theory [Chapter 5]
 - (a) Basic definitions and properties

6. Functions [Chapter 7]

- (a) Basic definitions and properties
- (b) Application: The Pigeonhole Principle
- (c) Composition
- (d) Countability and uncountability

7. Recursion [Chapter 8]

- (a) Recursive definitions of functions
- (b) Functional programming in ML

8. Relations [Chapter 10]

- (a) Basic definitions and properties
- (b) Equivalence relations
- (c) Partial orders