Computer Science and Engineering CSE 2813
Discrete Structures

CREDITS/CONTACT HOURS: Credit Hours: 3, Contact Hours: 45

COORDINATOR:
Dr. Song Zhang

TEXTBOOKS:
a. Supplemental Material: No required material

SPECIFIC COURSE INFORMATION:
Catalog Description: Three hours lecture. Concepts of algorithms, induction, recursion, proofs, topics from logic, set theory, combinatorics, graph theory fundamental to study of computer science.
a. Prerequisites: Grade of C or better in CSE 1284 and MA 1313 or equivalent
b. Required/Elective:
   Computer Science – Required
   Software Engineering – Required
   Computer Engineering – Required

SPECIFIC GOALS OF THE COURSE:
Specific Outcomes of Instruction:
1. To develop students' mathematical reasoning, including formal logic and proofs.
2. To provide students with the basic tools to compare relative efficiency of algorithms.
3. To develop the basis for combinatorial analysis.
4. To develop students' ability to manipulate abstract structures such as sets, graphs and trees, relations and functions, and finite automata.
5. To introduce the mathematics of recurrences.
   a. Criterion 3 Outcomes:
      Note: Parenthesized list indicates the ABET EAC and CAC outcomes addressed by each performance criteria.
      1. The student will be able to manipulate truth tables and logical operators, including implication, as well as understand propositional and predicate logic and quantification, and recognize logical fallacies. (EAC: a; CAC: a)
      2. The student will demonstrate competence in several styles of proof, including proof by contradiction and proof by induction. (EAC: a; CAC: a)
      3. The student will be able to compute Big-O of functions, and demonstrate knowledge of the comparative growth of functions. The student will be able to solve simple recurrence relations. (EAC: a; CAC: a)
4. The student will be able to compute permutations and combinations and make use of the Pigeonhole Property and the Principle of Inclusion/Exclusion. (EAC: a; CAC: a)

5. The student will demonstrate grasp of the basic properties of relations, including reflexive, symmetric, antisymmetric and transitive relations. The student will be able to recognize partial orderings and equivalence relations. (EAC: a; CAC: a)

6. The student will understand the formal properties of directed and undirected graphs. The student will demonstrate familiarity with the abstract representation of graphs, and with major graph traversal algorithms and their properties. (EAC: a; CAC: a)

TOPICS COVERED:

Lecture (Number of class hrs)
1. Propositional and Predicate Logic 4
2. Proof techniques (especially induction) 6
3. Sets 4
4. Binary Relations, functions, equiv relations, partial orderings 7
5. Graphs 6
6. Combinatorics and recurrence 9
7. Analysis of Algorithms: performance measures 6
8. Tests 3