MATHEMATICAL MODELING

MA 536

Course Description

Discrete Mathematical Modeling in the context of rational decision making and optmization theory; graph theoretic models including directed and planar graphs, trees, properties of graphs such as connectedness, completeness, isomorphisms, etc., adjacency and path matrices for representing graphs. Algorithms for traversing trees, the shortest path problem, generating linked structure, sorting, etc.; data base models, decision models, artificial intellilgence models, computer simulation.

Goals of the Course

1. To introduce the student to the elements of graph theory from both a mathematical and an applications point of view.
2. To introduce methodology for representing relations with applications to relations which hold among data items.
3. To introduce concepts involved in representing and characterizing non-numeric data such as bit strings, character strings, etc.
4. To provide programming experience in verifying algorithms for solving problems which depend on operations on data structures.
5. To help the student develop a mathematical intuition for the structure of relations in discrete finite sets of data elements.
6. To provide experience with programming systems and their capabilities for handling various data types and data structures.
7. To introduce algorithmic analysis and design criteria for data manipulation in a database.

Course Content

A. Functions and Relations 10%

1. The ordered pair and related concepts
2. Relations
3. Equivalence relations
4. Equivalence classes and partitions

B. Graph Theory