MODULE: FORMAL SPECIFICATIONS

Aims and Objectives

- Introduce students to a formal approach to system specification;
- Show how both predicate and propositional calculus are used as a foundation for specification;
- Introduce the Z notation for system specification;
- Develop case studies;
- Show students how to prove properties of specifications formally;
- Introduce complexity analysis.

Assessment Methods:

- Written Exam 80%
- Course Work 20%

Reading List :

Title	Author	Publisher
An Introduction to Formal Specification and Z	Potter, Sinclair & Till	Prentice-Hall 1991
Z An Introduction to Formal Methods	Diller A.	John Wiley 1990
Formal Specification using Z	Lightfoot D.	Macmillan 1990
An Introduction to Z	Imperato M.	Chartwell-Bratt 1991
The Z Notation	Spivey J.	Prentice-Hall 1989
Discrete Mathematics in Computer Science	Stanat & McAllister	Prentice-Hall 1977

SYLLABUS

1. Logic

- Propositional Calculus: propositions, truth tables, laws of deduction, argument forms – modus ponens, modus tollens, hypothetical syllogism, contradiction, addition, constructive dilemma, destructive dilemma, proof of the validity of arguments;
- Predicate Calculus: predicates, laws of the calculus, quantifying over ranges, proof involving equivalences of predicates, trading laws.

2. Set Theory

- Proof of the laws of set theory using predicate calculus;

3. Relations & Functions

- Theory of relations and functions with emphasis on operators introduced in Z;

4. Z notation

- Schemas, state space, initial state, observer operations, constructor operations, input and output for change of state;
- Case studies;
- Sequences and Bags.
- Proving properties of specifications.

5. Complexity Theory

- Introduction to the analysis of algorithms.