IT424 Logic for Computer Science

Instructor:
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Objectives

Logic has been called "the calculus of computer science". The argument is that logic plays a fundamental role in computer science, similar to that played by calculus in the physical sciences and traditional engineering disciplines. Indeed, logic plays an important role in areas of Computer Science as disparate as architecture (logic gates), software engineering (specification and verification), programming languages (semantics, logic programming), databases (relational algebra and SQL), artificial intelligence (automatic theorem proving), algorithms (complexity and expressiveness), and theory of computation (general notions of computability).

This course provides the student with a thorough introduction to computational logic, covering in depth the topics of syntax, semantics, decision procedures for both propositional and first-order logic. The material is taught from a computer science perspective, with an emphasis on algorithms and computational complexity. The goal is to prepare the students for using logic as a formal tool in computer science.

Contents

Propositional Logic, First Order Logic, Semantic tableaux, Hilbert systems, Gentzen systems, Resolution procedure, Prolog, Program Verification

Text Books

1. Mathematical Logic for Computer Science, M. Ben-Ari, Springer, 2003

References

1. Logic in Computer Science: Modelling and reasoning about systems, M. Huth, M. Ryan, Cambridge University Press, 2004
2. Logics for Computer Science, A. Singh, PHI, 2004
3. The Essence of Logic, J. Kelly, PHI, 2001

Prerequisite

1. Discrete Mathematics

Grading Standards

InSem 1 25%
InSem 2 25%
Final Exam 50%