

Course Title: Advanced Model Checking

Course Code CSE-952

Course Objectives:

Having completed this course, students will be able to model the behavior of reactive systems using finite-state machines and temporal logic. They will understand and be able to use model checkers to check whether crucial properties are satisfied.

Course Outcomes:

Having completed this course, students will be able to model the behavior of reactive systems using finite-state machines and temporal logic. They will understand and be able to use model checkers to check whether crucial properties are satisfied.

Course Contents

- System Verification
- Modeling Concurrent Systems
- Linear-Time Properties
- Regular Properties
- Computation Tree Logic
- Equivalences and Abstraction
- Partial Order Reduction
- Time Automata
- Probabilistic Systems
- Model-checking tools

Recommended / Reference Books:

- E.-R. Olderog and H. Dierks: Real-Time Systems. Cambridge University Press, 2008.
- B. Bérard et al.: Systems and Software Verification: Model-Checking Techniques and Tools, Springer 2001.
- C. Baier and J.-P. Katoen: Principles of Model Checking, MIT Press, 2008.
- T-A. Henzinger, P-H. Ho, and H. Wong-Toi. HYTECH: A model checker for hybrid systems. International Journal on Software Tools for Technology Transfer, 1(1-2):110-122,1997.
- Goran Frehse. Phaver: Algorithmic verification of hybrid systems past HYTECH. In HSCC, pages 258-273, 2005
- A Tutorial on UPPAAL. Gerd Behrmann, Alexandre David, and Kim G. Larsen. In proceedings of the 4th International School on Formal Methods for the Design of Computer, Communication, and Software Systems (SFM-RT'04). LNCS number 3185, Springer.