



University of Tehran
School of Electrical and Computer Engineering

Course	Principles of Model Checking		
Course type, level, credit	Elective	Graduate	3 units
Field, Major	Computer Engineering	Software	
Co-requisite(s)	-		
Prerequisite(s)			
Prerequisite by topic	Basic knowledge of automata theory, data structures and algorithms		
Goals	In this course, students get familiar with basics of modeling concurrent and reactive systems, and verification of such systems using model checking techniques. The modeling is based on high-level modeling languages, which in turn, are transformed into transition systems. Model checking is done based on well-known temporal logics.		
Outcome	Upon successful completion of the course, students will ... <ol style="list-style-type: none"> 1. be able to formally model the system under verification 2. be able to describe the correctness properties using temporal logics 3. be able to apply model checking techniques and tools to verify the properties. 		
Topics	<ol style="list-style-type: none"> 1. Introduction to Verification 2. Transition Systems and Program Graphs 3. High-Level Modeling Languages <ol style="list-style-type: none"> a. Promela b. Petri Net c. Actor Model 4. Linear Properties 5. Fairness 6. Regular Properties 7. Linear Temporal Logic 8. Computation Tree Logic 9. Timed Automata 		

	10. Probabilistic Model Checking
Required software	Afra Toolkit, Spin Model Checker
Assignments	8 homeworks
Projects	-
Grading	Assignments and quiz: 20 % Midterm exam: 40 % Final exam: 40 %
Textbook(s)	[1] C. Baier and J.-P. Katoen, Principles of Model Checking, MIT Press, 2008. [2] S. Kundu, S. Lerner, and R. Gupta, High-Level Verification: Methods and Tools for Verification of System-Level Designs, Springer-Verlag, 2014.
Further readings	[1] M. Ben-Ari, Principles of the Spin Model Checker, Springer-Verlag, 2008.