

CMPE 58S: Computer Aided Verification, Fall 2013

Instructor: Asst. Prof. Alper Sen **Email:** alper.sen@boun.edu.tr **Office Hours:** By appointment **Website:** <http://www.cmpe.boun.edu.tr/courses/cmpe58S/fall2013>

This is a graduate level course in verification. Verification checks whether a system satisfies its specifications. This process takes the largest portion of SW or HW development activities. The dependability of complex computer systems becomes a challenge with every new generation of systems. The objective of this course is to learn the fundamental techniques involved in verifying large-scale concurrent systems (multithreaded programs, or multicore hardware designs) using a variety of techniques. The course covers an overview of verification techniques ranging from formal methods such as model checking to specification languages such as temporal logic. There will be assignments to use verification tools to find bugs.

Tentative: There will be one midterm, one final exam, assignments and a term project.

Right to take the final exam: Term project grade >50, midterm grade >30.

Objectives:

The participants will become familiar with both the theory and practice of verification.

Topics: (the order is not fixed yet)

- Concurrency, Models of Computation
- Propositional Logic
- Temporal Logic (Linear time, Branching time)
- Explicit Model Checking
- Binary Decision Diagrams
- Symbolic Model Checking
- Bounded Model Checking using SAT
- Runtime Verification (Assertion Based Verification)
- Equivalence Checking

Tools that can be used in the course:

NuSMV, SPIN model checker, Java Pathfinder

Textbook:

"Logic in Computer Science: Modeling and reasoning about systems" by Michael R A Huth and Mark D Ryan

Reference Textbooks:

"Model Checking" by Edmund M. Clarke, Orna Grumberg, and Doron Peled