

Cleveland State University
Department of Electrical Engineering and Computer Science

EEC 622/722 Formal Methods in Software Engineering

Catalog data: EEC 421/521 Software Engineering (4-0-4).
Pre-Requisite: EEC 521: Software Engineering, or permission of instructor.
Software system formal mechanisms, including specification, validation, and verification. Formal specification of concurrent systems using temporal logics. Evolution of formalism to model a certain system. Use of model checking and program verification tools for verification of concurrent software.

Textbook: Michael Huth and Mark Ryan, Logic in Computer Science: Modelling and reasoning about systems. Cambridge University Press. ISBN 0 521 54310X. 2004.
The material in the textbook will be supplemented by lecture notes and a set of research papers that will be assigned in class.

Coordinator: Dr. Nigamanth Sridhar
Email: n.sridhar1@csuohio.edu

CourseWeb Page: The following URL will contain class announcements, handouts, assignments, and other useful resources. In general, this will be the primary way in which I will communicate information to you (other than class lectures, of course)
<http://selab.csuohio.edu/~nsridhar/teaching/spring13/eec622>

Objectives: Upon successful completion of this course, the student should:

1. Be able to write and understand safety and liveness properties of concurrent systems
2. Be able to write and understand specifications of concurrent systems using various temporal logics
3. Be able to design state transition systems and Kripke structures to model concurrent software
4. Have command over techniques of explicit-state and symbolic model checking
5. Be able to use a variety of model checking tools (SPIN, SMV, etc.) for verifying concurrent systems
6. Be able to understand the benefits of program verification, and have an understanding of available tools for program verification.
7. Be able to use program verification tools (Dafny, RESOLVE).

Grading: The following grade components will be assessed in this course:

Grading Component	Masters	Doctoral
Pop Quizzes	5%	5%
Homework	35%	25%
Midterm Exam	15%	15%
Final Exam	25%	15%
Project	1	20%
Technical Paper	–	20%
Total	100%	100%

Project: All students in the class are required to complete a term project. The project can be one of two kinds: (a) a survey of model checking or program verification methods and tools, or (b) evaluation of an existing toolset for program verification based on benchmarks for verification systems presented in class. Doctoral students are required to do a project only of type (b).

Technical Paper: Doctoral students in the class will be required to prepare a complete technical paper based on their project. The style and quality of the paper should be suitable for submission in a peer-reviewed conference or journal.

Attendance: Since this is a lecture-based course, although there is no official attendance policy, students are strongly encouraged to attend every class. Only a portion of the course material will be covered in the textbook. The majority of the exam material will be covered only during the lecture periods. Based on previous experience, since each lecture builds upon the lectures that preceded it, missing even a single class can make it difficult for you to keep up with the course material. Please attend every class — it makes it easier to earn your participation points, and more importantly, makes it more enjoyable for me to grade your exams.

As a courtesy to me, if you choose to attend class, please show up on time. If you must miss a class, it is your responsibility to get any missed lecture notes, handouts, and project assignments from your fellow students.

If I will miss a class period, I will make every effort possible to notify you at least one class period in advance. If I am more than fifteen minutes late to class, you should assume that I am dealing with an emergency, and will not be able to make it to class. In such a rare case, class is automatically canceled, and you are free to leave.

Pop Quizzes: Throughout the semester, I will give quick quizzes about current concepts and materials. The decision of whether there is a quiz or not on a given day will be made on that day (I will flip a coin twice. Two heads means a quiz). The quizzes will be in a variety of formats. The pop quizzes will be given during class, some at the start of class and some at the end of class. If you are not present for a pop quiz, you automatically receive a zero grade for the quiz. At the end of semester, the average of the quiz grades will be computed. No make-up will be given for pop quizzes.

Late Assignments, Missed Exams, Quizzes, and Presentations: Any assignments must be submitted in class at the beginning of the period on their due date. Late projects will not receive any credit. Similarly, failure to attend class on the day of an exam, quiz, or scheduled presentation will result in an automatic zero grade for the work. If you arrive late on the day of an exam, quiz, or scheduled presentation, you will be allowed to participate, but will not be given additional time to compensate for being tardy. Make-up work will be granted only with a valid, written, medical, or university excuse. It is your responsibility to give me the written excuse and to arrange for the make-up work within one week of your absence.