CSE 788.P11 **Autumn 2006**
Prof. Paul Sivilotti

CIS 788.P11: Model Checking

Department of Comuter Science and Engineering
The Ohio State University
Distributed: Wednesday, Sept 20th.

Class: Mon/Wed/Fri, 12:30 – 1:18 pm, DL 698.

Instructor: Dr. Paul Sivilotti

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Office Hours: Wednesday 1:30 – 2:30 pm and Friday 9:30 – 10:30 am. Also by appointment.

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Description: The class will introduce some basic temporal logics, including CTL, LTL, and CTL*. Expressivity of these logics and issues of fairness will be discussed. We will cover Kripke structures and explicit state model checking. We will also cover BDDs and symbolic model checking. Students will work with model checkers of each kind. Additional topics, time permitting, could include: model checking LTL, compositional approaches to model checking, and optimization through abstraction and symmetry.

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

1. Have used both an explicit state and symbolic model checking tools to verify a small system
2. Be familiar with basic temporal logics for software specification, including LTL, CTL, and CTL*
3. Understand the data structures (eg Kripke structures, BDDs) used in model representation
4. Understand the corresponding algorithms, including their complexity, used for model checking
5. Understand the principles underlying compositional approaches to system verification, including assumption-commitment and rely-guarantee.
6. Have presented a paper or topic to the class.

Textbooks: The following textbook is the principle reference.

1. *Systems and Software Verification: Model-Checking Techniques and Tools*, by Bérard *et al.*, Springer, 2001.

In addition, the following books are also useful references for consultation.

1. *Logic in Computer Science: Modelling and Reasoning About Systems*, Huth and Ryan, Cambridge University Press, 2nd edition, 2004.
2. *Model Checking*, Clarke, Grumberg, and Peled, MIT Press, 1999.

Prerequisites: Permission of instructor.

Grading Scheme: Grades are assigned based on an absolute score out of 100 (no curve): 80 and higher is an A (or A-), 70-79 is a B (+/-), 60-69 is a C (+/-), 50-59 is a D (+/-), and less than 50 is an E. The absolute score is calculated as follows:

Assignments	20%
Presentation	60%
Feedback	10%
Participation	10%

Assignments will be small take-home exercises, given sporadically through the quarter. During the second half of the quarter, each student will give a presentation to the group on a course topic. Students will provide feedback to their peers on their presentations. Active participation during seminar discussions will earn between 8 and 10 out of 10.

Note: There will be no midterm or final exam.