

## CIS 4930/CDA 5416 Introduction to Computer-Aided Verification

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<b>Office Hour:</b>	TBD
<b>Class Meeting Time/Location:</b>	TBD
<b>Credit Hours:</b>	3

### 1 Course Description

This course introduces basic concepts of model checking, a formal verification approach for concurrent system verification. Several commonly used model checking approaches will be covered. Fundamental elements of model checking including specification using temporal logic, design modeling, algorithms to thoroughly check specification on design models will be introduced. Students will gain hand-on experience by using a state-of-the-art model checker to model and verify various designs.

### 2 Prerequisites

Background in hardware design and automata theory is desirable. The following courses are required for taking this course.

- COT 3100 Discrete Structures
- CDA 3201 Computer Logic Design
- COT 400 Analysis of Algorithms

### 3 Textbook

No textbook is required. Lecture notes and/or research papers will be handled out for each class. The following is a list of good references to the subject of this course.

- *Model Checking*, E. Clarke, MIT Press, ISBN 9780262032704.
- *Logic in Computer Science*, M. Huth, Cambridge University Press, ISBN 052154310X.
- *Hardware Design Verification: Simulation and Formal Method-based Approaches*, W. Lam, Prentice Hall, ISBN 9780131433472.
- *The SPIN Model Checker*, G. Holzmann, Addison-Wesley, ISBN 0321228626.
- *Principles of Model Checking*, C. Baier, The MIT Press, ISBN 026202649X.

### 4 Main Topics

The following is a tentative list of topics to be covered subject to change.

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- Basic concepts of verification and model checking
- Concurrent system modeling
- Specification using temporal logics
- Introduction to SMV
- CTL model checking
- LTL model checking
- Binary decision diagrams and symbolic model checking
- Symbolic simulation
- Bounded Model Checking
- Boolean satisfiability solvers

## 5 Project

Students will form teams of two, and each team will select a related topic to accomplish for the final project. Each team has the freedom to select a project subject to instructor's approval. The project can be implementation of some previous work, or algorithms or methods to address issues of some previous work, etc. Each team needs to submit a project proposal describing the scope of the project, a detailed plan of how to finish the project, and experiments and expected results. At the end of the semester, each team needs to submit a final report describing the experimentation, obtained results and analysis/discussion, and problems encountered during the project and the solutions. Each team also needs to give a 30 minute oral presentation to report the project in front of the whole class.

## 6 Evaluation

Each student is evaluated based his/her performance on homework and exams. The distribution of grades is shown as follows. Homeworks may include some programming assignments.

Homeworks	40%
Midterm Exam	30%
Project	30%

### Final grading Scale:

$\geq 90\%$	:	<i>A</i>
80% – 89.9%	:	<i>B</i>
70% – 79.9%	:	<i>C</i>
60% – 69.9%	:	<i>D</i>
$< 60\%$	:	<i>F</i>

## 7 Communication

Blackboard will be the sole means for communications. Grades, handouts, and other related materials will be posted only on Blackboard. The following three locations on Blackboard will be used frequently during this semester.

- **Course Document** where lecture material and other related documents are posted
- **Assignments** where assignments are posted and your solutions are submitted. *Anything submitted otherwise will be ignored.*
- **Grade Book** where grades for assignments, exam(s), and the final project are posted.

In addition, your email inbox needs to be cleared because messages broadcast to the whole class will be sent out via announcements and/or emails. *You are responsible for not receiving emails due to the overflow of your email inbox.*

## 8 Policy for Missing Exam and/or Assignments

Late submission of assignments and the make-up exam are granted only when a police report or a doctor's note showing some emergency is presented.

## 9 Academic Integrity/Academic Dishonesty

Students are expected to be honest and not cheat on their assignments/examinations/project. Collaboration and discussion with fellow students are highly encouraged, but copying each other's work is forbidden. Every student should read the University's policies on student conduct, academic dishonesty, etc. Please see the University's Undergraduate Catalog regarding these policies at <http://www.ugs.usf.edu/catalogs/0607/adadap.htm>. Students caught cheating in any form will receive an **FF** grade for the course.

## 10 Last Day to Drop with 'W': March 28th.

## 11 General Policies

- All announcements and assignments will be posted through Blackboard. Students are required to look in Blackboard for course material and related information.
- Class Attendance is required although not monitored. Students are responsible for all information communicated during class. This information will not be necessarily duplicated in the class webpages.
- Academic dishonesty will not be tolerated and the student, in question, will be dealt with in accordance with the University policies.
- Cell phones may not be used as calculators. Cell phones must be turned off at all times including exams and lectures.
- The communication functions including text messaging on all devices must be turned off during exams.
- Students are not allowed to sell or distribute notes provided for this class.

- Students with disabilities are encouraged to consult the Instructor as soon as possible. If accommodations are needed, a letter from the Office of Student Disability Services (SVC 1133) will be required. Please inform the Instructor if there is a need for alternate format for documents or notetaker.
- Students who anticipate the necessity of being absent from class due to the observation of a major religious observance must provide notice of the date(s) in writing by the second class meeting.
- The instructor reserves the right to interpret the class policies if confusions may occur.