

SE-561 Math Foundations of Software Engineering

Fall 2010

Location: BH 201

Time: M 6:00PM – 8:45PM

Instructor

Jiacun Wang

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Office Hours: Monday 4:00-5:30. Other time by appointment

Course Objectives

This course will introduce fundamental mathematical concepts of software engineering, such as propositional logic, predicate logic, temporal logic, model checking and formal languages. It will help students to develop the ability to think abstractly and work with symbolic representations as if they were concrete objects.

Textbook

Michael Huth and Mark Ryan,

Logic in Computer Science: modelling and reasoning about systems

2nd edition, 2004.

Purchase of this book is required.

Course Work

- There will be 5 homework assignments, a midterm exam and a final exam.
- All homework must be turned in by the due day.
- Both of the two exams are open-book.

Grading

Homework	50%
Midterm	25%
Final exam	25%

Class Participation

Class participation is strongly recommended. If you miss a class, it is your responsibility to find out what is covered and what announcements are made in the class.

Withdrawal

Last date to withdraw with automatic assignment of a "W" grade: November 9, 2010.

Academic Honesty

Everything you turn in for grading must be your own work. Academic dishonesty subverts the University's mission and undermines the student's intellectual growth. Therefore, we will not tolerate violations of the code of academic honesty. Penalties for such violations include suspension or dismissal and are elaborated upon in the Student Handbook.

Special Accommodations:

Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor or the appropriate disability service provider on campus as soon as possible. In order to receive accommodations, students must be registered with the appropriate disability service provider as set forth in the student handbook and must follow the University procedure for self-disclosure, which is stated in the University *Guide to Services and Accommodations for Students with Disabilities*. Students will not be afforded special accommodations for academic work done prior to completion of the documentation process with the appropriate disability service office.

Tentative Course Content

- Introduction to Math Foundations of Software Engineering
- Propositional Logic
 - Natural Deduction
 - Propositional Logic as a Formal Language
 - Semantics of Propositional Logic
 - Normal Forms
- Predicate Logic
 - Predicate Logic as a Formal Language
 - Proof Theory of Predicate Logic
 - Semantics of Predicate Logic
 - Undecidability
 - Expressiveness
- Temporal Logic
 - Linear-time temporal logic
 - Branching-time temporal logic
- Verification by Model Checking
 - Motivation for verification
 - The NuSMV model checker
 - Running NuSMV
- Formal Languages
 - Formal Languages
 - Regular Expressions
 - Finite-State Machine