ICT600 Computational Mathematics

Semester 2, Academic Year 2015

Instructor

Cholwich Nattee (cholwich@siit.tu.ac.th)

Time and Place

Thursday; 13:00–16:30 at RS 1-501

Examination

Midterm Examination: February 25, 2016; 13:30–16:30
Final Examination: May 12, 2015; 13:30–16:30

Course Description

Set theory; Relations; Formal proof methods; Finite automata; Regular expressions; Context-free grammar; Pushdown automata; First order logic; Theories related to counting, graphs and networks; Interplay between continuous models and their solution via discrete processes; Vector spaces, basis, dimension, eigenvalue problems, diagonalization, inner products, unitary matrices; Introduction to applied statistics and its application to intelligent systems; introduction to supervised statistical learning including discrimination methods.

Grading

Your final grade will be earned based on the best of the followings

Homework	10%
Attendance/Exercise	10%
Midterm Examination	40%
Final Examination	40%

References

- Michael Sipser, Introduction to the Theory of Computation, 2nd Edition, Thomson Course Technology. ISBN 0-534-95097-3
- Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, ISBN 0-13-604259-7
- David Poole, Linear Algebra: A modern introduction, 2nd edition (Thomson Brooks/Cole, 2006)

Quizzes

All quizzes and exams will be closed book. There will be no makeup's for missed work; an unexcused absence will be given a grade of 0. **The instructor should be notified before missing any exam or quiz if at all possible and immediately thereafter when not possible**. The instructor will determine if the absence from an exam will be excused.

Lectures

You are very STRONGLY encouraged to attend lectures. Although the instructor will follow the book rather closely, it WILL be far simpler to understand the materials from the lectures, rather than from the book alone. Simply reading (or even memorizing!) the book, without achieving an understanding of the ideas involved, will be insufficient to obtain a passing grade. **According to Thammasat University's Regulation on Graduate Study[1], students who miss more than 20% of classes will not be allowed to take the final exam and will automatically fail (Grade F) the course**. Your attendance can be checked randomly at any time after 14:15. The door will be locked while the attendance is being checked.

Homework

As the name suggests, homework is work to be done outside of class. We will not devote much class time to discussing homework problems. Please feel free to see the instructor to obtain assistance. You are encouraged to work with other students on the homework however you must write down your own work. It would be a mistake to skip the homework, because no skill (in mathematics, foreign language, athletics, and so on) can be learned by passive involvement, but only by regular practice. Homework assignments will be graded with attention given to the method and insight rather than final outcomes. **Late work will not be accepted**.

Goals

The goal for the semester is to learn, understand and be able to work with the main ideas of Computational mathematics. This does not only mean that you should be able to work through a bunch of problems similar to ones seen in the homework. But that you should have the ability to articulate the ideas presented in the course in a clear and coherent manner as well.

Expectations

I expect you to do most of your learning outside of the classroom. You should expect to spend 5–8 hours a week studying and working on the material outside of class. Mathematics, like most subjects, is learned by doing it. We will not have time in class for you to do a lot of mathematics yourself. However, I do expect you to come to class and participate actively in class discussions. If you must miss a class, I expect you to find out what happened, either from your instructor or one of your classmates. You are responsible for everything that goes on in class.

[1] `http://regu.tu.ac.th/quesdata/Data/J22.pdf`

Rules and Regulations

1. By enrolling in this course, you agree to follow all the regulations issued by Sirindhorn International Institute of Technology and Thammasat University.
2. When I TALK, you LISTEN. Be respectful to your classmates and your instructor. Keep your voice down. No chitchatting. Do not disturb the class.
3. If you are not present during attendance checking time, you will not earn the credit for that day. The room will be locked during that time. You are not allowed to go in and out of the classroom while attendance checking is in place.
4. All communication devices must be off or on silent mode during lecture.
5. You are not allowed to talk on the phone in class. In case of emergency, you have to take your phone call outside.
6. No snoring during class time.
7. No pets.
8. Three strikes you out! If the disorder level is high, noise etc, the whole class will be warned. If it reaches three times, the whole class will not receive the attendance credit that day.
9. Videotaping, Taking a photograph, Voice recording and any other ways of recording the lecture and lecturer are not allowed in class.

Should you fail to follow any of these rules, you may be asked to leave the classroom, and/ or more penalties will be applied.

Academic Integrity

A fundamental tenet of all educational institutions is academic honesty; academic work depends upon respect for and acknowledgment of the work and ideas of others. Misrepresenting someone else's work as one's own is a serious offense in any academic setting and it will not be condoned.

Academic misconduct includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for academic evaluation (e.g. papers, projects, examinations and assessments - whether online or in class); presenting, as one's own, the ideas, words or calculations of another for academic evaluation; doing unauthorized academic work for which another person will receive credit or be evaluated; using unauthorized aids in preparing work for evaluation (e.g. unauthorized formula sheets, unauthorized calculators, unauthorized programs or formulas loaded into your calculator, etc.); and presenting the same or substantially the same papers or projects in two or more courses without the explicit permission of the instructors involved.

A student who knowingly assists another student in committing an act of academic misconduct shall be equally accountable for the violation, and shall be subject to the sanctions and other remedies described in The Student Code. Sanctions shall include, but are not limited to, a letter sent to the Dean of Students of the University; a grade of 0 on the assignment, quiz or exam; a grade of F for the course.

Schedule

No.	Date	Topic
1	2016-01-14	Basic Mathematics: Sets, Relations, Graphs, Strings, and Languages
2	2016-01-21	Formal proof methods: Definitions, Theorem, and Methods of Proofs
3	2016-01-28	First-order Logic
4	2016-02-04	Automata and Regular Expressions
5	2016-02-11	Pumping Lemma for Regular Languages and Context-Free Grammars
6	2016-02-18	Pushdown Automata
7	2016-02-25	Midterm Examination
	2016-03-03	*No class (Midterm Exam Week for Undergraduate Students)*
	2016-03-10	*No class (Midterm Exam Week for Undergraduate Students)*
8	2016-03-17	Counting Theory and Probability
9	2016-03-24	Bayesian Networks
10	2016-03-31	Hidden Markov Models
11	2016-04-07	Matrix, Unitary matrix, and Matrix operations
	2016-04-14	*No class (Songkran days)*
12	2016-04-21	Vector Space, Basic, Dimension, Eigenvalue, and Eigen Vector
13	2016-04-28	Introduction to Supervised Machine Learning
	2016-05-05	*No class (Coronation day)*
14	2016-05-12	Final Examination