University of the Philippines Diliman
College of Engineering
Department of Computer Science

Course Information

Course Number:	CS 133 WFY
Course Schedule:	Wednesdays and Fridays, 16:00h to 17:30h
Course Title:	Automata Theory and Computability
Course Description:	Finite automata, formal languages, and regular expressions. Context free grammars and pushdown automata. Turing machines, Church's thesis, complexity classes and (un)decidability.
Credit:	3 units
Term:	Semester 2, AY 2018 to 2019
Prerequisite:	CS 30 (Discrete mathematics for computer science)
Methodology:	Class lectures, readings, exercises, exams
Instructor:	Francis George C. Cabarle
Consultation:	Mon 15:00h to 18:00h, Thu 16:00h to 17:00h, Wed y Fri 14:30h to 17:30h; Room 317 or 319, Dept. of Computer Science, UPD
Email Address:	fccabarle@up.edu.ph

Course Outline

- Introduction

  Introduction to automata theory
  Some concepts of discrete mathematics
  Formal languages

- Regular languages and finite automata

  (Non)deterministic finite automata
  NFA and DFA equivalence
  (Non)Regular languages
  Regular expressions
  Properties of regular languages
  Pumping lemma for regular languages

- **EXAM 1**

- Context-free languages and pushdown automata

  (Non)context-free languages
  (Non)deterministic pushdown automata
  Pumping lemma for CFLs

- **EXAM 2**

- Turing machines, Decidability, and Time Complexity

  Church-Turing thesis
  Language of a Turing machine
  Turing machine variants
  Decidable and undecidable problems
  Intractability
  Complexity classes

- **EXAM 3**

Class Policies

University and college policies are presumed to be in effect.

Exams. Closed-notes written exams usually taken within class hours for a duration of 75 to 80 minutes. Questionnaires and Answer Sheets will be provided for the exam. Scratch/extra sheets of paper will also be provided. No make-up exam will be given unless the student has a valid excuse. Complaints regarding exam results will be entertained only up to a week after exam sheets are returned. After such a week has expired, no further complaints regarding the exam will be accepted.

Cheating. Cheating in any form will be subjected to proper disciplinary action and will incur a final grade of 5.0.

Grading System

Students will be graded according to the following scale:

General Average	Final Grade
[92 - 100]	1.0
[88 - 92)	1.25
[84 - 88)	1.50
[80 - 84)	1.75
[76 - 80)	2.00
[72 - 76)	2.25
[68 - 72)	2.50
[64 - 68)	2.75
[60 - 64)	3.00
[0 - 60)	5.00

- Breakdown of final grade:

3 Exams	75%
Quizzes	25%

- If the general average of the student is below 60% after the 3rd exam, the student must take the FINAL (chance to pass) EXAM *provided that* the student
  1. has taken ALL three exams, *AND*
  2. at least two of three are above 50%.
- The final grade will then be either a 3.0 or 5.0 corresponding to a passing or failing grade in the final exam, respectively.

Suggested References

There is no required textbook, but the following are strongly suggested:

- M. Sipser. *Introduction to the Theory of Computation*: 2ed. PWS Publishing Company, 2005.
- J. Hopcroft, R. Motwani, J. Ullman. *Introduction to Automata Theory, Languages and Computation*: 2ed. Addison-Wesley, 2001.
- Other (non)electronic references on automata and computability theory, e.g. MIT OCW course 6.045J/18.400J on automata, computability, and complexity,[1] and *Machines, Languages, and Computation* by P.J. Denning, J.B. Dennis, J.E. Qualitz, Prentice-Hall, 1978 (also available at the engineering library).

[1] http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-045j-automata-computability-and-complexity-spring-2011/index.htm