Course Information

- Time: 1420 to 1720 Wednesdays
- Place: B01, Management Building I
- Requirements: discrete mathematics, algorithms
- Textbook: Michael Sipser. Introduction to the Theory of Computation
- Home page:  
  http://www.iis.sinica.edu.tw/~bywang/courses/theory-comp
- Office hour: 1430-1530 Mondays
- Grading: midterm (35%), final (35%), homeworks (30%)
What is Theory of Computation about?

- In Algorithms, we have learned many things computers can do.
  - sorting, shortest path, minimal spanning tree, etc.
- In Discrete Mathematics, we have seen a problem not solvable by computers.
  - We argue that there is no program that answers whether a given program text represents a terminating program.
- In Theory of Computation, we are interested in the limitations of computers.

What are the fundamental capabilities and limitations of computers?
Theory of computation is a large (and interesting) field.

We will cover fundamentals of three basic theories:

- Automata. What is computation?
- Computability. What are the limitations of computation?
- Complexity. What are capabilities of computation?
We will discuss two models of computation.
Finite automata and regular languages.
Pushdown automata and context-free languages.
Limitations of these computational models.
We will learn the basic language of this course.
We will discuss a formal model of computers.

Church-Turing thesis.

Decidability.

Reducibility.

We will learn limitations of computers.
Complexity Theory

- We will discuss different resource measures of computers.
- Time complexity.
- Space Complexity.
- Intractability.
- We will learn capabilities of computers.
Since 1966, the Turing Award has been given annually by the Association for Computing Machinery (ACM) to persons for technical contributions to the computing community.