CSIE 5111: Introduction to Mathematical Logic

Website

`http://www.csie.ntu.edu.tw/~tonytan/teaching/2015a-logic/2015a-logic.html`

Instructor

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Venue and time

Lecture : Tuesday, 15:30–17:10, room 546
Tutorial : Wednesday, 16:30–17:20, room 546

Prerequisite

Discrete mathematics and mathematical maturity. Familiarity with theory of computation will be helpful, but not necessary.

Syllabus

Week	Topic	Important dates
1	Preliminaries	HW 1 out (after the tutorial)
2	Propositional calculus part. I	HW 1 due (before the lecture)
3	Propositional calculus part. II	–
4	Proof system in propositional calculus	HW 2 out
5	First-order logic part. I	–
6	First-order logic part. II	HW 2 due
7	First-order logic part. III	HW 3 out
8	Proof system in first-order logic	–
9	–	HW 3 due, Midterm exam
10	Gödel's completeness theorem	HW 4 out
11	Compactness and Löwenheim-Skolem theorem	–
12	Elementary classes and categorical sets	HW 4 due, HW 5 out
13	Peano arithmetic and number theory	–
14	Gödel's incompleteness theorem part. I	HW 5 due
15	Gödel's incompleteness theorem part. II	HW 6 out
16	Logic, set theory and mathematics	–
17	First-order logic in computer science	HW 6 due
18	–	Final exam

Textbook

We will not follow one particular textbook. All the materials that we will cover can be found in the following textbooks:

- *A Mathematical Introduction to Logic* by H. Enderton.
- *A Concise Introduction to Mathematical Logic* by W. Rautenberg.
- *Mathematical logic* by H.-D. Ebbinghaus, J. Flum and W. Thomas.

You can find informal treatment of logic in the following books:

- *Gödel, Escher, Bach: An Eternal Golden Braid* by D. Hofstadter.
- *Gödel's Theorem: An Incomplete Guide to its Use and Abuse* by T. Franzén.
- *A Tour through Mathematical Logic* by W. Rautenberg.

Grading

- Six assignments weigh 10% each.
- The midterm exam on topics covered up to week 8 weighs 20%.
- The final exam on topics covered up to week 17 weighs 20%.