



Syllabus 2017 Computer and Mathematical Sciences Foundations of Software Science

Japanese

Basic information

held this year:	yes
instructor(s)	Prof. Eijiro Sumii, Assoc. Prof. Kazutaka Matsuda
room	Medium Lecture Room, GSIS Building
schedule	The latter period (Friday) 13:00–14:30
begins on:	10/06

Objectives and outline

Guaranteeing the reliability of software is crucial in the modern society where a variety of social infrastructures are controlled by computers. We lecture methods of understanding software as a scientific object in a mathematical approach and discussing/verifying its behavior with rigor. Specifically, we cover computation models and their formal semantics that form the basis of software description, as well as software specification, verification, and type systems based on those models and semantics.

Class plan

May vary every year. Will be announced in the first lecture.

Standard schedule as follows:

1. Introduction, basic logic (propositional and predicate) and set theory
2. Inductive definitions; syntax of untyped lambda-calculus
3. Small-step reduction (operational) semantics of untyped lambda-calculus
4. Church encodings in untyped lambda-calculus
5. Simply typed lambda-calculus
6. Natural deduction for propositional logic; Curry-Howard correspondence/isomorphism
7. Dependent types and predicate logic
8. Midterm exam
9. Review of midterm exam
10. State transition systems
11. Bisimulations
12. Calculus of communicating systems (CCS)
13. CCS (cont.)
14. Final exam
15. Review of final exam

Evaluation

By assignments and examination.

Textbook(s)

Will be announced in the first lecture.

Web site

<http://www.kb.ecei.tohoku.ac.jp/~sumii/class/software-kiso-kagaku-2015/>

Office hours

By appointment (by e-mail).

Other information

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