

COSE212: Programming Languages

Lecture 17 — Course Review

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Why Study Programming Languages?

- Programming languages are the most fundamental tools in computer science:
 - ▶ All CS disciplines use some programming languages (maybe the only commonality across all)
 - ▶ Programming languages determine the way we think
- Thus, a thorough understanding of the fundamentals of programming languages is needed for everyone who majors in computer science.

About This Course (from Lecture 0)

This course is *not* about

- to learn particular programming languages



- to improve your “programming skills” (e.g., tools, libraries, etc)

Instead, in this course you will learn

- fundamental principles of modern programming languages
- how programming systems are designed and implemented
- thinking formally and rigorously

To succeed in this course, you must

- have basic programming skills
- be familiar with at least two PLs (e.g., C, Java)
- have taken Theory of Computation, Discrete Math, etc
- be prepared to learn new things

Topics (from Lecture 0)

- **Part 1 (Preliminaries):** inductive definition, basics of functional programming, recursive and higher-order programming
- **Part 2 (Basic concepts):** syntax, semantics, naming, binding, scoping, environment, interpreters, states, side-effects, store, reference, mutable variables, parameter passing
- **Part 3 (Advanced concepts):** type system, typing rules, type checking, soundness/completeness, automatic type inference, polymorphic type system, lambda calculus, program synthesis

Checklist

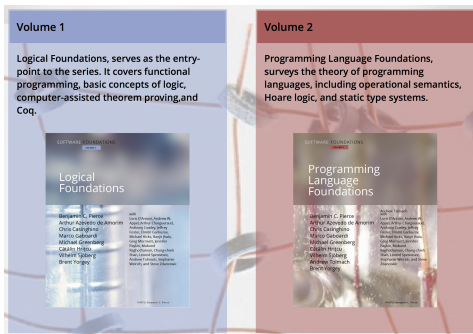
Have you pick up the following ideas from this course?

- The role of induction in programming languages
- The power of higher-order, typed, and recursive programming
- Designing programming languages
- Implementing programming languages
- Essential concepts of programming languages

For Further Study

- The Software Foundations series: a broad introduction to the mathematical underpinnings of reliable software.

<https://softwarefoundations.cis.upenn.edu>



한 학기 수고 많았습니다!