Lecture 0 – Course Overview

COSE212: Programming Languages

Jihyeok Park

PLRG

2024 Fall

Course Information

- **Instructor:** Jihyeok Park (박지혁)
    - **Position:** Assistant Professor in CS, Korea University
    - **Expertise:** Programming Languages, Software Analysis
    - **Office hours:** 14:00–16:00, Tuesdays (appointment by e-mail)
    - **Office:** 609A, Science Library Bldg
    - **Email:** jihyeok_park@korea.ac.kr

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- **Teaching Assistant:**
  - Jungyeom Kim (김준겸) – kimjg1119@korea.ac.kr
  - Seongmin Ko (고성민) – 2018320221@korea.ac.kr

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  - Seongmin Ko (고성민) – 2018320221@korea.ac.kr
- **Discussion & Questions:** https://campuswire.com/c/G2CA06AE4

Passcode:

Grading

- **4 Homework Assignments: 30%**
  - Programming assignments in Scala (submission in **Blackboard**)
  - You can utilize or refer to any other materials (e.g., ChatGPT), but you **MUST** write your **OWN** solution.
  - Cheating is strictly prohibited. Cheating will get you an F.

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- **Midterm exam: 30%**
  - October 23 (Wed.) 18:00 – 20:30 (150 min.)
  - In classroom, closed book, closed notes

- **Final exam: 30%**
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- **Attendance: 10%**
  - Please use **Blackboard** to attend the class **by yourself**.

Schedule

Weak	Contents	Weak	Contents
1	Introduction	9	Continuations
2	Syntax and Semantics	10	First-Class Continuations
3	Identifiers and First-Order Functions	11	Type Systems
4	First-Class Functions and Recursion	12	Algebraic Data Types
5	Mutable Variables	13	Parametric Polymorphism
6	Garbage Collection	14	Subtype Polymorphism
7	Lazy Evaluation	15	Type Inference
8	**Midterm Exam (Oct. 23 - Wed.)**	16	**Final Exam (Dec. 18 - Wed.)**

On the four days listed below, there will be no offline lectures. Instead, lecture videos will be uploaded to **Blackboard**.

- Sep. 16 (Mon.) / 18 (Wed.) – 추석
- Oct. 9 (Wed.) – 한글날
- Nov. 20 (Wed.) – External Schedule

Course Materials

- **Self-contained lecture notes.**

https://plrg.korea.ac.kr/courses/cose212/

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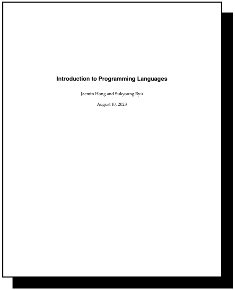
- **Reference: “Introduction to Programming Languages”** written by Jaemin Hong and Sukyoung Ryu



Introduction to Programming Languages

Jaemin Hong and Sukyoung Ryu

August 10, 2023

https://hjaem.info/itpl

Goal of This Course

To learn **essential concepts** of **programming languages**

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  - **implement** their **interpreters** using **Scala**.

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- How? You will learn how to:
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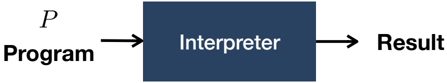
- However, note that:
  - You will **NOT learn** particular programming languages.
  - You will **NOT learn** how to write programs in those languages.
  - This is **NOT** an introductory course. You should have a **strong understanding** of introductory computer science courses. (i.e., theory of computation, discrete mathematics, and data structures)

Interpreters vs Compilers

- An **interpreter** takes and executes a program to produce the result.



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  - For example, `scala`, `python`, `bash`, desktop calculator, etc.
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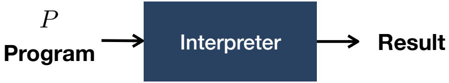

P

Program → Interpreter → Result

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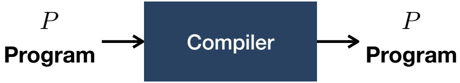

P

Program → Compiler → P Program

  - Good for **speed**, but more **complex**.
  - For example, `scalac`, `gcc`, `javac`, etc.
  - If you're interested in compilers, take **COSE312: Compilers**.

Roadmap: Growing a Language

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- **Part 1: Untyped Languages**
  - Syntax, Semantics, Identifiers
  - **Functional** – Functions, Closures, Recursion
  - **Imperative** – Mutation, Sequences, Garbage Collection
  - **Advanced** – Lazy Evaluation, Continuations

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  - **Functional** – Functions, Closures, Recursion
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  - **Advanced** – Lazy Evaluation, Continuations

- **Part 2: Typed Languages**
  - **Type Systems** – Types, Typing Rules, Typed Languages
  - **Algebraic Data Types** – Variants, Pattern Matching
  - **Polymorphism** – Parametric Polymorphism, Subtype Polymorphism
  - **Type Inference** – Type Variables, Type Unification

Next Lecture

- Basic Introduction of Scala

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