

Lecture 0 – Course Overview

COSE212: Programming Languages

Jihyeok Park



2024 Fall

- **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

- **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
- **Class:** COSE212 - 01 (English)

- **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
- **Class:** COSE212 - 01 (English)
- **Lectures:** 13:30–14:45, Mon. & Wed. @ 205 우정정보관

- **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
- **Class:** COSE212 - 01 (English)
- **Lectures:** 13:30–14:45, Mon. & Wed. @ 205 우정정보관
- **Homepage:** <https://plrg.korea.ac.kr/courses/cose212/>

- **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
- **Class:** COSE212 - 01 (English)
- **Lectures:** 13:30–14:45, Mon. & Wed. @ 205 우정정보관
- **Homepage:** <https://plrg.korea.ac.kr/courses/cose212/>
- **Attendance:** Use **Blackboard** to attend the class **by yourself**.

- **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
- **Class:** COSE212 - 01 (English)
- **Lectures:** 13:30–14:45, Mon. & Wed. @ 205 우정정보관
- **Homepage:** <https://plrg.korea.ac.kr/courses/cose212/>
- **Attendance:** Use **Blackboard** to attend the class **by yourself**.
- **Discussion & Questions:** <https://campuswire.com/c/G2CA06AE4>



Passcode:

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

- **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.

- **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.**

- **Midterm exam: 30%**

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

- **Final exam: 30%**

- December 18 (Wed.) 18:00 – 20:30 (150 min.)
- In classroom, closed book, closed notes

- **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.**

- **Midterm exam: 30%**

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

- **Final exam: 30%**

- December 18 (Wed.) 18:00 – 20:30 (150 min.)
- In classroom, closed book, closed notes

- **Attendance: 10%**

- Please use [Blackboard](#) to attend the class **by yourself**.

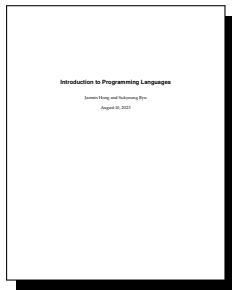
- **Self-contained lecture notes.**

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

- **Self-contained lecture notes.**

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

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



<https://hjaem.info/itpl>

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

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

- Why?

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

- Why? After this course, you will be able to:

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

- Why? After this course, you will be able to:
 - **learn new programming languages** quickly.
 - **evaluate** and pick the best language for a given task.
 - **design** your own **specialized languages** for specific tasks.

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

- Why? After this course, you will be able to:
 - **learn new programming languages** quickly.
 - **evaluate** and pick the best language for a given task.
 - **design** your own **specialized languages** for specific tasks.
- How?

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

- Why? After this course, you will be able to:
 - **learn new programming languages** quickly.
 - **evaluate** and pick the best language for a given task.
 - **design** your own **specialized languages** for specific tasks.
- How? You will learn how to:
 - **design** programming languages in a **mathematical** way.
 - **implement** their **interpreters** using **Scala**.

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

- Why? After this course, you will be able to:
 - **learn new programming languages** quickly.
 - **evaluate** and pick the best language for a given task.
 - **design** your own **specialized languages** for specific tasks.
- How? You will learn how to:
 - **design** programming languages in a **mathematical** way.
 - **implement** their **interpreters** using **Scala**.
- 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)

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

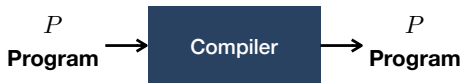


- Good for **understanding** program behavior, easy to **implement**.
- For example, scala, python, bash, desktop calculator, etc.
- You will implement interpreters of various languages in this course.

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



- Good for **understanding** program behavior, easy to **implement**.
 - For example, scala, python, bash, desktop calculator, etc.
 - You will implement interpreters of various languages in this course.
- A **compiler** takes a program and produces another 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

We will grow a language step by step from a simple arithmetic language to a complex language with various features.

We will grow a language step by step from a simple arithmetic language to a complex language with various features.

- **Part 1: Untyped Languages**

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

We will grow a language step by step from a simple arithmetic language to a complex language with various features.

- **Part 1: Untyped Languages**

- Syntax, Semantics, Identifiers
- **Functional** – Functions, Closures, Recursion
- **Imperative** – Mutation, Sequences, Garbage Collection
- **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

- Basic Introduction of Scala

Jihyeok Park

jihyeok_park@korea.ac.kr

<https://plrg.korea.ac.kr>