Extended Syllabus

(The details of the syllabus are subject to change)

Course Title	Introduction to Computer System	Semester	1st Semester, 2024
Credit	3	Course Number	CSE3030 AIE3054
Class Time	Wed/Fri 09:00~10:15	Enrollment Eligibility	2nd/3rd grade (recommended)

	Instructor: Jaeseung Choi (최재승)	Homepage: islab-sogang.github.io
	E-mail: jschoi22@sogang.ac.kr	Telephone: 02-705-8490
	Office: AS 711 Office hours: Will be announced in the first class	

I. Course Overview

1. Description

In this course, students will learn about the internal operations of a computer. While abstraction is an important concept in computer science, knowing the internal details of a computer is also important. The course will cover important topics in computer system, such as data representation, assembly language, memory hierarchy, and software vulnerability. By learning such low-level details, students will also learn how to write correct, secure, and efficient code.

2. Prerequisites

Students must have experience in C and Python programming. For instance, students majoring in CS are expected to have taken *Computer Programming I (CSE2003)* and *Introduction to AI Programming (COR1010)*. Students from other majors are welcome to take this course, but they must have taken similar courses, such as *Advanced Applied C Programming (STS2008)*.

3. Course Format (%)

Lecture	Discussion	Experiment	Field study	Presentation
100 %				

4. Evaluation (%)

Exam and Quiz	Presentation	Project	Assignment	Participation
70 %			30 %	

Ⅱ. Course Objectives

This course is intended to deepen the students' understanding on the internals of computer systems. By learning the internals of a computing system, students will be able to get a better understanding on what is going under the hood at machine level during a program execution. Also, the course will provide students with important skills and knowledges for becoming a good programmer.

Ⅲ. Course Format

Every week we will have two lectures. The lecture will cover fundamental theories and knowledges on computer systems. This course also involves several lab assignments, and sometimes the lecture will give you advices and feedback on the assignments.

IV. Course Requirements and Grading Criteria

There is no requirement for completing this course, as long as you don't get FA. Cut-off lines for each grade will be decided during the semester, considering the difficulty of exam and lab assignments.

Ⅴ. Course Policies

- As the course mainly relies on lecture, it is strictly prohibited to disrupt the class (for example, chatting loudly with your friends or wandering around during the class).
- Regarding the attendance, this course will follow the rules of Sogang University.
- Cheating is strictly forbidden. Cheating in the exam will result in immediate **F**. Also, if you copy others' code in a lab assignment, you will get zero point for that assignment and your final letter grade will be downgraded (for example, from **A-** to **B-**, from **B0** to **C0**).

VI. Materials and References

The course will primarily rely on the lecture notes provided from the instructor. To deepen the understanding of computing system, students are recommended to read the following textbook: *"Computer Systems: A Programmer's Perspective (3rd Edition)"*, Randal E. Bryant and David R. O'Hallaron, Pearson

Ⅶ. Course Schedule (subject to change)

For all of the weeks, (1) the class method will take lecture format, and (2) the lecture notes uploaded in *Cyber Campus* will be used as the class material.

Week 1	**Learning Objectives**	Understand the context and goal of the course
	Topics	Course orientation and overview
	Assignments	
Week 2	**Learning Objectives**	Understand the data representation in computer systems
	Topics	Bits, bytes and integers
	Assignments	
Week 3	**Learning Objectives**	Learn the low-level operation of computer system (1)
	Topics	Basic concepts of CPU and assembly
	Assignments	Lab #1 – Bit Lab
Week 4	**Learning Objectives**	Learn the low-level operation of computer system (2)
	Topics	Basics instructions of x86-64 assembly language
	Assignments	
Week 5	**Learning Objectives**	Learn the control transfer mechanism
	Topics	Conditional instructions of x86-64 assembly language
	Assignments	
Week 6	**Learning Objectives**	Learn the procedure calling mechanism
	Topics	Function call and return in x86-64 assembly language
	Assignments	Lab #2 – Reversing Lab
Week 7	**Learning Objectives**	Learn the complex data type handling in machine-level code
	Topics	Representation of data structure in x86-64 assembly language
	Assignments	

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Week 8	Midterm exam period	
Week 9	Learning Objectives	Try to understand the internals of computer, using some practical and familiar examples
	Topics	Brief tour of computer systems
	Assignments	
Week 10	Learning Objectives	Learn the basics of software security
	Topics	Buffer overflow
	Assignments	
Week 11	Learning Objectives	Learn the basic concepts in cache memory
	Topics	Memory hierarchy, cache hit/miss, locality
	Assignments	
Week 12	Learning Objectives	Learn the key mechanisms of cache memory (1)
	Topics	Direct-mapped cache
	Assignments	Lab #3 – Cache Lab
Week 13	Learning Objectives	Learn the key mechanisms of cache memory (2)
	Topics	Set-associative cache, fully associative cache
	Assignments	
Week 14	Learning Objectives	Learn the basic principles of key concepts in computer system
	Topics	Kernel, system call, process, virtual memory
	Assignments	
Week 15	Learning Objectives	Backup week
	Topics	TBD
	Assignments	
Week 16	Final exam period	

Ⅷ. Special Notes

Course announcements will be made in Cyber Campus (cyber.sogang.ac.kr).

IX. Aid for the Challenged Students

The instructor will sincerely respond to the request from *Support Center for Students with Disabilities (장애학생지원센터)*. Students with disabilities may also contact the instructor and ask for helps, such as an allocation of a front seat.

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