

System Programming and Practice

Course Name	Course type (credit/hours)		Required course(4/5)		Course code	F061
	Target students Division/major/grade		Software and Computer Engineering/Sophomore		Opening semester	2021 2ND SEMESTER
	Class time and classroom		Mon 13:30~15:00 (Pa1309)Wed 6(Pa1328)Wed 7(Pa1328)Thu 13:30~15:00 (Pa1309)		English Grade	A(100%English)
Reference to this course	Prerequisite courses		Computer Organization and Architecture, Computer Programming and Practice			
	Related basic courses		Data Structure			
	Recommended concurrent courses		Computer Networks			
	Related		Operating Systems			
Instructor	Name (title/division)		Sangeun Oh(Assistant Professor, Software and Computer Engineering)			
	Office Room Number	HMS Lab.	Office phone Number	2437	e-mail	
	Office hours			Homepage address	https://sites.google.com/view/sangeunoh	
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

- This course handles the overall concepts of system software. The course covers core system applications like assembler, linker, and loader, focusing on the hypothetical computer architecture, called SIC. And the course also deals with basic concepts of operating systems focusing on Unix-based systems.
- In this course, systematic practical training is provided. The practical training includes assembly programming using a SIC simulator called SicTools and system programming (Linux API, I/O device control) using a Raspberry Pi board.

2. Course Objectives

This course aims to discuss various functionalities of system software and emphasize system application capabilities. Through this course, students will learn the following:

- (1) Students will learn the basic concepts and process of program building.
- (2) Students will learn the basic concepts of the Linux file system and device drivers.
- (3) Students will understand the concepts and functionalities of an assembler and linking loaders.
- (4) Students will be able to apply and understand Linux device drivers on the embedded practice board.

3. Class types and activities

- Lectures, practice, and team projects are conducted concurrently.
- In principle, both lectures and practice are face-to-face classes but may be changed to live conference calls (via Zoom) or recorded lecture videos according to the corona virus situation.

4. Teaching Method

- | | |
|---|---|
| <input checked="" type="checkbox"/> lecture | <input type="checkbox"/> discussion and debate |
| <input checked="" type="checkbox"/> team project(presentation and case studies) | <input checked="" type="checkbox"/> experiments(role-playing,etc) |
| <input type="checkbox"/> designing and production | <input type="checkbox"/> on-site learning(on-site training) |
| <input type="checkbox"/> others | |

5. Support Systems in Use

- | | | |
|--|---|---|
| <input checked="" type="checkbox"/> AjouBb | <input type="checkbox"/> automatic recording system | <input type="checkbox"/> web-based assignment |
| <input type="checkbox"/> cyber lecture | <input type="checkbox"/> online content | |
| <input type="checkbox"/> class behavior analyzing system | <input type="checkbox"/> others | |

6. Teaching Tools

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> PBL(Problem Based Learning) | <input type="checkbox"/> CBL(Case Based Learning) | <input checked="" type="checkbox"/> TBL(Team Based Learning) |
| <input type="checkbox"/> UR(Undergraduate Research) | <input type="checkbox"/> FL(Flipped Learning) | <input type="checkbox"/> DSAL(Data Science Active Learning) |
| <input type="checkbox"/> others | | |

7. Knowledge and ability required for taking this course

- Basic Knowledge on Computer Architecture
- C Programming Language Usability
- Understanding the understanding of data structures

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		10%	Subject to change.
midterm exam		15%	Subject to change.
final exam		30%	Subject to change.
quiz			
presentation			
discussion			
homework		45%	Assignments: 15% + Team project 30%. Subject to change.
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	System Software: An Introduction to Systems Programming, 3rd Edition	L. L. Beck	Addison Wesley	1997
Main	System Programming with C and Unix	Adam Hoover	Addison Wesley	2010
Sub	Operating System Concepts, 10th Edition	A. Silberschatz, P.B. Galvin and G. Gagne	Wiley	2018
Sub	Computer Systems: A Programmers Perspective, 3rd Edition	Randal E. Bryant and David R. OHallaron	Pearson	2015

10. Class system and Class schedule

- Lecture on the major functions of the Asembler, Loader, Linker, and Linux system software, including Linux OS related to system software, and experience application processes through practical tasks and project progress. This course will discuss topics related to system software such as Linux OS, Assemblers, Loaders, Linkers, and Basic functionalities of Linux systems software. The course will also include a lecture-based learning portion and a practice portion to re-learn the concepts in real-world implementations.

- Improve system program utilization by working on labs and projects based on Embedded Linux-based Raspberry Pi. The practice portion of the course and the final project will be designed around an embedded board. We will start with a set of lectures on the usage of the embedded boards and move on the learning how the linker/loader, cross-compiler, device drivers are used within the Embedded Linux OS within the board.

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction to System Programming	E	Sangeun Oh	Lecture & Practice		
2	System Software & Computer Architecture	E	Sangeun Oh	Lecture & Practice		
3	Assembler & SciTools Practice	E	Sangeun Oh	Lecture & Practice		
4	Assembler & SciTools Practice	E	Sangeun Oh	Lecture & Practice		
5	Assembler & SciTools Practice	E	Sangeun Oh	Lecture & Practice		
6	Assembler & Linking Loader	E	Sangeun Oh	Lecture & Practice		
7	Linking Loader	E	Sangeun Oh	Lecture & Practice		
8	Midterm Exam	E	Sangeun Oh			
9	Introduction to Operating Systems & Raspberry Pi Practice	E	Sangeun Oh	Lecture & Practice		
10	Linux OS	E	Sangeun Oh	Lecture & Practice		
11	Team Project Proposal Presentation	E	Sangeun Oh	Lecture & Practice		
12	I/O Operations	E	Sangeun Oh	Lecture & Practice		
13	Processes & Threads	E	Sangeun Oh	Lecture & Practice		
14	Inter-Process Communications	E	Sangeun Oh	Lecture & Practice		
15	Team Project Final Presentation	E	Sangeun Oh	Lecture & Practice		
16	Final Exam	E	Sangeun Oh			

11. Other items of notification