

## 1. Course Description

It is very important for computer science students to understand CPU (Central Processing Unit) and programming in assembly languages. This course adopts a virtual CPU (Central Processing Unit) COMET2 and an assembly language CASL2 defined for the fundamental information technology engineer examination in Japan. After reviewing binary and logical operations, students learn programming in an assembly language CASL2 using an original simulator WCASL2. The course covers the following:

- Instructions of CASL2 such as load, store, arithmetic and logical operations, compare, jump, shift, call, push, pop, input and output.
- Concept of index register, stack and sub-routine.
- Process of bit-string data.

Students will learn with LMS contents and enrich their understanding through taking quizzes on LMS and writing programs. Also, students will learn how CPU processes each instruction in detail. Especially advanced students will implement the process using language Java.

This course is related to diploma policy 3 and 4.

## 2. Course Objectives

This course aims to provide students with an in-depth understanding of the CPU, which is the most important element of a computer system and programming in an assembly language. To be precise, at the end of the course, students are expected to do following:

- To explain names and roles of the elements which compose CPU
- To explain typical machine instructions of CPU.
- To write simple programs in an assembly language.
- To explain how CPU processes each instruction in detail.

## 3. Grading Policy

Quizzes and programming works are given in every class. The criteria for passing are to be accepted all required quizzes and programming works, and to score 60% points on basic questions of the final examination. Feedbacks are provided via LMS.

The final grade of students who passed will be calculated according to the following process: programming reports 60%, basic questions of final examination 10%, and advanced questions on final examination 30%.

## 4. Textbook and Reference

Textbook

No textbooks.

## 5. Requirements (Assignments)

In-class and out-of-class learning cannot be distinguished because this subject is a correspondence course. Learning materials are provided via LMS. Students are expected to learn according to the directions on LMS. Learning activities on each class will take about 4 hours and a half.

## 6. Note

Learning materials are provided via LMS. The course is conducted in Japanese.

## 7. Schedule

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|------|--|
| [1]  | Introduction   |
| [2]  | COMET II and CASL II   |
| [3]  | Simple program written in CASL II                                    |
| [4]  | CASL II programming using jump instructions                          |
| [5]  | CASL II programming with repetition processing                       |
| [6]  | CASL II programming using indexed addressing                         |
| [7]  | CASL II programming using logical operations and shift instructions  |
| [8]  | CASL II programming using stack                                      |
| [9]  | CASL II programming using subroutine                                 |
| [10] | CASL II programming using character data and IO instructions         |
| [11] | A bit more complex CASL II programming                               |
| [12] | Processes of assemble  |
| [13] | Processes of CPU COMET II for each instruction                       |
| [14] | Exercise for fundamental information technology engineer examination |
| [15] | Review and advanced work   |