

1. Course Code

2206

2. Course Title

Foundations of Computer Systems

3. Teacher

MIYAMOTO, Yukinobu

4. Term

Fall 1

5. Course Overview and Objectives

The premise of this course is to introduce students to the foundations of computer systems, including Structure of Computers, Computer Hardware, Software and Computer Networks. This course is designed to give broad knowledge of computer systems for students with limited knowledge in this field. Topics covered in this course is Binary and hexadecimal numbers, logical circuits, basic structure of computer, computer programming, operating system, and computer networks, etc. If you are already familiar with these subjects, you do not need to take this course. The course will be composed with reading assignments, lectures, and exercises.

6. Course Goals (Attainment Targets)

- (1) Capable to explain various basic components of computer system and its functions
- (2) Capable to explain hardware and software of computer systems
- (3) Capable to explain the role of an operating system
- (4) Capable to explain about data structure and algorithm
- (5)
- (6)

7. Correspondence relationship between Educational goals and Course goals

| Educational goals of the school | | | Course Goals |
|---------------------------------|--|---------------------------|-----------------|
| High level ICT skills | Basic academic skills | | (1) (2) (3) (4) |
| | Specialized knowledge and literacy | | |
| Human skill (Tankyu skill) | Ability to continually improve own strengths | | |
| | Ability to discover and resolve the problem in society | Problem setting | |
| | | Hypothesis planning | |
| | | Hypothesis testing | |
| | | Practice | |
| | Fundamental Competencies for Working Persons | Ability to step forward | |
| | | Ability to think through | (3) (4) |
| | | Ability to work in a team | |
| Professional ethics | | | |

8. Course Requirements (Courses / Knowledge prerequisite for this course)

None

9. Textbooks (Required Books for this course)

None

10. Reference Books (optional books for further study)

To be announced in the Class.

11. Evaluation

| Goals | Evaluation method & point allocation | | | | | |
|------------|--------------------------------------|------|---------|--------------|--------------|-------|
| | examination | Quiz | Reports | Presentation | Deliverables | Other |
| (1) | | ○ | ○ | | | |
| (2) | | ○ | ○ | | | |
| (3) | | ○ | ○ | | | |
| (4) | | ○ | ○ | | | |
| (5) | | | | | | |
| (6) | | | | | | |
| Allocation | | 60 | 40 | | | |

12. Notes

You should bring your PC or Mac to the class.

13. Course plan

(Notice) This plan is tentative and might be changed at the time of delivery

Lesson 1: Introduction

Lecture 60 min. Exercise 30min.

1. Course Overview
2. What's in a Computer?
3. History of Computer

Lesson 2: Binary Numbers and Logical calculation Lecture 45 min. Exercise 45 min.

1. Bit and Byte
2. Binary Numbers and its Calculation
3. Logical Value and its Calculation

Lesson 3: Presentation of Information**Lecture 45 min. Exercise 45 min.**

1. Character codes
2. Analog – Digital Conversion
3. Sound, Photo, and Video

Lesson 4: Inside the CPU**Lecture 45 min. Exercise 45 min.**

1. Logical Circuit
2. Adder
3. Logical Circuit Simulator

Lesson 5: The Toy Computer**Lecture 45 min. Exercise 45 min.**

1. The Toy Computer
2. Real CPU
3. Other types of Computers

Lesson 6: Software and Algorithms**Lecture 45 min. Exercise 45 min.**

1. What is an Algorithm?
2. How to describe Algorithm
3. Searching
4. Sorting
5. Complexity of Problems

Lesson 7: Operating Systems**Lecture 45 min. Exercise 45 min.**

1. Operating Systems
2. File Systems

Lesson 8: Mid Term Summary**Lecture 45 min. Exercise 45 min.**

1. Review of what we have learned so far
 2. Questions and Answer
 3. Review of Exercises
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| Lesson 9: Fundamentals of Artificial Intelligence | Lecture 90 min. |
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1. What is Artificial Intelligence?
2. Machine Learning
3. Neural Networks
4. Genetic Algorithm

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| Lesson 10: Artificial Intelligence Practice | Lecture 45 min. Exercise 45 min. |
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1. AI on Python
2. Categorizing and Clustering
3. Practice of Data Analysis by AI

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| Lesson 11: Programing and Programing Languages | Lecture 45 min. Exercise 45 min. |
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(Prof. Shima)

1. Assembly Language
2. High Level Languages
3. Software Development
4. Software as Property

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| Lesson 12: Learning to Program | Lecture 45 min. Exercise 45 min. |
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(Prof. Shima)

1. JavaScript
2. Loops and Conditionals
3. Using Web Services

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| Lesson 13: Networking and the Internet | Lecture 45 min. Exercise 45 min. |
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(Lec. Yokoyama)

1. Ethernet and Wireless LAN
2. Internet Overview
3. IP address and the Internet Protocol

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| Lesson 14: World Wide Web and other Services | Lecture 45 min. Exercise 45 min. |
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(Lec. Yokoyama)

1. How the Web works
2. Other services
3. Web Security

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| Lesson 15: Latest Trends of Image Processing | Lecture 90 min. |
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(Lec. Ohtera)

1. Latest Trends of Image Processing
 2. Virtual Reality Experience
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