

# Digital Communication

Syllabus Number

4F303

Special Subjects

Elective 2 credit

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## 1. Course Description

The aim of the class is student be able to understand the basic technology of transmitting information by digital signals. It will be learned about Fourier transform, which is important in signal processing, digital modulation and demodulation, which are important in digital communication technology, and optical fiber technology that supports high-speed, large-capacity communication. Specifically, we will acquire necessary skills and knowledge on DP2 and DP4.

## 2. Course Objectives

1. Students be able to explain the outline of digital communication and typical technologies.
2. Students be able to represent the signals used for digital communication in the frequency domain and the time domain.
3. Students be able to explain the characteristics of typical digital modulation and demodulation.
4. Students be able to explain fiber optic transmission used in optical communication.

## 3. Grading Policy

Those who pass both the reports [Report A] and [Report B] will be eligible to take the test. Grades will be evaluated by the test.

It will be provided feedback (understanding the content and pointing out insufficient points as technical sentences) by correcting the report assignment.

## 4. Textbook and Reference

Textbook

Classes are conducted with textbooks and subtexts. Subtext will be uploaded to LMS.

Hatori, Sugawara, Yatugi, Kobayashi and Izumi (ISBN-13: 978-4339007909) in Japanese. CORONA PUBLISHING CO.,LTD.

## 5. Requirements(Assignments)

Follow the instructions posted in the lesson content to study.

It will expected about 4.5 hours for each lesson study, study of related matters and exercises.

## 6. Note

In the test, examinee can bring textbooks, study notes, assignment reports, and scientific calculators. But examinee will couldn't pass the answer by reading the textbook during test. Therefore, examinee need a well prepared for the test.

This lesson uses calculus and Euler's formulas. Please reinforce the mathematics if necessary.

## 7. Schedule

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|------|---|
| [1]  | Digital communications and signal analysis 1: Fourier series by trigonometric function    |
| [2]  | Signal analysis 2: Fourier series by complex exponential function                         |
| [3]  | Signal analysis 3: Fourier transform essential for understanding communication technology |
| [4]  | Signal analysis 4: properties of the Fourier transform used in digital communication      |
| [5]  | Signal analysis 5: periodic function representing the nature of a signal                  |
| [6]  | Signal analysis 6: Fourier series expansion of periodic functions                         |
| [7]  | Coding of information: digitization   |
| [8]  | Digital modulation 1: overview of phase shift keying                                      |
| [9]  | Digital modulation 2: binary phase shift keying   |
| [10] | Digital modulation 3: differential phase shift keying                                     |
| [11] | Optical fiber 1: light propagation by optical fiber and type of optical fiber             |
| [12] | Optical fiber 2: optical communication system   |
| [13] | Optical fiber 3: loss limit and variance limit  |
| [14] | Review 1: review the issues pointed in the returned [ Report A]                           |
| [15] | Review 2: review the issues pointed in the returned [ Report B]                           |