

# Physical Measurement and Analysis

Syllabus Number

3E221

Special Subjects

Elective 2 credit

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## 1. Course Description

Not only is the measurement merely to measure the physical quantities, but it includes all acts of the quantitative recognition of things such as the research of the measurement, the development of measurement methods, the data processing for measurement data, and the recognition for the measurement of objects.

Contents of this course are as follows:

- Physical background for measurement data
- Principle of measurements
- Methods of measurements
- Processing of measurement data
- Correct evaluation for measurement values with errors
- Method of processing signal data with noise

This course relates to DP4.

## 2. Course Objectives

The aim of this course is to make students understand the significance of measurements and acquire the ability to perform correct evaluation for measurement values, to express measurement results correctly, and to process measurement data properly.

## 3. Grading Policy

Final Exam: 60%

Middle Exam and Exercises: 20%

Reporting: 20%

The results will be informed and reviewed mainly via LMS.

## 4. Textbook and Reference

Textbook

Japanese textbook, ISBN: 978-4627664432 (by Nishihara and Yamatoh).

## 5. Requirements(Assignments)

LMS will be used in this course.

Function calculator can be used in the final and middle exam.

For preparation, 30 min are required for each class in standard. You should read the textbook and try to find what you cannot understand, then take a class.

For review, 60 min are required for each class in standard. Practice questions for review will be distributed in class.

## 6. Note

The 13th class will proceed with learners' discussion.

## 7. Schedule

- |      |  |
|------|--|
| [1]  | Science of measurement   |
| [2]  | What the measurement is  |
| [3]  | Accuracy and error   |
| [4]  | Function of measurement value                                    |
| [5]  | Describing measurement value                                     |
| [6]  | Physical values, Middle Exam #1                                  |
| [7]  | Unit system  |
| [8]  | Null method and other measurement                                |
| [9]  | Direct and indirect measurement                                  |
| [10] | Mechanical sensor, Middle Exam #2                                |
| [11] | Electronic sensor  |
| [12] | Optical sensor   |
| [13] | Novel topics in this field                                       |
| [14] | Noise reduction technique (mainly electrical method)             |
| [15] | Noise reduction technique (mainly computational method); summary |