

# Multivariate Analysis

General Engineer  
Subjects Elective  
2 credit

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## 1. Course Description

First you will review basic statistic technique. Second you will study multivariate techniques such as regression analysis, principal component analysis, discriminant analysis, cluster analysis, etc. You will understand the theories to interpret the analysis results. You will also obtain the ability to apply the multivariate analysis technique through case studies and exercises using computer software. This subject corresponds to the diploma policy DP2.

## 2. Course Objectives

As multivariate is widely applied to various fields including science and technology, you will be able to understand basic techniques of statistic and multivariate, and will be able to apply them to practical problem solving session.

## 3. Grading Policy

Your overall grade in this class will be decided based on the following: - Score of the presentation result of the practical exercise using computers for 50%,- Score of the submitted report for 50%. However, if you are not eager to attending the lecture or the exercise, you will not be given the credit.

## 4. Textbook and Reference

### Textbook

Noguchi "Zukai to suuti-rei de manabu taehenryoukaiseki-nyuumon", ISBN: 978-4-542-60112-3. Japanese Standard Association

The lecture materials will be posted on LMS.

### Reference

Nagata and Munechika Introduction to Multivariate Analysis, ISBN: 978-4781909806. Science-sha

You can find various books dealing with multivariate analysis for your personal purpose.

We will use Microsoft Excel for computer exercise so that you can use it after this lecture.

## 5. Requirements(Assignments)

It is desirable that you understand mathematical statistics and linear algebra of undergraduates. You should review the exercises for each technique of multivariate analysis and apply them in your own problems.

## 6. Note

In addition to lectures, you will take computer exercises almost every class to understand the lecture well. The contents of the lectures and exercises may be changed appropriately according to students' understanding level and students' own research interest. This class will be taught in Japanese. However, if necessary, English will also be available.

## 7. Schedule

- [1] Introduction and basic statistical technique (1): how to summarize in statistics
- [2] Basic statistical technique (2): correlation analysis
- [3] Basic statistical technique (3): foundation of probability distribution and normal distribution
- [4] Basic statistical technique (4): inference and test
- [5] Basic statistical technique (5): how to select statistical models
- [6] Regression analysis(1): single regression analysis and formulation
- [7] Regression analysis(2): important points for single regression analysis
- [8] Regression analysis(3): multiple regression analysis and formulation
- [9] Regression analysis(4): important points for multiple regression analysis and variable selection method
- [10] Regression analysis(5): how to handle qualitative variables and linear algebra essential for multivariate analysis
- [11] Regression analysis(6): logistic regression
- [12] Cluster analysis: hierarchical method and nonhierarchical method
- [13] The other methods: principal component analysis, discriminant analysis, etc
- [14] Practical exercise using computers
- [15] Presentation of the practical exercise using computers