

FE 534
MULTIVARIATE STATISTICAL ANALYSIS FOR ENGINEERS
(3-0) 3

Assoc. Prof. Dr. Figen Tokatlı
Office: 335 (Idari Bina)
Phone: 750 62 95
e-mail: figentokatli[at]iyte.edu.tr

Prerequisites: A statistical course or quality control course (undergraduate or graduate)

Text Book:

Johnson, Richard A. and Wichern, Dean W., *Applied Multivariate Statistical Analysis*,
Prentice Hall, New Jersey, 4th ed., 1998

Reference Book(s):

Any statistical books and engineering mathematics books including vector and matrix operations.

Course Description:

Multivariate statistical data analysis is concerned with statistical methods for describing and analyzing multivariate data that consist of multiple measurements on many variables. Understanding the relationships and dependence among variables is fundamental to multivariate analysis. The objectives of multivariate methods include followings: data reduction or simplification, sorting and grouping the data, investigation of the dependence among variables, prediction of one or more variables on the basis of observations on the other variables and hypothesis testing to validate assumptions. Researchers in biological, physical and social sciences as well as engineers can use multivariate analysis since they collect measurements on a number of variables. The concepts of basic statistics and matrix manipulations are important in multivariate analysis. At the beginning of the course, a short introduction to these topics will be given.

Course Outline

- I. Introduction
 - I.1. What is chemometrics?
 - I.2. Basic matrix algebra: scalar, vector, matrix, matrix addition, multiplication, inverse, transpose, orthogonality, orthonormality
- II. Introduction to statistics used in multivariate analysis
- III. Normal Distribution, test of normality and transformation to normality
- IV. Hypothesis testing and confidence intervals
- V. Multivariate Linear Regression
- VI. Principal Components
- VII. Factor Analysis
- VIII. Discrimination and Classification

Homework, Term Project, Examination:

Students will be assigned homework every two weeks. A group project (two people) will be assigned in the first half of the semester. Groups need to find data which they are going to analyze with multivariate methods. At the end of the semester, groups will present their work to the class. Software will be used extensively.

Homework: 20 %

Project (presentation and report): 40 %

Examinations: There will be a midterm exam (40 %)