DEPARTMENT OF INDUSTRIAL ENGINEERING
IE 506 DESIGN AND ANALYSIS OF EXPERIMENTS

Instructor : **Ali R. Kaylan (**kaylan@boun.edu.tr**)**
Engineering Building, Room: M4032
Office-Hours: Monday, Tuesday 14:00-15:00, Thursday 16:00-18:00.

Teaching Assistant : TBA
Office-Hours: TBA

LECTURE HOURS : Tu 13:00-13:50 M1181, Th 14:00-15:50 M2170.

COURSE WEBPAGE **: moodle.boun.edu.tr**

COURSE DESCRIPTION : This course aims to expose experimental design concepts and related statistical modeling tools of data analysis. The students are expected to learn how to plan, design and conduct experiments efficiently and effectively, and also how to analyze the data collected to draw recommendations for the decision makers. Tools and techniques covered are readily usable to solve real life problems in new product design and development, process development, and manufacturing process improvement. Computer software packages (Design-Expert, Minitab) are employed to illustrate the methods presented throughout the course.

COURSE TEXTBOOK : Douglas C. Montgomery, **Design and Analysis of Experiments**, Seventh Edition, John Wiley and Sons, 2009.

Software Tools: **Design-Expert (Web Site: www.statease.com)**
Minitab (Web Site: www.minitab.com)

COURSE OUTLINE :   **Chapter**
         1. Role of experimental design in engineering studies   1
         2. Simple Comparative Experiments   2
           a) Descriptive statistics
           b) Random sampling and related distributions
           c) Statistical Inference : Estimation and Hypothesis Testing
           d) Comparison of two treatments, t-test
         3. Comparison of more than two treatments   3-4
           a) Analysis of variance
           b) Randomized block design
           c) Latin squares and other block designs
           d) Multiple comparisons
         4. Measuring the effects of variables   5-8
           a) Factorial designs
           b) Fractional factorial designs

5. Regression and correlation analysis   10
   a) Linear regression
   b) Detection and correction of model violations
   c) Weighted least squares
   d) Biased estimation of regression coefficients
      Principal components and ridge regression
   e) Stepwise regression
6. Process Optimization Approaches   11-14
   a) Response surface methodology
   b) Robust Design and Taguchi Methods
   c) Nested Plot and Split Plot Designs

FINAL EXAM

GRADING:
30% (Midterm) + 20% (Project) + 10% (Class Participation) + 40% (Final) = 100%

PREREQUISITE : A basic course in statistics (IE 256 or equivalent) or permission of instructor