MODEL BUILDING USING STATISTICAL METHODS
(Elective-I)

Course Code: 15CH2107

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Prerequisites: Basic knowledge of probability and statistics

Course outcomes: On successful completion of the course, the student should be able to

CO1: Recognize which process variables are most influential in the process.

CO2: Relate the influential variables to the response variables.

CO3: Identify where to set these influential variables so that the response variable is at its desired value.

CO4: Formulate the design matrix for two and three factor variables.

CO5: Optimize the response variable using the response surface methodology.

UNIT-I   (10-Lectures)
Review of statistics, Probability Distributions, Normal plots, testing whether a distribution is normal or not. Hypothesis testing, constructing confidence intervals, the paired t test and its importance.

UNIT-II   (10-Lectures)
Importance of ANOVA and factor importance for one factor and two factor analysis by ANOVA method.

UNIT-III   (10-Lectures)
Importance of Design of Experiments, Two factor and three factors over two level cases with replication. Importance of center points in the design of experiments. Significance of curvature in the design. Analyzing unreplicated data using the Lengths method and normal plots.

UNIT-IV   (10-Lectures)
Importance of Fractional factorial design and   resolution III, IV and V designs. How to choose an alias structure.

UNIT-V   (10-Lectures)
Linear regression for the case of full factorial design. Linear regression with missing data. Test for significance of regression. Estimating the precision and constructing confidence intervals of the regressed parameters.

UNIT-VI   (10-Lectures)
Importance of the Response surface methodology. Central composite design and the Box-Behnken design matrices. Handling more than one objective functions using the Desirability function approach.

TEXT BOOKS:
1. Design and Analysis of Experiments   7th Ed. D. Montgomery, John Wiley, 2009.
2. Statistics for Experimenters, An Introduction to Design, data analysis and Model Building, G.P Box, W.G Hunter and J.S Hunter, John Wiley,1978.