

MTH354 Advanced Statistical Methods in Experimental Design

Level: 3

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JULY

Synopsis:

MTH354 Advanced Statistical Methods in Experimental Design continues from MTH353 Basic Statistical Methods in Experimental Design to focus on the connection between the experiment and the model that the experimenter can develop from the results of the experiment. It covers factorial and fractional factorial designs in greater detail. The course introduces response surface methodology and gives an overview of random effects model and nested and split-plot designs.

Topics:

- Two-Level Fractional Factorial Designs
- The General $2^{(k-p)}$ Fractional Factorial Design
- Resolution III, IV and V Designs
- The 3^k Factorial Design
- Factorials with Mixed Levels
- Constructing Factorial and Fractional Factorial Designs Using an Optimal Design Tool
- Regression Model Diagnostics
- The Method of Steepest Ascent
- Experiments with Random Factors
- Nested Design
- Split-Plot Design
- Analysis of Covariance

Textbooks:

Douglas L. Montgomery: Design and Analysis of Experiments (ebook) 10th John Wiley & Sons
ISBN-13: 9781119492443

Learning Outcome:

- Verify the generators for a given design.
- Discuss the differences between a split plot and a two-way ANOVA.
- Implement a randomised complete block design and construct the ANOVA table.
- Demonstrate a factorial design and constructing the ANOVA table in R.
- Analyze the data collected based on the design used and its underlying assumptions.
- Interpret the results of an experiment and report the conclusions.

Assessment Strategies (Evening Class):

| Components | Description | Weightage Allocation (%) |
|-------------------------------|------------------------------|---------------------------------|
| Overall Continuous Assessment | COMPUTER MARKED ASSIGNMENT 1 | 10 |
| | TUTOR-MARKED ASSIGNMENT 1 | 20 |
| Overall Examinable Components | Written Exam | 70 |
| Total | | 100 |