INDIAN INSTITUTE OF TECHNOLOGY KANPUR

DEPARTMENT OF MANAGEMENT SCIENCES

Proposal for New Course

1. **Course Title:** Design and Analysis of Experiments
2. **Course Number:** DMSXXX
3. **Credits:** 3-0-0-1[10]
4. **Duration of the course**: Full semester
5. **Proposing Instructor:** Nivedita Bhaktha & Deepu Philip
6. **Proposing department:** Management Sciences
7. **Pre-requisite Courses:** At least one course on Probability and statistics
8. **Other Interested Faculty:**

Course Description

This comprehensive semester-long course provides introduction to the principles, methods, and applications of Design of Experiments (DOE) and its implementation using R. Students will develop theoretical understanding and hands-on skills to design, analyze, and interpret experimental data across engineering, industrial, and behavioral science contexts. The learning objectives are as follows:
- Design and analyze different types of experiments tailored to research or industrial needs.
- Apply appropriate statistical models and interpret the results.
- Use R effectively to manage, analyze, and visualize experimental data.
- Implement DOE for optimization and process improvement.

Course Content

Sl. No.	Topics	No. of Lectures
1.	Introduction and philosophy of design of experiments	2
2.	Fundamentals of design of experiments	4
3.	Anova	3
4.	Latin Square, Graeco-Latin Square, Youden Square Designs	3
5.	Randomized control block designs and balanced incomplete block designs	6
6.	Factorial Designs	3
7.	Fractional Factorial Designs	4

8.	Robust Designs	3

Textbooks

- Montgomery, D. C. (2017). *Design and analysis of experiments*. John wiley & sons.

- Fisher, R. A., & Fisher, R. A. (1971). *The design of experiments* (8th ed., p. 216). New York: Hafner.

- Dean, A., & Voss, D. (Eds.). (1999). *Design and analysis of experiments*. New York, NY: Springer New York.

- Cochran, W. G., & Cox, G. M. (1950). *Experimental Designs*. Wiley (C1950).

- Antony, J. (2023). *Design of experiments for engineers and scientists*. Elsevier.

- Kempthorne, O. (1952). *The design and analysis of experiments*.

- Casella G. (2008). *Statistical Design*. Springer.

Students

Mtech and PhD students of DoMS and other departments. Senior undergraduate students interested in understanding DOE.

Signature of Proposer:

Sd/- Nivedita Bhaktha [Date: 12 August 2025]   Sd/- Deepu Philip [Date: 21 Aug 2025]

This course is Approved/ Not Approve   This course is Approved/ Not Approved DPGC

Convener, DoMS   Chairperson SPGC