NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Design and Analysis of Experiments		
Programme	M.Tech. Industrial Engineering and Management – I Semester		
Course Code	PR 664	**No. of Credits**	3
Department	Production Engineering	**Faculty**	R. JEYAPAUL
Pre-requisites Course Code	General awareness about Statistical Theory and applications		
Course Coordinator(s) (if, applicable)	-		
Other Course Teacher(s)/Tutor(s) E-mail	jeyapaul@nitt.edu	**Telephone No.**	9444290049
Course Type	☐ **Core course**	☑ **Elective course**	

COURSE OVERVIEW

Design of Experiments (DOE) is a systematic method to determine the relationship between factors affecting a process and the output of that process. In other words, it is used to find cause-and-effect relationships. This information is needed to manage process inputs in order to optimize the output.

In an experiment, we deliberately change one or more process parameters in order to observe the effect the changes on one or more response variables. The design of experiments is an efficient procedure for planning experiments so that the obtained data can be analysed to yield valid and objective conclusions.

This course enables students to design, data collection and perform analysis to solve any problem by the application of DOE methodology.

COURSE OBJECTIVES

- To provide an introduction to fundamental concepts of experimentation methodology
- To enhance student understanding of the complexities of experimental design and control of manufacturing processes
- To analyze the effect of total number of experiments on the conclusion about process parameter

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
After studying this course, students are able to: 1. Understand the need, steps to be followed for conducting experiments 2. Create experimental designs using factorial experiments and other special experimental techniques 3. Apply Taguchi techniques for various parameter design problems	PO 3, PO 4 and PO 6

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	Week 1	Introduction to design of experiments, Review of statistics, Basic terminologies, principles	Chalk and Talk / PPT
2	Week 2	Steps to be followed for conducting experimentation, examples	Chalk and Talk
3	Week 3	Single factor experiments, ANOVA, Test on means	Chalk and Talk
4	Week 4	Randomized Block design, Latin Square Design, Greaco Latin Square Design, Tutorials	Chalk and Talk
5	Week 5	Balanced Incomplete Block Design, missing observations, Tutorials	Chalk and Talk
6	Week 6	Introduction to Factorial design (FD), 2 & 3 factor factorial design, tutorials	Chalk and Talk
Descriptive Assessment - 1			

7	Week 7	blocking in FD, 2^k Design, Contrast Equations, Yate's algorithm, Tutorials	Chalk and Talk
8	Week 8	Blocking in 2^k design, Tutorials	Chalk and Talk
9	Week 9	Confounding in 2^k design, Confounding in 2 Blocks, Tutorials	Chalk and Talk
10	Week 10	Confounding in 4 blocks, partial confounding, tutorials	Chalk and Talk
Descriptive Assessment -2			
11	Week 11	Taguchi Design, steps, methodology for design and data collection	PPT
12	Week 12	Data Analysis in Taguchi method, Case Studies, Tutorials	PPT
Objective type quiz			
Compensation Assessment			
Descriptive Semester Examination			

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Descriptive Assessment – 1	End of 6 Weeks	45 Min	20%
2	Descriptive Assessment – 2	End of 10 Weeks	1 Hr	20%
3	Objective type Quiz	End of 12 Weeks	10 Min	10%
4	Compensation Assessment	End of 12 Weeks	1.5 Hrs	30%
5	Descriptive Semester Exam	End of Semester	3 Hrs	50%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

TEXT BOOK:

1. Montgomery, D.C. "Design and Analysis of Experiments", John Wiley and Sons, 5th Edition,2002.

REFERENCE BOOKS:

1. Hicks,C.R. "Fundamental concepts in the Design of Experiments", Holt, Rinehort and Winston, 2000.
2. Bagchi, T.P. "Taguchi Methods explained", PHI, 2002.
3. Ross, P.J. "Taguchi Techniques for quality Engineering", Prentice Hall, 2000.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

Course Exit survey will be collected at the end of the semester before the start of semester examination through online. Students can log in their MIS account to give the feedback. Mid-semester anonymous feedback shall be collected to improve the teaching-learning process. Apart from this, students can share feedback during class committee meetings.

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

- Attending classes regularly and continuously is required for the students to understand the concepts.
- Participation in the discussions is mandatory during the tutorial classes.
- Strict academic disciplines have to be maintained inside the class room.
- If any student is not able to attend any of the continuous assessments (1, 2, and 3) due to genuine reason, student is permitted to attend the compensation assessment with % weightage equal to maximum of the CAs. However, a student absent for more than one CAs, maximum of the % weightage among the assessments for which the student was absent will be considered for computing marks for CA.

ADDITIONAL COURSE INFORMATION

The Course teacher is available for consultation in the department after class hours. Queries may also be emailed to the Course Coordinator directly at jeyapaul@nitt.edu

FOR SENATE'S CONSIDERATION

Course Faculty _____ **CC-Chairperson** _____ **HOD** _____ 6/9/17