Data Design Analysis (MSM4234)

Course Code	MSM4234			
Course Name	DATA DESIGN ANALYSIS			
Credit Hour	4			
Prerequisite Course	Industrial Statistics (MSM4213)			
Contact Hours	Lecture:	3	units	(3 hour(s) per week)
	Tutorial:	0	unit	(0 hour(s) per week)
	Laboratory:	2	units	(2 hour(s) per week)
Rationale for the Inclusion	Data Design Analysis (Experimental design) is a process of planning a research, or experiment to meet specified objectives. This branch of applied statistics deals with planning, conducting, analyzing and interpreting controlled tests to evaluate the factors that control the value of a parameter or group of parameters. The methods can be applied to various data sets from many different fields.			
Course Objective	This course will give students an exposure to various experimental design methods. Students will experience the theoretical and practical aspects of experimental design as they apply the basic principle of experimental design for various data sets from many different fields. Students should be able to classify response variables, dependent variables, factors, independent variables, factor levels, and treatment levels in an experimental design. Students will also be able to differentiate the roles of replication, randomization, and blocking in experimental design. At the end of this course, students should be able to design experiments that reasonably estimate the uncertainty associated with all data and results, recommend a conclusion or suggestion based on the experimental design, and construct a powerful data analysis by using any software tools.			
Course Synopsis	In this course, students are exposed to experimental design methods including basic principles and guidelines for designing experiments, experimentation with single factor, Randomized Blocks, Latin Squares and Related Designs, Factorial Design, the 2k Factorial Design, the 3k Factorial Design, Response Surface Methodology, Nested Design and Split-Plot Design. The methods are developed and applied to various data sets from many different fields. Appropriate software such as XLSTAT-DOE for Microsoft Excel or R shall be used in this course to implement these design methods. Discussion on real case studies such as manufacturing process optimization will be covered.			

Program Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
	/	/	/		/				

Soft Skills	**Code**	**CTPS**	**CS**	**TS**	**LL**	**ES**	**EM**	**LS**
	KIM	5		4				

Course Outcomes		
	By the end of semester, students should be able to:	
	CO1	Recommend a conclusion or suggestion based on data design analysis results for various industrial applications.
	CO2	Construct data design analysis by using approriate statistical software.

	CO3	Organise real life data to solve related problems in various disciplines by using appropriate design of experiment techniques.
	CO4	Perform the works collaboratively and promote teamwork among group members to solve the given projects.

	Methods	**Weighting**	**CO1**	**CO2**	**CO3**	**CO4**	
Assessment Methods	Test	30%	/		/		
	Assignment	30%	/	/	/	/	
	Final Examination	40%	/		/		
	Total	**100%**					

Learning References	1	Montgomery, D.C., Design and Analysis of Experiments, 8th Edition, Wiley, 2012. (Main Reference).
	2	David J. Glass, Experimental Design for Biologists, Second Edition, Cold Spring Harbor Laboratory Press, 2014.
	3	Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences, Fourth Edition edition, SAGE Publications, Inc; 2012.
	4	Kamel Rekab and Muzaffar Shaikh, Statistical Design of Experiments with Engineering Applications, Chapman & Hall/CRC. 2005. (latest version)
	5	Paul, D.B. and Robert E.M., Experimental Design with Applications in Management, Engineering and the Sciences, Thomson Learning. 2002. (latest version)