

Course Code	EM524		
Course Title	Design and Analysis of Experiments		
No. of Credits	3		
Pre-requisites	EM213		
Compulsory/Optional	Optional		
<b>Aim(s):</b> To develop the skills necessary to efficiently and effectively design and analyze experiments.			
<b>Intended Learning Outcomes:</b> On successful completion of the course, the students should be able to;			
<ul style="list-style-type: none"> <li>• Identify the most suitable design for an experiment.</li> <li>• Apply statistical methods to design experiments and to analyze the data using statistical software.</li> <li>• Develop successful experiments that can lead to reduce development time, enhance process performance, and improve product quality.</li> </ul>			
<b>Time Allocation (Hours):</b> Lectures 30                      Tutorials 7                      Practical 16			
<b>Course content/Course description:</b>			
<ul style="list-style-type: none"> <li>• <b>Fully randomized design, Randomized complete block design, Latin square design:</b> Introduction, design of the experiment, statistical analysis of the fixed effects model, estimation of the model parameters, pair wise comparisons of the means, residual analysis.</li> <li>• <b>Two factor and Three factor factorial designs:</b> advantage of factorials, design of the experiment, testing for interactions, statistical analysis of the fixed effects model with and without interactions, estimation of the model parameters.</li> <li>• <b>2<sup>k</sup> factorial designs:</b> estimating factor effects, formulation of the model, statistical testing using ANOVA, residual analysis, blocking and confounding, interpretation of results.</li> <li>• <b>Fractional factorial designs:</b> One-half fraction and one-quarter fraction of the 2<sup>k</sup> factorial design.</li> <li>• <b>Taguchi method:</b> background and overview of Taguchi method, loss function, insight to orthogonal arrays, design of experiment, robust design using Taguchi method.</li> <li>• <b>Response surface method:</b> Introduction, designs for fitting the first-order model and the second order model.</li> </ul>			
<b>Recommended Texts :</b>			
<ul style="list-style-type: none"> <li>• D.C. Montgomery, Design and Analysis of Experiments, 7<sup>th</sup> edition, (2008), John Wiley and Sons, Inc.</li> <li>• D.C. Montgomery and G.C. Runger, Applied Statistics and Probability for Engineers, 6<sup>th</sup> edition, (2013), John Wiley and Sons, Inc.</li> <li>• Madhav S. Phadke, Quality Engineering using Robust Design, 1<sup>st</sup> edition, (1989), Prentice Hall.</li> </ul>			

<b>Assessment</b>	<b>Percentage Mark</b>
<b>In-course</b>	
Tutorials	10
Lab Assignments/Quizzes	20
Mid Semester Examination	20
<b>End-semester</b>	50