جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Special Topic: Stat Design of Experiment - STAT 290C

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	STAT 290C
Course Title	Special Topic: Stat Design of Experiment
Academic Semester	Spring
Academic Year	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	09:00 AM - 10:30 AM | Mon , 10:30 AM - 12:00 PM | Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Joaquin Ortega Sanchez	JOAQUIN.ORTEGASANCHEZ@KAUST.EDU.SA		4297, 1, Al-Khawarizmi (bldg. 1)	Monday 14:00 - 15:00 Wednesday 10:00 - 11:00 Thursday 15:00 - 16:00

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	This course is an introduction to the statistical design of experiments and the role of random effects in data analysis. Topics include randomization tests, blocking, Latin squares, split plots, repeated measures and crossover designs, incomplete block designs, lattice designs, two level factorials, experiments without replication, factorials in incomplete blocks, confounding, fractional factorials, response surface methodology, Bayesian designs, and basics of design of computer experiments.
Course Description from Program Guide	This course is an introduction to the statistical design of experiments and the role of random effects in data analysis. Topics include randomization tests, blocking, Latin squares, split plots, repeated measures and crossover designs, incomplete block designs, lattice designs, two level factorials, experiments without replication, factorials in incomplete blocks, confounding, fractional factorials, response surface methodology, Bayesian designs, and basics of design of computer experiments.
Goals and Objectives	This course will provide students with an introduction to the statistical design and analysis of experiments. Specific objectives are the systematic study of various designs selected for the purpose for experimentation, how to plan experiments taking decisions for any stage of the experimental process, determine how to assign the experimental units to the levels of the treatment factors, use adequate statistical models for designed experiments. The R programming language will be used to construct experimental designs and to perform the analysis of the experimental data.
Required Knowledge	The material provided in introductory graduate courses on calculus, basic statistical theory, applied linear models.

Reference Texts	John Lawson (2015). Design and Analysis of Experiments with R, Texts in Statistical Science, Chapman & Hall/CRC. Angela Dean, Daniel Voss, Danel Draguljic (2017). Design and Analysis of Experiments, Second Edition, Springer Texts in Statistics, Springer. Roger Mead, S. G. Gilmour, A. Mead (2012). Statistical Principles for the Design of Experiments, Cambridge Series in Statistical and Probabilistic Mathematics, Cambridge University Press. Raymond H. Myers, Douglas C. Montgomery, Christine M. Anderson-Cook (2009). Response Surface Methodology, Third Edition, John Wiley & Sons. Robert L. Mason, Richard F. Gunst, James L. Hess (2003). Statistical Design and Analysis of Experiments, Second Edition, Wiley Series in Probability and Statistics, John Wiley & Sons. Douglas C. Montgomery (2013). Design and Analysis of Experiments, Eighth Edition, John Wiley & Sons.
Method of evaluation	**30.00**% - Homework /Assignments **30.00**% - Midterm exam **40.00**% - Course Project(s)
Nature of the assignments	Homework exercises. Assigned reading of specific book chapters and papers. Individual projects.
Course Policies	Attendance is required. Assignments will be handed out on the announced dates throughout the course. Late assignment submissions will not be accepted unless prior arrangements have been made (except in university established cases of illness or emergency). All homework assignments must be neatly typed (LaTeX is recommended). All projects and homework assignments are required. Grades will be posted on the course website. If you dispute your grade on any homework or project, you may request a regrade (from the TA/instructor for the assignments or the instructor for the exams) only within 48 hours of receiving the graded exam. Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these exceptional circumstances must be verifiable. The assignment of an (I) requires first an approval of the Dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. Collaboration and checking answers on assignments are allowed and encouraged. Of course, copying assignments is not tolerated. In brief, you are allowed to collaborate on all homework problems according to the following rules: you must first attempt to solve each problem on your own. If you get stuck, you can then talk to any student currently enrolled in the class about the issue, as well as the instructor or the TA. However, solutions and R code should not be exchanged (i.e., you still must work through the details of the problem after you have gotten help, write the final answers alone, and understand them thoroughly).
Additional Information	Class notices and course-related information will be posted periodically on the course website. Please regularly check the site for relevant information. Also, there may be essential e-mail communications, so it is necessary for you to monitor your e-mail account.

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Mon 01/28/2019 Thu 01/31/2019	Introduction. Completely randomized designs with one factor.
2	Mon 02/04/2019 Thu 02/07/2019	Factorial designs.
3	Mon 02/11/2019 Thu 02/14/2019	Factorial designs with several factors
4	Mon 02/18/2019 Thu 02/21/2019	Randomized block designs.
5	Mon 02/25/2019 Thu 02/28/2019	Designs to study variances.
6	Mon 03/04/2019 Thu 03/07/2019	Fractional factorial designs.
7	Mon 03/11/2019 Thu 03/14/2019	Fractional factorial designs.
8	Mon 03/18/2019 Thu 03/21/2019	Incomplete and confounding block designs.
9	Mon 03/25/2019 Thu 03/28/2019	Spring Break
10	Mon 04/01/2019 Thu 04/04/2019	Split-plot designs.
11	Mon 04/08/2019 Thu 04/11/2019	Crossover and repeated measures designs.
12	Mon 04/15/2019 Thu 04/18/2019	The analysis of second-order response surfaces.
13	Mon 04/22/2019 Thu 04/25/2019	Experimental designs for fitting response surfaces.
14	Mon 04/29/2019 Thu 05/02/2019	Experimental designs for fitting response surfaces.
15	Mon 05/06/2019 Thu 05/09/2019	Models and designs for mixture experiments.
16	Mon 05/13/2019 Thu 05/16/2019	Design and analysis of computer experiments.
17	Mon 05/20/2019 Thu 05/23/2019	Final Exam Week

Note

The instructor reserves the right to make changes to this syllabus as necessary.