The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:
Design and analysis of experiments

1	**Course title**	Design and analysis of experiments
2	**Course number**	0301936
3	**Credit hours (theory, practical)**	3
	Contact hours (theory, practical)	3
4	**Prerequisites/corequisites**	
5	**Program title**	Phd Mathematics
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**Faculty**	Faculty of Science
9	**Department**	Mathematics Department
10	**Level of course**	300-level
11	**Year of study and semester (s)**	
12	**Final Qualification**	
13	**Other department (s) involved in teaching the course**	None
14	**Language of Instruction**	English
15	**Date of production/revision**	14/11/2017

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Professor Hisham
Hilowhilow@ju.edu.jo

17. Other instructors:

Professor Ahmad Zgoul
Dr Amal Helu

18. Course Description:

As stated in the approved study plan.

. Basic ideas and tools for good experimentation: Randomization, Blocking and Replication.One way and 2-way completely randomized designs for fixed / random effects experiments.Analysis of Variance, Comparison of Multiple Treatment Means and the Generalized Type Ierror rate. Orthogonal contrasts. Simple Linear regression and The Analysis of covariance. Hierarchical (nested) designs. Randomized Complete and Incomplete Block Designs. Latin square and Cross-over designs.

19. Course aims and outcomes:

A- Aims:

This course is about concepts and techniques employed in designing and analyzing experiments for the purpose of controlling and accounting for variability in experimental data.

Therefore, the aim of this course is to introduce student to the principles and methods for designing experiments and analyzing experimental data , where the course will discuss (i)how to design good experiments controlling for allsources of variability , (ii) carry them out to generate experimental data and finally (iii) analyze the data they yield to quantify and describe the effects of all factors influencing the conduct of the experiment. Students will also gain experience with statistical packages (SAS ,SPSS and MINITAB) to help them conduct the necessary statistical analysis then formulate conclusions and generalizations about the problems studied and experimented.

It is worth noting that experiments are conducted in almost all fields of science to solve real life problems and to propose new innovations in order to make human life easier and more enjoyable. Experiments vary in structure and complexity. Therefore, each experiment must be conducted according to an optimal design and collected data there-from are optimally analyzed by analysis of variance techniques using an optimal linear model to maximize the information about the problem investigated. Linear models relate mathematically input variables affecting the conduct of the experiment with output responses so that cause –effect relationships effects could be measured and quantified between inputs and outputs**.**

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

Having successfully completed this course each student will be able to:

(1) understand issues and principles of Design of Experiments and also understand that experimentation is rocess starting with identification of the problem and formulating hypotheses, then designing to investigateproblem experimentally and finally analyze collected experimental data to formulate conclusions and ke generalizations.

(2) apply the three principles for designing experiments : randomisation, replication and stratification (blocking) to practical problems involving experimentation and data collection.

(3) explore the general theory of factorial and block designs to find and propose appropriate designsspecific applications.

4)evaluate designs using common optimality criteria and use these criteria to compare competingsigns.

(5) Apply experimental design theory for any experimental design structure and its correspondingalytical methods for any experimental application.

(6) Efficiently use statistical software packages to analyze data from different forms of experiments.

(7) write reports in non-technical language summarizing results of statistical analysis of allforms of experimental data**.**

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Basic principles of experimental design: randomization , replication and blocking (paired and unpaired designs)	1-2		1-7	Homework Assignments And Reports Writing	
One-way Completely randomized designs and their ANOVA and Multiple comparisons Fixed and random effects models Sub-	3-5		1-7	Homework Assignments And Reports Writing	
Simple Regression and Analysis of Covariance	6-7		1-7	First Exam	
Two-way	8-10		1-7	Homework	

completely randomized designs and their ANOVA Interaction analysis				Assignments And Reports Writing	
Randomized complete and incomplete block designs and Latin Square designs	11-13		1-7	Homework Assignments And Reports Writing Second Exam	
Sub-sampling experimental units and Nested designs and their ANOVA Cross-over designs and repeated measurements	14-15		1-7		

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

The course will be conducted combining class lectures ,computer sessions and student presentations

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methodsand requirements:

Students taking this course will be evaluated by two midterm exams and project presentation accounting for 50% of the total grade then a Final written exam accounting for 50% of the total grade.

23. Course Policies:

A- Attendance policies:

Consistent attendance is mandatory and critical to success in the course. Missing a class means missing aolt of important course content, class discussions and instructions regarding homework assignments ,reading and tests.B- Absences from exams and handing in assignments on time:

Unless each student make prior arrangements to his/her absence or have a documented excusable absence he/shewill receive a zero for missed exams. Students with excusable absences will be expected to take the exam immediately upon returning to class.

C- Health and safety procedures:

The following are only excusable absences from attending classes or exams:

(i) death in immediate family (ii) Doctor-documented medical illness

(ii) heavy rain or snow causing traffic closure

D- Honesty policy regarding cheating, plagiarism, misbehavior:

(iii) Academic dishonesty is unacceptable in the course and at campus. Students caught cheating, plagiarizing, submitting the same work of other persons as your own will be met with disciplinary action. Please refer to the university's academic handbook for this regard.

(iv) E- Grading policy:

(v) First Exam 20% Second Exam 30% and Final Exam 50%

(vi) F- Available university services that support achievement in the course:

(vii) The department computer lab will be utilized for conducting all necessary statistical analysis

(viii)

24. Required equipment:

Statistical packages like SAS ,SPSS ,MINITAB

25. References:

A- Required book (s), assigned reading and audio-visuals:

(i)Design and Analysis of Experiemnts,9th edition
Douglas C. Montgomery
Wiley 2017

(ii) Design and Analysis of Experiemnts,2th
editionAngelea Dean, Daniel Voss and Danel
Draguljic Springer Verlag

(iii) Design and Analysis of Experiemnts,2th
editionKlaus Hinkelmann and Oscar Kempthorne
Wiley

B- Recommended books, materials, and media:

26. Additional information:

Name of Course Coordinator : Prof. Hisham Hilow Signature : ---------- Date : ----------

Head of curriculum committee/Department : ---------- Signature : ----------

Head of Department : Prof. murad ahmad Signature : ----------

Head of curriculum committee/Faculty : ---------- Signature : ----------

Dean : Prof. Mahmoud Al Jaghoub Signature : ----------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File