هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Design Experiments
Course Code:	STS 423
Program:	Applied Statistics & Data Management
Department:	Mathematics
College:	College of Science
Institution:	Majmaah University, Saudi Arabia
Version:	2023
Last Revision Date:	10/10/2023

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A. General information about the course:

1. Course Identification

1. Credit hours: (.....)					
2. Course type					
A.	☐University	☐College	☒Department	☐Track	Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (...8.....)					
4. Course general Description:					
The course aims to provide a basic introduction to: **Review of statistical inference - Main principals of experimental design: Replication – Randomness – Blocks – Simple comparisons experiments: t-test and alike tests. Single Factor Experiments: Completely randomized design – Model adequacy checking – Contrasts and orthogonal contrasts – Comparing pairs of treatment means - Block designs: Randomized complete block design – Latin square design – Graeco-Latin square design - Factorial designs: Two-Factor factorial design, Three-Factor factorial design, General factorial designs - Designs with two-level factors: Two factors with two levels designs, Three factors with two levels designs, General two-level factors designs. Confounding. Fractional factorial designs.**					
5. Pre-requirements for this course (if any)**:**					
STS 211 (Probability and Statistics)					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
After complete this course students will be able to understand : **1) To develop an understanding of experimental methods and major experimental designs, and think critically about their proper application.** **2) Write hypotheses that can be tested using experiments.** **3) Be able to develop different types of experimental and quasi-experimental designs** **4) Apply Knowledge of ethical standards to an experiment.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	36
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	12
5.	**Others (specify)**	12
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Use experiment as a method for causal inference	K1	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed teaching: Discovery Oral questions Indirect teaching: Peer Learning	Homework Quiz Midterms Final Exams E-exam Oral Exam
1.2	When designing experiments, know when to use blocking	K1		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	versus clustering for random assignment and subsequent data analysis			
...				
2.0	**Skills**			
2.1	When implementing an experiment, know how to handle spillovers and non-compliance; know how to correct for multiple testing.	**S1**	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed teaching: Discovery Oral questions Indirect teaching: Peer Learning	Homework Quiz Midterms Final Exams E-exam Oral Exam
2.2				
...				
3.0	**Values, autonomy, and responsibility**			
3.1	Categorize work in a group, communicating effectively	V2	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed teaching: Discovery Oral questions	Homework Class Activities
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Review of statistical inference - Main principals of experimental design: Replication – Randomness – Blocks	12
2.	Simple comparisons experiments: t-test and alike tests. Single Factor Experiments: Completely randomized design – Model adequacy checking – Contrasts and orthogonal contrasts – Comparing pairs of treatment means	12
3.	Block designs: Randomized complete block design – Latin square design – Graeco-Latin square design -	12

4.	Factorial designs: Two-Factor factorial design, Three-Factor factorial design, General factorial designs - Designs with two-level factors: Two factors with two levels designs,	12
5.	Three factors with two levels designs, General two-level factors designs. Confounding. Fractional factorial designs.	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First & Second Exams	6th week and 10th weeks	40%
2.	Quizzes	Every 2 week	5%
3.	Assignments	Every 2 week	5%
4.	Class Activities	2 time in semester	5%
5.	Electronic Test	One time in semester 10 week	5%
6.	Final	After 10th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Design and Analysis of Experiments by Montgomery (8th Edition) DOUGLAS C. MONTGOMERY
Supportive References	Field Experiments: Design, Analysis, and Interpretation /Alan S. Gerber and Donald P. Green. S
Electronic Materials	http://www.itl.nist.gov/div898/handbook/toolaids/pff/index.htm
Other Learning Materials	https://wwnorton.com/books/9780393979954

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with capacity of 30-students. Computer Lab of Mathematics Department

Items	Resources
Technology equipment (projector, smart board, software)	Mathematical & Statistical software packages like: 1- R, SPSS, MATHEMATICA. 2- MATLAB. 3- MAPLE. SCIENTIFIC WORKPLACE, PYTHON
Other equipment (depending on the nature of the specialty)	---------

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Effectiveness of Students assessment	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
The extent to which CLOs have been achieved	Staff members (Peer Reviewer)	Direct (Meeting between course coordinators and the tutors)
Other	----------	----------

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	