هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد
NCAAA

2024
TP-153

Course Specification
(Bachelor)

Course Title:	**Statistical Analysis with R**
Course Code:	**STA 1442**
Program:	**Bachelor of Science in Applied Statistics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**2 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 1 Lab, 1 Tutorial)					
2. Course type					
A.	☐University	☐College	☒ Program	☐Track	☐Others
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: Level 7 or Level 8 / Year 4					
Level 7 / Year 4					
4. Course General Description:					
This course is an introduction to practical applied statistics with R, a programming language and software environment for statistical computing, and with RStudio, an integrated development environment for R. Topics include introduction to R, data and programming, summarizing data, probability and statistics in R, simple and multiple linear regression, categorical predictors and interactions, model diagnostics, collinearity, variable selection and model building, selected data analyses.					
5. Pre-requirements for this course:					
STA 1241					
6. Co-requisites for this course:					
None					
7. Course Main Objective(s):					
This course gives students an opportunity to use the public domain and free software R to perform statistical computing. At the end of this course students will be able to: ▪ **Create and modify R data sets.** ▪ **Write their own R functions and use some packages in R;** ▪ **Create figures and plots using R.** ▪ **Become familiar with the major R data structures.** ▪ **Use R for statistical programming, computation, graphics, and modeling.**					

2. Teaching mode

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

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	15
3.	Field	0
4.	Tutorial	15
5.	Others (specify)	0
Total		60

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

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	List motivation for learning a programming language.	K1, K2, K3	2 lecture hours per week	Direct: Regular Exams
1.2	To outline critical R programming concepts.	K1, K2, K3	1 tutorial hours per week 1 lab hours per week Self-study	Direct: Short Quizzes
2.0	Skills			
2.1	To apply OOP concepts in R programming.	S4, S5	Use of statistical software, Lecturing, Interactive learning.	Direct: Regular Exams Participations Short Quizzes
2.2	To explain the use of data structure and loop functions.	S1, S5	Use of statistical software, Lecturing, Interactive learning.	Direct: Regular Exams Participation Short Quizzes
2.3	To analyze data and generate reports based on the data.	S3, S5	Use of statistical software, Lecturing, Interactive learning.	Direct: Participations Short Quizzes
2.4	To apply various concepts to write programs in R.	S2, S5	Use of statistical software, Lecturing, Interactive learning.	Direct: Participations Short Quizzes
3.0	Values, autonomy, and responsibility			
3.1	To work individually.	V1, V2	Interactive learning, Group interaction, Problem solving.	Direct: Lab Exam, Practical exam, Assignments
3.2	To justify the output in a collective team environment.	V1, V3	Group interaction, Problem solving.	Direct: Lab assignments and Mini-projects

C. Course Content

No	List of Topics	Contact Hours
1.	**Basics:** First steps, R language essentials.	3
2.	**The R environment:** Session management, The graphics subsystem, R programming, Data entry.	6
3.	**Probability and distributions:** Random sampling, Probability calculations and combinatorics, Discrete distributions, Continuous distributions, The built-in distributions in R.	7
4.	**Descriptive statistics and graphics:** Summary statistics for a single group, Graphical display of distributions, Summary statistics by groups, Graphics for grouped data, Tables, Graphical display of tables.	12
5.	**One- and two-sample tests:** One-sample t-test, Two-sample t-test, Comparison of variances, The paired t-test.	16
6.	**Regression and correlation:** Simple linear regression, Residuals and fitted values, Prediction and confidence, Correlation.	16
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homeworks, Quizzes, Mini-projects**	**During the term**	**10%**
2.	**First Midterm**	**Week 5-6**	**25%**
3.	**Lab exam**	**Week 10-11**	**25%**
4.	**Final Exam**	**Week 16-17**	**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	1- **Introductory Statistics with *R*,** 2nd Edition. P. Dalgaard, Springer Verlag, 2008. ISBN: 978-0-387-79053-4 **(Main Reference)** 2- **An Introduction to *R*,** Notes on *R*: A Programming Environment for Data Analysis and Graphics, W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: http://www.cran.r-project.org/doc/manuals/R-intro.pdf. (Main Reference)
Supportive References	1- ***Statistics and Data Visualization Using R: The Art and Practice of Data Analysis*;** David S. Brown, SAGE Publications Inc, 2021. 2- ***Probability and Statistics with R,*** 2nd Edition, Maria Dolores Ugarte, Ana F. Militino, Alan T. Arnholt, CRC Press, 2016.
Electronic Materials	**Course Website: Learning Management Systems (Blackboard)**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ Each class room should be equipped with a whiteboard and a projector. ▪ Laboratories should be equipped with computers and an internet connection.
Technology equipment (projector, smart board, software)	The rooms should be equipped with data show and Smart Board. All computers should be equipped with the following software: • Microsoft Excel • IBM SPSS • R-Project • MATLAB
Other equipment (depending on the nature of the specialty)	See the Attached File

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and teaching staff	Surveys and Questionnaires
Effectiveness of Students assessment	Course Coordinator	Peer Reviews
Quality of learning resources	Students and teaching staff	Classroom Observations
The extent to which CLOs have been achieved	Student Representatives	Student Performance Evaluations (exams, projects) CLOs Excel sheet.
Other	None	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL
REFERENCE NO.	
DATE	