هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

Course Specification
(Bachelor)

Course Title: **Selected Topics in Data Science**

Course Code: **CS 474**

Program: **Computer Science**

Department: **Computer Science**

College: **CCIS-Male**

Institution: **Majmaah University**

Version: **2023**

Last Revision Date: **14 September 2023**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3(3,1,0)

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:

This course aims to develop strong data analytic skills using both theoretical and case-based approach to apply data mining and advanced statistical techniques to real world problems facing the society. The students will learn about the use of various multivariate methods, how to design the study to collect data amenable for such analysis, and the issues involved in acquiring, storing, accessing, analyzing, and visualizing large, heterogeneous and real-time data associated with diverse real-world domains.

5. Pre-requirements for this course (if any):

STAT 102

6. Pre-requirements for this course (if any):

7. Course Main Objective(s):

This course aims to review and complement foundation statistical knowledge and to establish the context for a range of methods, used in the analysis of simple and complex systems (including non-linear and multivariate scenarios). The course builds expertise in advanced analytics, data mining and quantitative reasoning that have become essential to meet the complexities of information requirement for decision making. The emphasis is on an intuitive understanding of the principles and a practical ability to apply these to real world data scenarios.

2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
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				
2.0	**Skills**			
2.1	Ability to identify the characteristics of data and compare the data analysis techniques for various applications.	**S2**	Classroom Teaching, and Lab	Quiz, Mid Exam, Final Exam, Assignment, Lab Exercises
2.2	Ability to appreciate the issues involved in acquiring,	**S2**	Classroom Teaching, and Lab	Quiz, Mid Exam, Final Exam, Assignment, Lab Exercises

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	storing, accessing, analyzing, and visualizing large, heterogeneous, and real-time data associated with diverse real-world domains			
…	Ability to demonstrate and apply the various multivariate methods,	S2	Classroom Teaching, and Lab	Quiz, Mid Exam, Final Exam, Assignment, Lab Exercises
	Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.	S4	Classroom Teaching, and Lab	Quiz, Mid Exam, Final Exam, Assignment, Lab Exercises
3.0	**Values, autonomy, and responsibility**			
3.1	**Ability to handle large scale analytics projects from various domains**	V1	Classroom Teaching, and Lab	Mini Project, Lab Exercises, Seminar
3.2				
…				

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to RStudio- Creating variables and assigning data, vectors and factors, lists, data classes, Looping statements, decision support statements, What is tidyverse?**	**4**

2.	Data to Insights to Decisions Data Exploration and Visualization with R, Installing and loading tidyverse, Loading and examining a Dataset, Grouping and summarizing a dataset, Plotting a dataset	8
3.	Loading Data into R: Loading a csv file, Using readr to load data	4
4.	Transforming Data: Filtering records to create a subset, Narrowing the list of columns with select(), Summarizing and Grouping	4
5.	Creating Tidy Data: Gathering, Spreading, Uniting	4
6.	Data Exploration Techniques in R: Bar Chart, Histogram	4
7.	Box Plots, 2D bin and hex charts, Summary statistics	8
8.	Data Visualization Techniques: scatterplot, Adding a regression line, Plotting categories, Labeling the graph, Legend layouts, density plots.	8
9.	Visualizing Geographic Data with ggmap: Creating a basemap, Adding operational data layers	8
10.	R Markdown: Creating an R Markdown file, Using Knit to output an R Markdown file	8
11.	Case Study- I	
12.	Case Study- II	
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignment 1	4	5%
2.	Quiz 1	5	10%
3.	Mid Term	8	20%
4.	Assignment 2	9	5%
5.	Quiz 1	12	10%
6.	Mini Project/ Seminar	14	10%
7.	Final Exam	16	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	Eric Pimpler, "Data Visualization and Exploration with R", Geospatial Training Services,2017
Supportive References	RStudio

Electronic Materials	www.cran.com
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom, Lab
Technology equipment (projector, smart board, software)	Projector, Smart Board, 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	Indirect
Effectiveness of Students assessment	Instructor	Direct
Quality of learning resources	Instructor	Direct
The extent to which CLOs have been achieved		
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	