Course Specification

(Bachelor)

Course Title:	Data Visualization
Course Code:	CS 473
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 covers the concepts of data visualization techniques in the form of plots used to show the relationships in the data. Different plots and their importance will be covered. Data visualization techniques will be implemented in R or Python.					
5. Pre-requirements for this course (if any)**:**					
STAT 102					
6. Pre-requirements for this course (if any)**:**					
7. Course Main Objective(s):					
a. To be able to use R Studio for data loading and transformation. b. To explore the data using bar chart, histogram, boxplot. c. To be able to visualize data using scatterplot. d. To be able to apply data visualization techniques in case studies					

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**			
2.0	**Skills**			
2.1	**To explore thedata usingbar chart, histogram, boxplot.**	**S2**	Classroom Teaching and Lab	Quizzes, Midterm Exam, Final Exam
2.2	**To be able to use R Studio for data loading and transformation.**	**S2**	Mini Project, Lab Exercises	Lab project
2.3	**To be able to visualize data using scatterplot.**	**S4**	Classroom Teaching, Mini Project, Lab Exercises	Lab project
3.0	**Values, autonomy, and responsibility**			
3.1	**To be able to apply data visualization techniques in case studies**	**V1**	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	