هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Data Visualization**
Course Code:	**CS 474**
Program:	**Computer Science**
Department:	**Computer Science**
College:	**College of Computer and Information Sciences**
Institution:	**Majmaah University**

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A. Course Identification

1. Credit hours: 3 (3, 0, 1)
2. Course type **a.** University ☐ College ☑ Department ☐ Others ☐ **b.** Required ☑ Elective ☐
3. Level/year at which this course is offered: Level-5 / 3
4. Pre-requisites for this course (if any)**:** CS 120
5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	44	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	22
3	**Tutorial**	
4	**Others** (specify)	
	Total	44

B. Course Objectives and Learning Outcomes

1. Course 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.

2. Course Main Objective

1) To be able to use R Studio for data loading and transformation.
2) To explore the data using bar chart, histogram, boxplot.
3) To be able to visualize data using scatterplot.
4) To be able to apply data visualization techniques in case studies

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1		
1.2		
1.3		
1...		
2	**Skills :**	
2.1	CLO1- To be able to use R Studio for data loading and transformation.	S2
2.2	CLO2- To explore the data using bar chart, histogram, boxplot.	S2
2.3	CLO3- To be able to visualize data using scatterplot.	S2
2...	CLO4- To be able to apply data visualization techniques in case studies	S1
3	**Values:**	
3.1		
3.2		
3.3		
3...		

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?	3
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	3
3	Loading Data into R: Loading a csv file, Using readr to load data	3
4	Transforming Data: Filtering records to create a subset, Narrowing the list of columns with select(), Summarizing and Grouping	3
5	Creating Tidy Data: Gathering, Spreading, Uniting	3
6	Data Exploration Techniques in R: Bar Chart, Histogram	3
7	Box Plots, 2D bin and hex charts, Summary statistics	3
8	Data Visualization Techniques: scatterplot, Adding a regression line	3
9	Plotting categories, Labeling the graph, Legend layouts, density plots.	3
10	Visualizing Geographic Data with ggmap: Creating a basemap, Adding operational data layers	3
11	R Markdown: Creating an R Markdown file, Using Knit to output an R Markdown file	2
12	Case Study- Wildfire Activity in the Western United States	3
13	Case Study- Single Family Residential Home and Rental Values	3
14	Case Study/Mini-project	6
Total		44

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge**		
1.1			
2.0	**Skills**		
2.1	CLO1- To be able to use R Studio for data loading and transformation.	Classroom Teaching and Laboratory practice	Midterm Exam, Quizzes, Final Exam Lab Exercise
2.2	CLO2- To explore the data using bar chart, histogram, boxplot.	Classroom Teaching and Laboratory practice	Lab Exercise
2.3	CLO3- To be able to visualize data using scatterplot.	Classroom Teaching and Laboratory practice	Midterm Exam, Quizzes, Final Exam Lab Exercise
2.4	CLO4- To be able to apply data visualization techniques in case studies	Classroom Teaching and Laboratory practice	Midterm Exam, Quizzes, Final Exam Lab Exercise
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	Week 3	10%
2	Lab Assignment 1	Week 3	10%
3	Mid Term	Week 6	20%
4	Lab Assignment 1	Week 7	10%
5	Quiz 2	Week 8	10%
6	Final Exam	Week 12	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Each student is allotted to an academic advisor for guidance and counselling.

- Available for a minimum of 4 hours per week/course, as communicated to the students.
- Student also contacts through social networking websites / D2L/ Email for advice and consultations

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014**
Essential References Materials	**•Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014.** **•Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013** *NINA ZUMEL, JOHN MOUNT, Practical Data Science with R, Manning Publications Co.,2014*
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms, laboratories
Technology Resources (AV, data show, Smart Board, software, etc.)	PC or Laptop with Windows/Linux, Smart Board, LCD Projector, 'R' programming Tool, Blackboard
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Internet connection

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Final Exam Answer Scripts Verification	Peer faculty members	Direct Review
Course Feedback	Students	Indirect course Survey

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	