



Course Specification

— (Bachelor)

Course Title: **Introduction to Data Science**

Course Code: **DSC 121**

Program: **Applied Statistics & Data Management**

Department: **Mathematics**

College: **College of Science**

Institution: **Majmaah University, Saudi Arabia**

Version: **2023**

Last Revision Date: **09/20/2023**



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A. General information about the course:

1. Course Identification

1. Credit hours: 3 (2+2)

2. Course type

A. University College Department Track Others

B. Required Elective

3. Level/year at which this course is offered: (2/1st year)

4. Course general Description:

This course will introduce students to the collection. Preparation, analysis, modeling and visualization of data, covering both conceptual and practical issues. Examples and case studies from diverse fields will be presented, and hands-on use of statistical and data manipulation software will be included:

Introduction- Definition - Data Science in various fields - Examples - Impact of Data Science - Data Analytics Life Cycle - Data Science Toolkit - Data Scientist - Data Science Team Understanding data: Introduction – Types of Data: Numeric – Categorical – Graphical – High Dimensional Data – Classification of digital Data: Structured, Semi-Structured and Un-Structured - Example Applications. Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution

Introduction to R- Features of R or Python - Environment - R Studio. Basics of R-Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures. Vectors: Definition- Declaration - Generating - Indexing - Naming - Adding & Removing elements - Operations on Vectors - Recycling - Special Operators - Vectorized if- then else-Vector Equality – Functions for vectors - Missing values - NULL values - Filtering & Sub-setting.

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

6. Co-requisites for this course (if any):

7. Course Main Objective(s):



After complete this course students will be able to understand :

1. Recognize various disciplines that contribute to a successful data science effort
2. Understand the processes of data science - identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.
3. Be aware of the challenges that arise in data sciences

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0%
3	Hybrid <ul style="list-style-type: none"> • 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	30
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	30
5.	Others (specify)	0
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	Be comfortable using commercial and open source tools such as the R language and its associated libraries for	K2	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed	Homework Quiz Midterms Final Exams E-exam Oral Exam





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	data analytics and visualization		teaching: Discovery Oral questions Indirect teaching: Peer Learning	
1.2	Learn skills to analyze real time problems using R	K4	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
...				
2.0	Skills			
2.1				
2.2				
...				
3.0	Values, autonomy, and responsibility			
3.1	Be able to use basic R or Python data structures in loading, cleaning and preprocessing a given data	V3	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
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Data Science- Introduction- Definition - Data Science in various fields - Examples	6
2.	Impact of Data Science - Data Analytics Life Cycle - Data Science Toolkit - Data Scientist - Data Science Team	6
3.	Understanding data: Introduction – Types of Data: Numeric – Categorical – Graphical – High Dimensional Data – Classification of digital Data: Structured, Semi-Structured and Un-Structured	12





4.	Example Applications. Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution	9
5.	Introduction to R- Features of R - Environment - R Studio. Basics of R- Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures	12
Total		45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Mid Term Exam	6 th week	15%
2.	Quizzes	Every 2 week	15%
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.	Second Mid Term Exam	12 th week	15%
7.	Final	After 10 th week	40%
	Total		100%

*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	Nina Zumel, John Mount, Practical Data Science with R, Cambridge University Press, 2014.
Supportive References	<ul style="list-style-type: none"> Mark Gardener , Beginning R - The Statistical Programming Language , John Wiley & Sons, Inc g , 2012
Electronic Materials	https://www.w3schools.com/datascience/ds_introduction.asp
Other Learning Materials	https://www.guru99.com/data-science-tutorial.html

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, and MATHEMATICA. 2- MATLAB. 3- MAPLE. SCIENTIFIC WORKPLACE, PYTHON
Other equipment (depending on the nature of the specialty)	Desktop or laptop with internet facility

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	

