

Course Specifications

Course Title:	Data Science
Course Code:	445CIS-3
Program:	Bachelor of Information Systems
Department:	Information Systems
College:	College of Computer Science and Information Systems
Institution:	Najran University







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A. Course Identification

1.	Credit hours: 3 (2, 1, 0) [Theory, Lab, Tutorial]
2.	Course type
a.	University College Department $$ Others
b.	Required $$ Elective
3.	Level/year at which this course is offered: Level 8/Year 4
4.	Pre-requisites for this course (if any):
N/.	A
5.	Co-requisites for this course (if any):
N/.	A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	50	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity		Contact Hours
1	Lecture	[3 contact hours * 10 weeks]	30
2	Laboratory/Studio	[4contact hours * 10 weeks]	20
3	Tutorial		0
4	Others (specify)		
	Total		50

B. Course Objectives and Learning Outcomes

1. Course Description

Data Science is the study of the generalizable extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science along with a good understanding of the craft of problem formulation to engineer effective solutions. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset. Students will be able learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration, exploratory data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication. The focus in the treatment of these topics will be on breadth, rather than depth, and emphasis will be placed on integration and synthesis of concepts and their application to solving problems. To make the learning contextual, real datasets from a variety of disciplines will be used.

2. Course Main Objective

Demonstrate the knowledge of data science techniques and statistical analysis tools to support business decision making.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding:	
1.1	Describe the role of data science and big data in business.	\mathbf{K}_1
1.2	Describe the process of analyzing dataset including data collection,	\mathbf{K}_1
	modeling, integration, exploratory analysis, prediction, and evaluation.	
1.3	Identify the differences between supervised and unsupervised learning	\mathbf{K}_1
1.4	Explain different data science models	\mathbf{K}_1
2	Skills:	
2.1	Demonstrate proficiency with statistical analysis of data	S 4
2.2	Develop the ability to build and assess data-based models.	S_1, S_2
2.3	Execute statistical analyses with professional statistical software (e.g., R,	S 4
-	Python, Minitab, SQL).	
3	Values:	
3.1	Develop leadership, teamwork, self-learning in the assigned tasks.	V1, V2
3.2		
3.3		
3		

C. Course Content

No	List of Topics	Contact Hours
1	What is Data Science?	2
2	Data Science Process and Exploratory Data Analysis	3
3	Classification	3
4	Regression Methods	3
5	Association Analysis	3
6	Clustering	3
7	Model Evaluations	
8	Recommender Engines	3
9	Time Series Forecasting	
10	Deep Learning	3
11	Text Mining	3
12	Anomaly Detection	3
13	Feature Selection	3
13	Lab	12
	Total	50

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 and understanding		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	Describe the role of data science and big data in business.	Lectures	Indirect: - Students CLO Survey Direct: - Quiz. - Midterm Examination. - Final Examination
1.2	Describe the process of analysing dataset including data collection, modeling, integration, exploratory analysis, prediction, and evaluation.	Lectures, Labs.	Indirect: - Students CLO Survey Direct: - Quiz. - Midterm Examination. - Lab assignment - Final Examination - Project
1.3	Identify the differences between classification and regression problems.	Lectures, Labs.	Indirect: - Students CLO Survey Direct: - Midterm Examination. - Lab assignment - Final Examination - Project
1.4	Interpretation of a real dataset	Lectures, Labs.	Indirect: - Students CLO Survey Direct: - Lab assignment - Project
2.0	Skills		
2.1	Demonstrate proficiency with statistical analysis of data.	Lectures, Labs.	Indirect: - Students CLO Survey Direct: - Assignments - Midterm Examination - Lab assignment - Final Examination
2.2	Develop the ability to build and assess data-based models.	Lectures, Labs.	Indirect: - Students CLO Survey Direct: - Assignments. - Midterm Examination - Lab assignment - Final Examination

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.3	Execute statistical analyses with professional statistical software (e.g., R, Python, Minitab, SQL).	Lectures, Group work, Project	Indirect: - Students CLO Survey Direct: - Quizzes. - Assignments. - Midterm Examination - Lab assignment - Final Examination - Course project
3.0	Values		
3.1	Develop leadership, teamwork, self- learning in the assigned tasks.	Group discussion, cooperative and reciprocal learning	Mini projects.
3.2			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes	TBA	10%
2	Theory Assignment	3 th & 8 th week	10%
3	Mid Term Exam-I	6 th week	20%
5	Labs	3 th & 8 th week	20% (10% final lab exam + 10% [mini project and continues evaluation])
6	Final Examination	12 th week	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:

- weekly office hours + appointments
- weekly academic advising hours
- Extra weekly 2 office hours prior to exams

F. Learning Resources and Facilities

0	
Required Textbooks	Data Science: Concepts and Practice Vijay Kotu & Bala Deshpande Morgan Kaufmann 2 nd edition 2018
Essential References Materials	Reference Books1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

1.Learning Resources

	 Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014.
Electronic Materials	https://www.python.org https://www.r-project.org https://www.learnpython.org
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Room Laboratory
Technology Resources (AV, data show, Smart Board, software, etc.)	data show, PCs.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Online course survey	Students	Indirect
Focus group discussion with small groups of students.	Instructor	Direct
Extent of achievement of course learning outcomes	Instructor	Direct
Peer consultation on teaching	Faculty	Direct

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	Department Council
Reference No.	14440729-0182-00018
Date	1444/08/01