Course Specification

(Bachelor)

Course Title: Data Science

Course Code: 445CIS-3

Program: Information Systems

Department: Information Systems

College: College Computer Science and Information Systems

Institution: Najran University

Version: *Course Specification Version Number*

Last Revision Date: *Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (……….)

4. Course General 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.

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

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

7. Course Main Objective(s):

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	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**	
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the role of data science and big data in business.	K1	**Class lectures and Labs**	**Quiz, midterm exams, assignments, and Final exam**
1.2	Describe the process of analyzing datasets including data collection, modeling, integration, exploratory analysis, prediction, and evaluation.	K1 K2	**Class lectures and Labs**	**Quiz, midterm exams, assignments, and Final exam**

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.3	Identify the differences between classification and regression problems.	K1	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
1.4	Interpretation of a real dataset	K1	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
2.0	Skills			
2.1	Demonstrate skills in data management.	S1, S2	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
2.2	Develop relevant programming abilities to solve data science problems.	S1, S2	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
...	Demonstrate proficiency with statistical analysis of data	S4	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
	Develop the ability to build and assess data-based models.	S1, S2	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
	Execute statistical analyses with professional statistical software (e.g., R, Python, Minitab, SQL).	S4	Class lectures and Labs	Quiz, midterm exams, assignments, and Final exam
3.0	Values, autonomy, and responsibility			
3.1				
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours

1.	What is Data Science?	8
2.	Statistical Inference	8
3.	Exploratory Data Analysis and the Data Science Process	8
4.	Three Basic Machine Learning Algorithms	8
5.	One More Machine Learning Algorithm and Usage in Applications	8
6.	Feature Generation and Feature Selection (Extracting meaning from Data)	8
7.	Recommendation Systems: Building a User-Facing Data Product	8
8.	Mining Social-Network Graphs	3
9.	Data Visualization	8
10.	Data Science and Ethical Issues	8
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Theory Assignment **(Written test)**	**2nd to 9th week**	5%
2.	Quizzes **(Written test)**	**3rd to 7th week**	15%
3.	Midterm Exam **(Written test)**	**11th week**	20%
4.	Labs **(Computer-based test)**	**13th week**	20%
5.	Final Examination **(Written test)**	**15th week**	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	Kotu, Vijay, and Deshpande, Bala. Data Science: Concepts and Practice. Netherlands, Elsevier Science, 2018.
Supportive References	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. V2.1, Cambridge University Press. 2014.
Electronic Materials	
Other Learning Materials	Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013. • Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. ISBN 0387952845. 2009.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms and laboratories**
Technology equipment (projector, smart board, software)	**projector, smart board and software**
Other equipment (depending on the nature of the specialty)	**Internet access**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students, Faculty, Program Leaders**	Direct
Effectiveness of Students assessment	**Program Leaders**	Direct and Indirect
Quality of learning resources	**Students, Faculty, Program Leaders**	Direct and Indirect
The extent to which CLOs have been achieved	**Program Leaders**	Direct
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	