



## Course Specifications (Postgraduate Degree)

<b>Course Title:</b>	<b>Statistics for Data Science</b>
<b>Course Code:</b>	<b>502PMDS-3</b>
<b>Program:</b>	<b>Professional Master of Data Science</b>
<b>Department:</b>	<b>Computer Science</b>
<b>College:</b>	<b>Computer Science and Information Systems</b>
<b>Institution:</b>	<b>Najran University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 3
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 1 <sup>th</sup> level/ 1 <sup>st</sup> year
<b>4. Pre-requisites for this course (if any):</b>
<b>5. Co-requisites for this course (if any):</b> NA

### 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	30
2	Laboratory/Studio	20
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>50</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>This course is designed to introduce students to the principles of statistical methods and procedures used for data analysis. It covers topics including data gathering, summarizing data using descriptive statistics, visualizing data, examining relationships between variables, probability, and hypothesis testing. At the end of the course, Students will complete a project to apply various concepts in the course using some statistical programming tools which involve real scenario to demonstrate an understanding of the foundational statistical thinking and reasoning.</p>
<p><b>2. Course Main Objective</b></p> <ul style="list-style-type: none"> <li>To introduce Students to concepts, methods, and best practices in statistical analysis</li> <li>To introduce the concept of hypothesis testing and to extract quantified factors from real dataset.</li> </ul>

- To provide students with the knowledge on building predictive models and perform exploratory analysis.
- To gain knowledge in some statistical tools including R to explore and analyze data
- To properly tune, select, validate statistical learning models, and interpret their results.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge</b>	
1.1	Describe the concepts and methods of mathematical modeling and apply it to data analytics and statistical analysis	K1
1.2	Explain the statistical concepts of data analysis, data collection, modeling, and inference	K1, K2
1.3	Illustrate how to formulate a problem from a real data and propose a solution	K1
1...		
<b>2</b>	<b>Skills</b>	
2.1	Employ statistical problem-solving skills to a real problem, including defining clear requirements, probability distribution, and model fit	S1, S2
2.2	Visualize, curate, and prepare data for use with a variety of statistical methods and models	S3
2.3	Recognize how the quality of the data and the means of data collection and preprocessing may affect conclusions	S2
2.4	Use statistical software packages to formulate problems, identify and gather relevant existing data, and analyze the data to provide insights	S2
2.5		
<b>3</b>	<b>Competences:</b>	
3.1		
3.2		
3.3		
3...		

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction	3
2	Statistical Learning	3
3	Introduction to R	3
4	Descriptive Statistics	3
5	Probability	3
5	Random variables and Probability Distributions	3
6	Hypothesis Testing	4
7	Models Building and Interpretations	4
8	Linear Regression	4
9	Classification	4
10	Resampling Methods	4
11	Linear Model Selection	4

12	Non-Linear Modeling	4
14	Unsupervised Learning	4
<b>Total</b>		<b>50</b>

## D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Understand concepts and methods of mathematical modeling and apply it to data analytics and statistical analysis	TS-1: Relate Course Learning Outcomes (CLOs) to the topics TS-2: Giving Lectures in PPT, recalling the lecture through asking Questions. Clarifying doubts on Lecture. TS-3: Conducting a discussion of real life problems, among teacher, students.  The course will be taught in a combined form of seminars and lab sessions. Readings will be assigned every week and students are expected to participate in discussion during the seminars. Students are also expected to participate in lab sessions and complete lab exercises on computers.	Quiz Assignments Midterm Examination Final Examination
1.2	Understand statistical concepts of data analysis, data collection, modeling, and inference		
1.3	Understand how to formulate a problem from a real data and propose a solution		
...			
<b>2.0</b>	<b>Skills</b>		
2.1	Employ statistical problem-solving skills to a real problem, including defining clear, requirements, probability distribution, and model fit	TS-1: Relate Course Learning Outcomes (CLOs) to the topics TS-2: Giving Lectures in PPT, recalling the lecture through asking Questions. Clarifying doubts on Lecture. TS-3: Conducting a discussion of real life problems, among teacher, students	Quiz Assignments Midterm Examination Final Examination,
2.2	Visualize, curate, and prepare data for use with a variety of statistical methods and models		Quiz, Assignments Final Examination
2.3	Recognize how the quality of the data and the means of data collection and preprocessing may affect conclusions		Quiz Assignments Final Examination
2.4	Use statistical software packages to formulate problems, identify and		Lab Assignments, Midterm Examination,

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	gather relevant existing data, and analyze the data to provide insights	TS-4: Cooperative learning among the students. Encourage students to browse different journals, seminars or websites at their leisure time to have a better understanding about the course. The course will be taught in a combined form of seminars and lab sessions. Readings will be assigned every week and students are expected to participate in discussion during the seminars. Students are also expected to participate in lab sessions and complete lab exercises on computers.	Final Examination
2.5			
<b>3.0</b>	<b>Competences</b>		
3.1			
3.2			
...			

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz1	3 <sup>rd</sup> week	5%
2	Midterm	6 <sup>th</sup> week	20%
3	Project	5 <sup>th</sup> week	10%
4	Theory Assignments	2 <sup>th</sup> , 5 <sup>th</sup> , 8 <sup>th</sup> , 10 <sup>th</sup> weeks	10%
5	Lab Assignments	7 <sup>th</sup> week	10%
6	Quiz2	10 <sup>th</sup> week	5%
8	Final Exam	12 <sup>th</sup> or 13 <sup>th</sup> 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.
- Tutorials are also provided to the students

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	An Introduction to Statistical Learning (with Applications in R), Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, (2014), Springer; Probability & Statistics for Engineers & Scientists, 8th Edition, Ronald Walpole, Raymond Myers, Sharon Myers, Keying Ye, Person Education International, ISBN: 9780132047678.
<b>Essential References Materials</b>	Introductory Statistics with R, Peter Dalgaard, (2008), Springer
<b>Electronic Materials</b>	
<b>Other Learning Materials</b>	Applied Predictive Modeling, Max Kuhn, Kjell Johnson, (2013), Springer

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Room B-58 Laboratory A-16L
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Data show, PCs.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<ul style="list-style-type: none"> <li>• Printer is important in the lab to print reports and some snapshots.</li> <li>• Projector and PC for the lab instructor is required</li> </ul>

## 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

Evaluation Areas/Issues	Evaluators	Evaluation Methods

**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

<b>Council / Committee</b>	Computer Science Departmental Council
<b>Reference No.</b>	14440203-0185-00002
<b>Date</b>	1st Sep, 2022