COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: MATHEMATICS FOR DATA SCIENCE

COURSE CODE: MDS20103

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Construct mathematical arguments that relate to the study of introductory linear algebra.	III (APPLY)
CO2	**CO2:** Analyze finite and infinite dimensional vector spaces and subspaces over a field and their properties, including the basis structure of vector spaces.	IV (ANALYZING)
CO3	**CO3:** Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism.	III (APPLY)
CO4	**CO4:** Explain orthogonality on vector spaces and compute inner products and, including GramSchmidt orthogonalization	II (UNDERSTAND)
CO5	**CO5:** Demonstrate knowledge and understanding of topics including, divisibility, prime numbers, congruence, Diophantine equations.	II (UNDERSTAND)

Table 1: CO, PO, PSO MAPPING

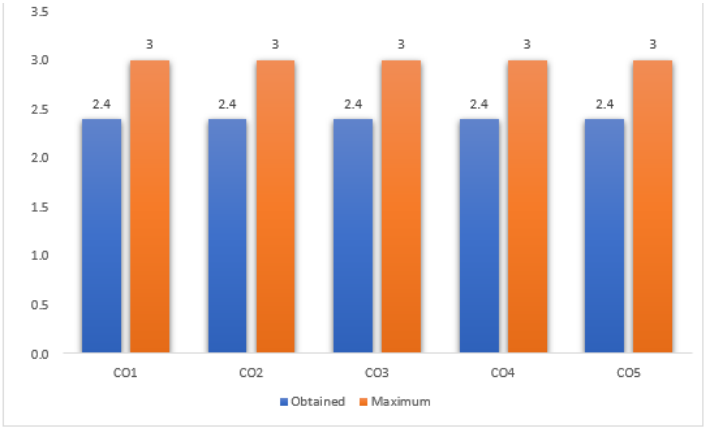
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	S
3	S	H	H	H					H	H	H	H	S
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	H

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	94.3	3.0			100.0	3.0	100.0	3.0	100.0	3.0	88.6	3.0	3.0	82.9	2.0	2.0	2.4
CO2	94.3	3.0			100.0	3.0			100.0	3.0	88.6	3.0	3.0	82.9	2.0	2.0	2.4
CO3	94.3	3.0	88.6	3.0	100.0	3.0			100.0	3.0	88.6	3.0	3.0	82.9	2.0	2.0	2.4
CO4			88.6	3.0	100.0	3.0			100.0	3.0	88.6	3.0	3.0	82.9	2.0	2.0	2.4
CO5			88.6	3.0	100.0	3.0			100.0	3.0	88.6	3.0	3.0	82.9	2.0	2.0	2.4

AVERAGE	AVERAGE
2	2.4

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.4		H 2.4	H 2.4				
CO2	H 2.4	H 2.4		H 2.4				
CO3	H 2.4	H 2.4	H 2.4	H 2.4				
CO4	H 2.4	H 2.4	H 2.4	H 2.4				
CO5	H 2.4	H 2.4	H 2.4	H 2.4				
AVERAGE OF COS FOR POS	2.4	2.4	2.4	2.4				
AVERAGE OF POS	2.4	2.4	2.4	2.4				
AVERAGE	2.4							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: STATISTICS AND PROBABILITY

COURSE CODE: MDS20105

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** To examine different concepts of probability and apply them in real life application.	II (UNDERSTAND)
CO2	**CO2:** To make use of different concepts of random variables in understanding scope of different distributions.	II (UNDERSTAND)
CO3	**CO3:** To utilize different concepts of expectations in understanding the characteristics of distributions	V (EVALUATE)
CO4	**CO4:**To understand the relationships between different discrete distributions.	II (UNDERSTAND)
CO5	**CO5:** To explain the different characteristics of continuous distributions and understand which one to use for different cases..	V (EVALUATE)

Table 1: CO, PO, PSO MAPPING

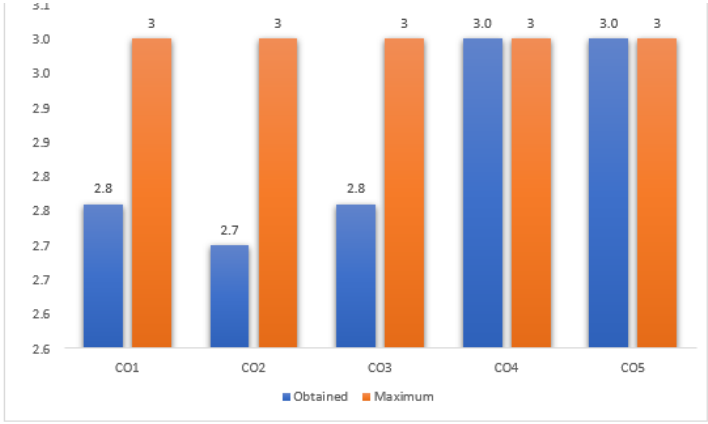
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PS05
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	S	H	H					H	H	H	H	S
4	H	H	H	H					H	H	H	S	S
5	H	H	H	H					S	H	H	H	H

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	57.1	0.0			100.0	3.0	100.0	3.0	100.0	3.0	85.7	3.0	2.4	97.1	3.0	3.0	2.8
CO2	57.1	0.0			100.0	3.0			100.0	3.0	85.7	3.0	2.3	97.1	3.0	3.0	2.7
CO3	57.1	0.0	94.3	3.0	100.0	3.0			100.0	3.0	85.7	3.0	2.4	97.1	3.0	3.0	2.8
CO4			94.3	3.0	100.0	3.0			100.0	3.0	85.7	3.0	3.0	97.1	3.0	3.0	3.0
CO5			94.3	3.0	100.0	3.0			100.0	3.0	85.7	3.0	3.0	97.1	3.0	3.0	3.0

AVERAGE	AVERAGE
3	2.844

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 3	H 3	H 3	H 3				
CO5	H 3	H 3	H 3	H 3				
AVERAGE OF COS FOR POS	2.844	2.865	2.88	2.844				
AVERAGE OF POS	2.8608	2.865	2.91	2.8608				
AVERAGE	2.87415							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: ARTIFICIAL INTELLIGENCE

COURSE CODE: MDS22104

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective learning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify, analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Defines Artificial Intelligence, Agents and Problem-Solving Agent	I (REMEMBERING)
CO2	**CO2:** Explains about Knowledge Representation, Forward and Backward Chaining.	III (UNDERSTAND)
CO3	**CO3:** : Differentiate between various Searching Techniques	IV (ANALYZE)
CO4	**CO4:** Apply various game playing Techniques	III (APPLY)
CO5	**CO5:** Explain about Heuristic, Forward and Backward state space search	II (UNDERSTAND)

Table 1: CO, PO, PSO MAPPING

Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	S
3	S	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	S

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
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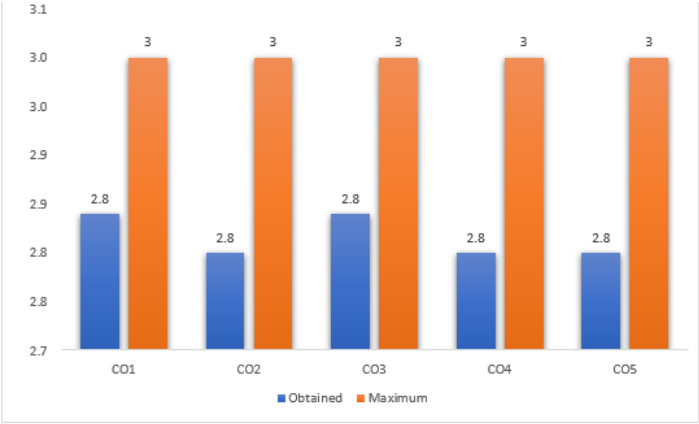

co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	65.7	1.0	2.6	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	65.7	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	65.7	1.0	2.6	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	65.7	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	65.7	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

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3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84	H 2.84				
CO2	H 2.8	H 2.8		H 2.8				
CO3	H 2.84	H 2.84	H 2.84	H 2.84				
CO4	H 2.8	H 2.8	H 2.8	H 2.8				
CO5	H 2.8	H 2.8	H 2.8	H 2.8				
AVERAGE OF COS FOR POS	2.816	2.81	2.82	2.816				
AVERAGE OF POS	2.8112	2.81	2.815	2.8112				
AVERAGE	2.81185							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: ADVANCED DATABASES

COURSE CODE: MDS20107

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

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PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1: Design a data base for a system using E-R data model and Relational Data model**	VI (CREATING)
CO2	**CO2: Design logical database with all integrity constraints over relations.**	VI (CREATING))
CO3	**CO3: Apply normalization steps in database design and removal of data anomalies**	III (APPLYING)
CO4	**CO4: Extend the characteristics of database transactions.**	II (UNDERSTAND)
CO5	**CO5: Distinguish the different types of NoSQL databases**	IV (ANALYZING)

Table 1: CO, PO, PSO MAPPING

Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
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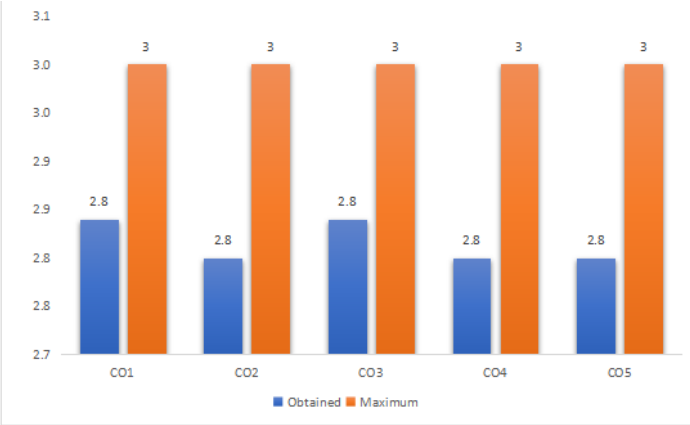

co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	68.6	1.0	2.6	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	68.6	1.0	2.5	100.0	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.6	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.5	100.0	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.5	100.0	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

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OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
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CO3	H 2.84	H 2.84	H 2.84	H 2.84				
CO4	H 2.8	H 2.8	H 2.8	H 2.8				
CO5	H 2.8	H 2.8	H 2.8	H 2.8				
AVERAGE OF COS FOR POS	2.816	2.81	2.82	2.816				
AVERAGE OF POS	2.8112	2.81	2.815	2.8112				
AVERAGE	2.81185							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: PYTHON FOR DATA SCIENCE

COURSE CODE: MDS22106

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

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PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1: Apply the concept of objects, variables, control structures, and numbers**	II (UNDERSTAND)
CO2	**CO2: Apply the concept of data structures for python.**	III (APPLY)
CO3	**CO3: Explain Functions, Modules, and Packages.**	V (EVALUATE)
CO4	**CO4: Explain Files, Exceptions and OOPs concepts**	II (UNDERSTAND)
CO5	**CO5: Apply the concepts of GUI programming**	III (APPLY)

Table 1: CO, PO, PSO MAPPING

Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
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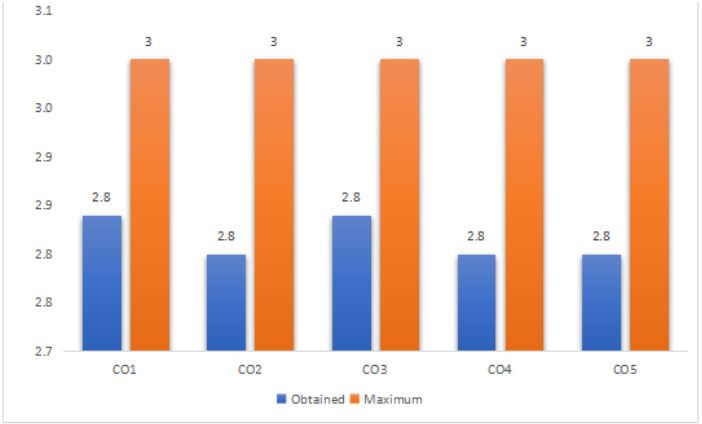

co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
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CO2	100.0	3.0			100.0	3.0			100.0	3.0	68.6	1.0	2.5	97.1	3.0	3.0	2.8
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.6	97.1	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.5	97.1	3.0	3.0	2.8
CO5			100.0	3.0	100.0	3.0			100.0	3.0	68.6	1.0	2.5	97.1	3.0	3.0	2.8

AVERAGE	AVERAGE
3	2.816

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.84		H 2.84	H 2.84				
CO2	H 2.8	H 2.8		H 2.8				
CO3	H 2.84	H 2.84	H 2.84	H 2.84				
CO4	H 2.8	H 2.8	H 2.8	H 2.8				
CO5	H 2.8	H 2.8	H 2.8	H 2.8				
AVERAGE OF COS FOR POS	2.816	2.81	2.82	2.816				
AVERAGE OF POS	2.8112	2.81	2.815	2.8112				
AVERAGE	2.81185							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: COMMUNICATIVE COMPETENCE

HADOOPCOURSE CODE: MDS20101

CREDITS: 2

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL

CO1	**Student can apply the knowledge of communicative competence to express the ideas clearly**	III(APPLYING)

Table 1: CO, PO, PSO MAPPING

Course outcomes	**Programme Outcomes**								**Program Specific outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**P08**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	
1	**H**	**S**	**H**	**H**					**H**	**S**	**S**	**S**	

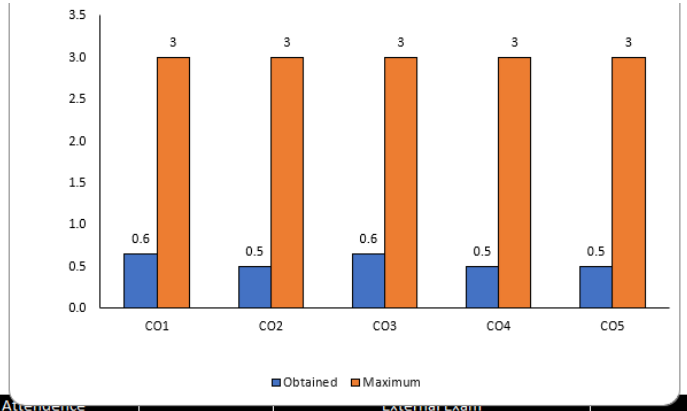
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendance			External Exam			
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment level	co wise internal	pass%	Attainment	co wise external	co wise total
CO1	100.0	3.0			0.0	0.0	100.0	3.0	0.0	0.0	82.9	2.0	1.6	0.0	0.0	0.0	0.6
CO2	100.0	3.0			0.0	0.0			0.0	0.0	82.9	2.0	1.3	0.0	0.0	0.0	0.5
CO3	100.0	3.0	91.4	3.0	0.0	0.0			0.0	0.0	82.9	2.0	1.6	0.0	0.0	0.0	0.6
CO4			91.4	3.0	0.0	0.0			0.0	0.0	82.9	2.0	1.3	0.0	0.0	0.0	0.5
CO5			91.4	3.0	0.0	0.0			0.0	0.0	82.9	2.0	1.3	0.0	0.0	0.0	0.5

AVERAGE	AVERAGE
0	0.556

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 0.64		H 0.64	H 0.64				
CO2	H 0.5	H 0.5		H 0.5				
CO3	H 0.64	H 0.64	H 0.64	H 0.64				
CO4	H 0.5	H 0.5	H 0.5	H 0.5				
CO5	H 0.5	H 0.5	H 0.5	H 0.5				
AVERAGE OF COS FOR POS	0.556	0.535	0.57	0.556				
AVERAGE OF POS	0.5392	0.535	0.5525	0.5392				
AVERAGE	0.541475							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE CODE: MDS20201

CREDITS:2

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1		II (UNDERSTAND)
CO2		IV (ANALYZING)
CO3		II (UNDERSTAND)
CO4		II (UNDERSTAND)
CO5		IV (ANALYZING)

Table 1: CO, PO, PSO MAPPING

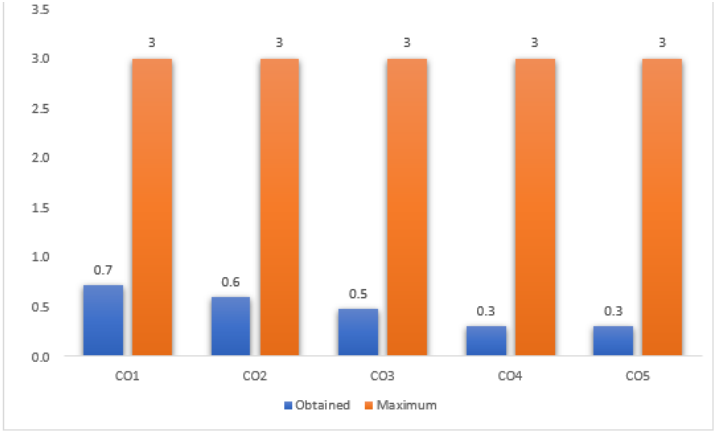
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	S

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			0.0	0.0	100.0	3.0	100.0	3.0	50.0	0.0	1.8	0.0	0.0	0.0	0.7
CO2	100.0	3.0			0.0	0.0			100.0	3.0	50.0	0.0	1.5	0.0	0.0	0.0	0.6
CO3	100.0	3.0	0.0	0.0	0.0	0.0			100.0	3.0	50.0	0.0	1.2	0.0	0.0	0.0	0.5
CO4			0.0	0.0	0.0	0.0			100.0	3.0	50.0	0.0	0.8	0.0	0.0	0.0	0.3
CO5			0.0	0.0	0.0	0.0			100.0	3.0	50.0	0.0	0.8	0.0	0.0	0.0	0.3

AVERAGE	AVERAGE
0	0.48

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 0.72		H 0.72	H 0.72				
CO2	H 0.6	H 0.6		H 0.6				
CO3	H 0.48	H 0.48	H 0.48	H 0.48				
CO4	H 0.3	H 0.3	H 0.3	H 0.3				
CO5	H 0.3	H 0.3	H 0.3	H 0.3				
AVERAGE OF COS FOR POS	0.48	0.42	0.45	0.48				
AVERAGE OF POS	0.432	0.42	0.3825	0.432				
AVERAGE	0.416625							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: MULTIVARIATE ANALYSIS AND STOCHASTIC PROCESS

COURSE CODE: MDS22203

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Understand the basic concepts of multivariate distributions.	II (UNDERSTAND)
CO2	**CO2:** : Summarize and interpret MANOVA techniques.	II (UNDERSTAND)
CO3	**CO3:** Understand the principles and characteristics of the multivariate data analysis techniques.	II (UNDERSTAND)
CO4	**CO4:** Describe a Markov chain and its transition matrix.	V (EVALUATE)
CO5	**CO5:** Determine the stationary distributions of a Markov chain.	V (EVALUATE)

Table 1: CO, PO, PSO MAPPING

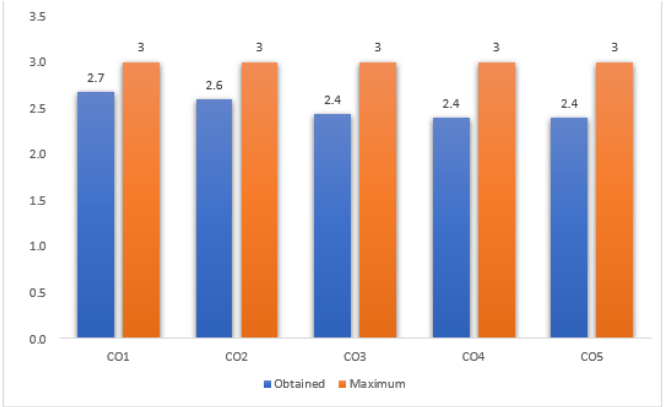
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PS05
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	S	H	H					H	H	H	H	S
4	H	H	H	H					H	H	H	S	S
5	H	H	H	H					S	H	H	H	H

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	77.8	2.0			100.0	3.0	100.0	3.0	100.0	3.0	58.3	0.0	2.2	91.7	3.0	3.0	2.7
CO2	77.8	2.0			100.0	3.0			100.0	3.0	58.3	0.0	2.0	91.7	3.0	3.0	2.6
CO3	77.8	2.0	55.6	0.0	100.0	3.0			100.0	3.0	58.3	0.0	1.6	91.7	3.0	3.0	2.4
CO4			55.6	0.0	100.0	3.0			100.0	3.0	58.3	0.0	1.5	91.7	3.0	3.0	2.4
CO5			55.6	0.0	100.0	3.0			100.0	3.0	58.3	0.0	1.5	91.7	3.0	3.0	2.4

AVERAGE	AVERAGE
3	2.504

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.68		H 2.68					
CO2	H 2.6	H 2.6	H 2.6	H 2.6				
CO3	H 2.44	H 2.44	H 2.44	H 2.44				
CO4	H 2.4	H 2.4	H 2.4	H 2.4				
CO5	H 2.4	H 2.4	H 2.4	H 2.4				
AVERAGE OF COS FOR POS	2.504	2.46	2.504	2.46				
AVERAGE OF POS	2.4688	2.46	2.4688	2.46				
AVERAGE	2.4644							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: REGRESSION ANALYSIS AND INFERENTIAL STATISTICS

COURSE CODE: MDS20205

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: To explain the concepts of estimation and testing of hypothesis which used for drawing the statistical inference.	II (UNDERSTAND)
CO2	CO2: To apply the idea of sampling distributions of different statistics in testing of hypothesis.	III (APPLY)
CO3	CO3: To develop a deeper understanding of simple linear regression and test for the quality of its fit.	VI (CREATING)
CO4	CO4: Interpret multiple linear regression model parameters and to understand the model selection	II (UNDERSTAND)
CO5	CO5: To estimate the effect of outliers and to understand the concepts of non-linear regression	V (EVALUATING)

Table 1: CO, PO, PSO MAPPING

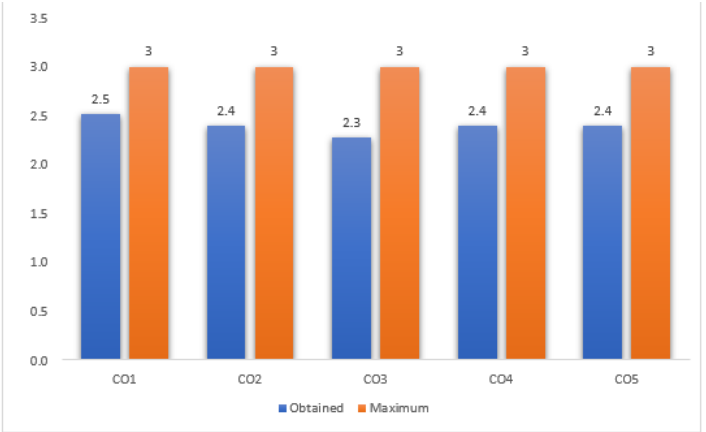
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	S

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	61.1	0.0			100.0	3.0	100.0	3.0	100.0	3.0	36.1	0.0	1.8	97.2	3.0	3.0	2.5
CO2	61.1	0.0			100.0	3.0			100.0	3.0	36.1	0.0	1.5	97.2	3.0	3.0	2.4
CO3	61.1	0.0	63.9	0.0	100.0	3.0			100.0	3.0	36.1	0.0	1.2	97.2	3.0	3.0	2.3
CO4			63.9	0.0	100.0	3.0			100.0	3.0	36.1	0.0	1.5	97.2	3.0	3.0	2.4
CO5			63.9	0.0	100.0	3.0			100.0	3.0	36.1	0.0	1.5	97.2	3.0	3.0	2.4

AVERAGE	AVERAGE
3	2.4

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.52		H 2.52	H 2.52				
CO2	H 2.4	H 2.4		H 2.4				
CO3	H 2.28	H 2.28	H 2.28	H 2.28				
CO4	H 2.4	H 2.4	H 2.4	H 2.4				
CO5	H 2.4	H 2.4	H 2.4	H 2.4				
AVERAGE OF COS FOR POS	2.4	2.37	2.4	2.4				
AVERAGE OF POS	2.376	2.37	2.37	2.376				
AVERAGE	2.373							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: MACHINE LEARNING
COURSE CODE: MDS22207

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):
PROGRAM OBJECTIVES (POs)
PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.
PO2: Identify the need and scope of the Inter disciplinary area.
PO3: Understand the professional, ethical, and social responsibilities.
PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:
PROGRAM SPECIFIC OUTCOMES (PSOs)
PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.
PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.
PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.
PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.
PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Define data and preprocessing problem.	I(REMEMBERING)
CO2	CO2: Describe machine learning concepts	IV (ANALYZING)
CO3	CO3: Illustrate regression tasks	II (UNDERSTAND)
CO4	CO4: Illustrate classification tasks	II (UNDERSTAND)
CO5	CO5: Explain unsupervised learning concepts	II(UNDERSTAND)

Table 1: CO, PO, PSO MAPPING

Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H

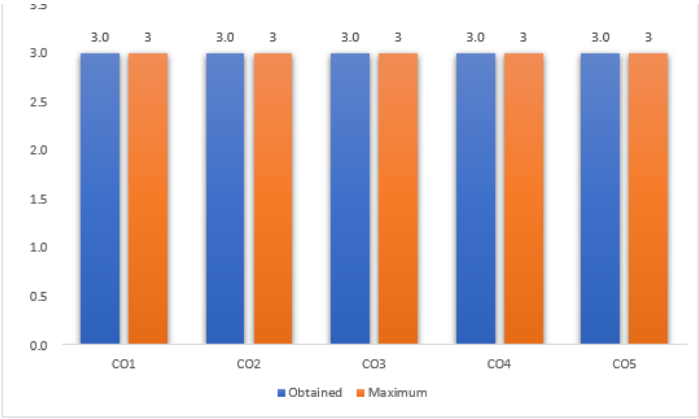
5	H	H	H	H					S	H	H	H	S

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	97.2	3.0			100.0	3.0	100.0	3.0	94.4	3.0	94.4	3.0	3.0	97.2	3.0	3.0	3.0
CO2	97.2	3.0			100.0	3.0			94.4	3.0	94.4	3.0	3.0	97.2	3.0	3.0	3.0
CO3	97.2	3.0	94.4	3.0	100.0	3.0			94.4	3.0	94.4	3.0	3.0	97.2	3.0	3.0	3.0
CO4			94.4	3.0	100.0	3.0			94.4	3.0	94.4	3.0	3.0	97.2	3.0	3.0	3.0
CO5			94.4	3.0	100.0	3.0			94.4	3.0	94.4	3.0	3.0	97.2	3.0	3.0	3.0

AVERAGE	AVERAGE
3	3

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 3		H 3	H 3				
CO2	H 3	H 3		H 3				
CO3	H 3	H 3	H 3	H 3				
CO4	H 3	H 3	H 3	H 3				
CO5	H 3	H 3	H 3	H 3				
AVERAGE OF COS FOR POS	3	3	3	3				
AVERAGE OF POS	3	3	3	3				
AVERAGE	3							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: BIG DATA ANALYTICS THROUGH HADOOP **COURSE CODE: MDS22206** **CREDITS: 4**
DEPARTMENT: M.Sc. DATA SCIENCE
PROGRAMME OUTCOMES Or POS(MDS): **PROGRAM OBJECTIVES (POs)** **PO1:** Engage in continuous reflective leaning in the context of technology and scientific advancement. **PO2:** Identify the need and scope of the Inter disciplinary area. **PO3:** Understand the professional, ethical, and social responsibilities. **PO4:** Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL

CO1	CO1: Able to understand the Big Data concepts in real time scenario	II (UNDERSTAND)
CO2	CO2: Understand the architecture of Hadoop and apply map reduce concepts.	IV (ANALYZING)
CO3	CO3: Understanding Hadoop YARN Architecture	II (UNDERSTAND)
CO4	CO4: Understand and exploring HIVE.	II (UNDERSTAND)
CO5	COS: Analyzing Data with PIG	IV (ANALYZING)

Table 1: CO, PO, PSO MAPPING

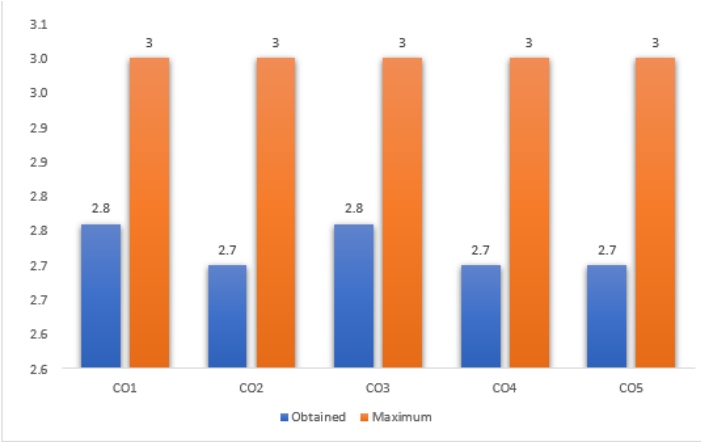
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	H
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	S

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	97.2	3.0			100.0	3.0	100.0	3.0	100.0	3.0	61.1	0.0	2.4	100.0	3.0	3.0	2.8
CO2	97.2	3.0			100.0	3.0			100.0	3.0	61.1	0.0	2.3	100.0	3.0	3.0	2.7
CO3	97.2	3.0	100.0	3.0	100.0	3.0			100.0	3.0	61.1	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	61.1	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	61.1	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: **(Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)**

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: SOCIAL MEDIA ANALYTICS

COURSE CODE: MDS22204B

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Identify various platforms in social media	III (APPLYING)
CO2	**CO2:** Understand processing of social media	II(UNDERSTANDING)
CO3	**CO3:** Compare differences between twitter and other social media networks	IV(ANALYZING)
CO4	**CO4:** Analyze Facebook information and write business cases.	IV (ANALYZING)
CO5	**CO5:** Differentiate social media networks Instagram(i.e.,usage of Instagram and data processing techniques also they will get idea)	IV (ANALYZING)

Table 1: CO, PO, PSO MAPPING

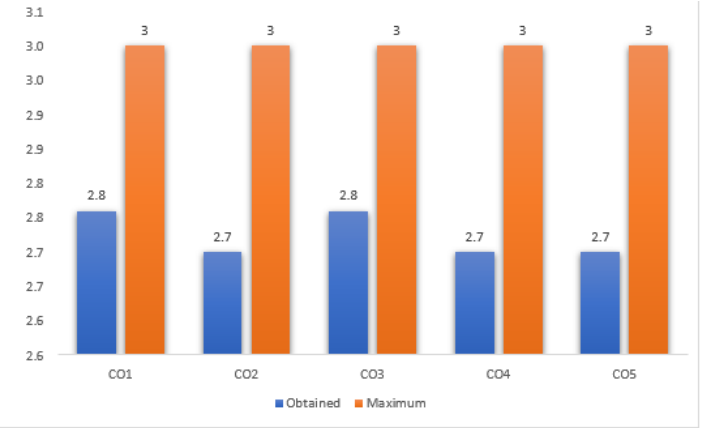
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PSO5
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	S
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	S
5	H	H	H	H					S	H	H	H	H

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	37.5	0.0	2.4	91.7	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	37.5	0.0	2.3	91.7	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	37.5	0.0	2.4	91.7	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	37.5	0.0	2.3	91.7	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	37.5	0.0	2.3	91.7	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	0							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE:CLOUD COMPUTING

COURSE CODE: MDS22204A

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	CO1: Illustrate the main concepts, features, challenges, and risks in cloud computing.	II (UNDERSTAND)
CO2	CO2: Describe virtualization of clusters and Data centers, virtual clusters, and resource management	III (APPLY)
CO3	CO3: Identify the architectures over virtualized data centers	II (APPLY)
CO4	CO3: Identify the architectures over virtualized data centers	II (APPLY)
CO5	CO5: Compare various cloud programming and software environments.	IV(ANALYZING)

Table 1: CO, PO, PSO MAPPING

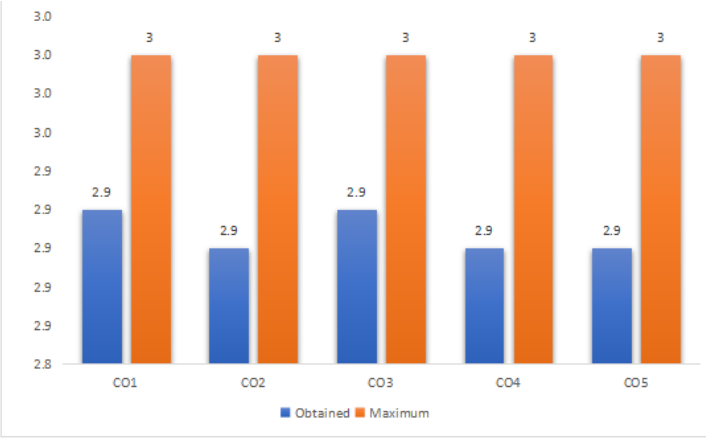
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	PS05
1	H	S	H	H					H	S	S	S	H
2	H	H	S	H					H	S	S	S	S
3	H	H	H	H					H	H	H	H	H
4	H	H	H	H					H	H	H	S	H
5	H	H	H	H					S	H	H	H	H

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	83.3	2.0	2.8	91.7	3.0	3.0	2.9
CO2	100.0	3.0			100.0	3.0			100.0	3.0	83.3	2.0	2.8	91.7	3.0	3.0	2.9
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	83.3	2.0	2.8	91.7	3.0	3.0	2.9
CO4			100.0	3.0	100.0	3.0			100.0	3.0	83.3	2.0	2.8	91.7	3.0	3.0	2.9
CO5			100.0	3.0	100.0	3.0			100.0	3.0	83.3	2.0	2.8	91.7	3.0	3.0	2.9

AVERAGE	AVERAGE
3	2.908

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.92		H 2.92	H 2.92				
CO2	H 2.9	H 2.9		H 2.9				
CO3	H 2.92	H 2.92	H 2.92	H 2.92				
CO4	H 2.9	H 2.9	H 2.9	H 2.9				
CO5	H 2.9	H 2.9	H 2.9	H 2.9				
AVERAGE OF COS FOR POS	2.908	2.905	2.91	2.908				
AVERAGE OF POS	2.9056	2.905	2.9075	2.9056				
AVERAGE	2.905925							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: Time Series & Forecasting Techniques

COURSE CODE: MDS21303

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL

CO1	Identifying linear, quadratic, Gompertz and Logistic models where appropriate and describe models for seasonal variation. Also explains the methods used to study cyclic components.	II (UNDERSTAND)
CO2	Estimate seasonal effects of time-series data by using Winten's method, Brown's, Box Jenkin's three-parameter exponential smoothing method.	II (UNDERSTAND)
CO3	To utilize AR, ARIMA models for time series data and to forecast the data using these models.	III (APPLY)
CO4	To interpret SARIMA model and criterion used to study them.	IV (ANALYZING)
CO5	To explain and verify mathematical considerations for analysing time series, including concepts of stationarity, autocovariance, autocorrelation	V (EVALUATING)

Table 1: CO, PO, PSO MAPPING

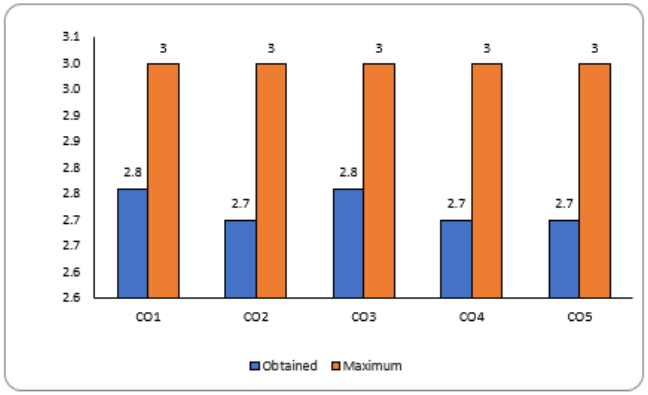
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	co wise	pass%	Attainment	co wise external	co wise total
CO1	86.1	3.0			100.0	3.0	100.0	3.0	100.0	3.0	38.9	0.0	2.4	97.2	3.0	3.0	2.8
CO2	86.1	3.0			100.0	3.0			100.0	3.0	38.9	0.0	2.3	97.2	3.0	3.0	2.7
CO3	86.1	3.0	91.7	3.0	100.0	3.0			100.0	3.0	38.9	0.0	2.4	97.2	3.0	3.0	2.8
CO4			91.7	3.0	100.0	3.0			100.0	3.0	38.9	0.0	2.3	97.2	3.0	3.0	2.7
CO5			91.7	3.0	100.0	3.0			100.0	3.0	38.9	0.0	2.3	97.2	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76					
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.715				
AVERAGE OF POS	2.7168	2.715	2.7225	2.715				
AVERAGE	2.717325							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: DEEP LEARNING

COURSE CODE: MDS23306

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Learn the fundamental principles of deep learning.	II (UNDERSTAND)
CO2	**CO2:** Identify the deep learning algorithms for various types of learning tasks in various domains.	III (APPLY)
CO3	**CO3:** To explore Deep learning techniques and various feature extraction strategies.	V (EVALUATE)
CO4	**CO4:** To mathematically understand the deep learning approaches and paradigms.	II (UNDERSTAND)
CO5	**CO5:** Implement deep learning algorithms and solve real-world problems	III (APPLY)

Table 1: CO, PO, PSO MAPPING

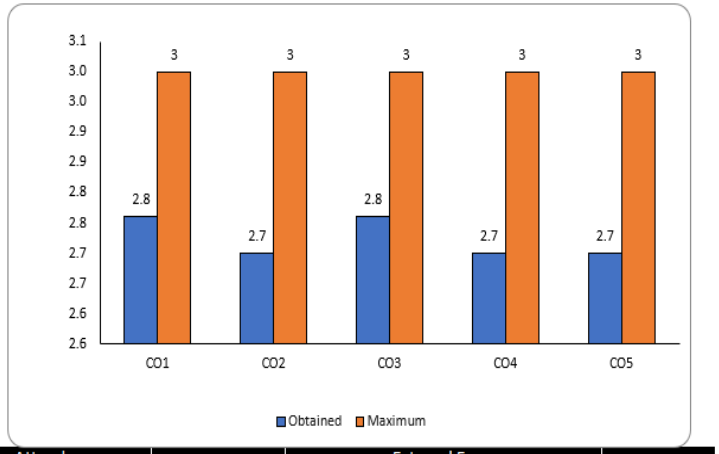
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	co wise internal	pass%	Attainment	co wise external	co wise total
CO1	100.0	3.0			100.0	3.0	100.0	3.0	97.2	3.0	50.0	0.0	2.4	97.2	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			97.2	3.0	50.0	0.0	2.3	97.2	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			97.2	3.0	50.0	0.0	2.4	97.2	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			97.2	3.0	50.0	0.0	2.3	97.2	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			97.2	3.0	50.0	0.0	2.3	97.2	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: NATURAL LANGUAGE PROCESSING

COURSE CODE: MDS21307

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Understand various approaches on syntax and semantics in NLP.	II (UNDERSTAND)
CO2	**CO2:** Apply various methods to discourse, generation, dialogue and summarization using NLP.	III (APPLY)
CO3	**CO3:** Analyze various methodologies used in Machine Translation, machine leaming techniques used in NLP including unsupervised models and to analyze real time applications.	IV (ANALYZING)

Table 1: CO, PO, PSO MAPPING

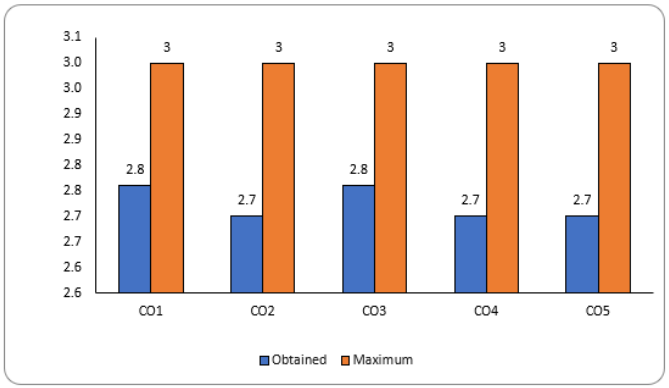
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	pass%	Attainment	co wise internal	pass%	Attainment	co wise external	co wise total
CO1	86.1	3.0			100.0	3.0	100.0	3.0	91.7	3.0	44.4	0.0	2.4	97.2	3.0	3.0	2.8
CO2	86.1	3.0			100.0	3.0			91.7	3.0	44.4	0.0	2.3	97.2	3.0	3.0	2.7
CO3	86.1	3.0	94.4	3.0	100.0	3.0			91.7	3.0	44.4	0.0	2.4	97.2	3.0	3.0	2.8
CO4			94.4	3.0	100.0	3.0			91.7	3.0	44.4	0.0	2.3	97.2	3.0	3.0	2.7
CO5			94.4	3.0	100.0	3.0			91.7	3.0	44.4	0.0	2.3	97.2	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: INTERNET OF THINGS

COURSE CODE: MDS21305

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Identify the importance of IOT and its applications.	II (UNDERSTAND)
CO2	**CO2:** Differentiate between IOT and M2M, SDN and NFV	II (UNDERSTAND)
CO3	**CO3:** Apply IOT design methodology.	III (APPLY)
CO4	**CO4:** Understand building of IOT devices and Raspberry PI**.**	IV (ANALYZING)
CO5	**CO5:** Explain working of application of IOT.	V (EVALUATING)

Table 1: CO, PO, PSO MAPPING

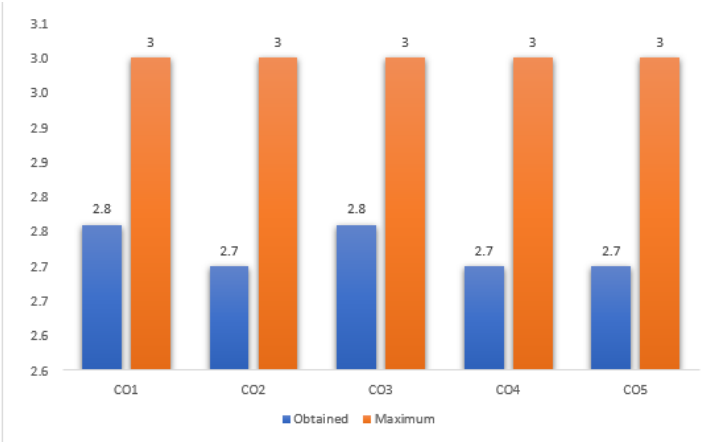
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	94.4	3.0			100.0	3.0	100.0	3.0	100.0	3.0	36.1	0.0	2.4	97.2	3.0	3.0	2.8
CO2	94.4	3.0			100.0	3.0			100.0	3.0	36.1	0.0	2.3	97.2	3.0	3.0	2.7
CO3	94.4	3.0	100.0	3.0	100.0	3.0			100.0	3.0	36.1	0.0	2.4	97.2	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	36.1	0.0	2.3	97.2	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	36.1	0.0	2.3	97.2	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: SCALABLE ARCHITECTURES FOR ML APPLICATIONS

COURSE CODE: MDS23304C

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Understand the basic concepts of Scalable Machine Leaming	II (UNDERSTAND)
CO2	**CO2:** To become a data scientist work in some development environment tailored for statistics and Machine Leaming	III (APPLY)
CO3	**CO3:** Obtain expertise to tum actionable insights and Fast Data Applications into innovative methods to solve real-world problems	III (APPLY)
CO4	**CO4:** Demonstrate the graph algorithms and live streaming data in Spark.	II (UNDERSTAND)
CO5	**CO5:** To impart knowledge on Kubemetes and batch processing	III (APPLY)

Table 1: CO, PO, PSO MAPPING

Course	Programme Outcomes	Program Specific outcomes

outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

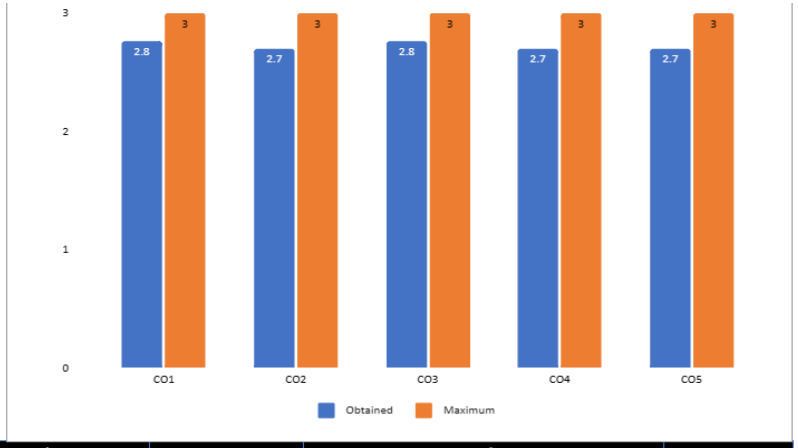
H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2

Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	55.6	0.0	2.4	100.0	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	55.6	0.0	2.3	100.0	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	55.6	0.0	2.4	100.0	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	55.6	0.0	2.3	100.0	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	55.6	0.0	2.3	100.0	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: REINFORCEMENT LEARNING

COURSE CODE: MDS23304B

CREDITS: 4

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):

PROGRAM OBJECTIVES (POs)

PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.

PO2: Identify the need and scope of the Inter disciplinary area.

PO3: Understand the professional, ethical, and social responsibilities.

PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.

PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.

PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.

PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.

PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO1	**CO1:** Understand basics of Monte-Carlo Method.	II (UNDERSTAND)
CO2	**CO2:** Understand RL model free methods.	II (UNDERSTAND)
CO3	**CO3:** Understand mathematical trick that improves the performance of Temporal Difference.	II (UNDERSTAND)
CO4	**CO4:** Acquire knowledge in finding the value of a state or an action when similar circumstances occur.	V(EVALUATING)
CO5	**CO5:** Analyze meaningful information from digital images, videos and other visual inputs.	IV(ANALYZING)

Table 1: CO, PO, PSO MAPPING

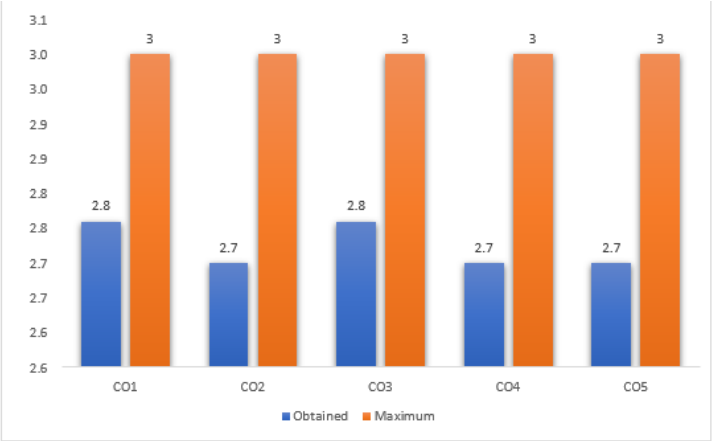
Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			100.0	3.0	100.0	3.0	100.0	3.0	33.3	0.0	2.4	94.4	3.0	3.0	2.8
CO2	100.0	3.0			100.0	3.0			100.0	3.0	33.3	0.0	2.3	94.4	3.0	3.0	2.7
CO3	100.0	3.0	100.0	3.0	100.0	3.0			100.0	3.0	33.3	0.0	2.4	94.4	3.0	3.0	2.8
CO4			100.0	3.0	100.0	3.0			100.0	3.0	33.3	0.0	2.3	94.4	3.0	3.0	2.7
CO5			100.0	3.0	100.0	3.0			100.0	3.0	33.3	0.0	2.3	94.4	3.0	3.0	2.7

AVERAGE	AVERAGE
3	2.724

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 2.76		H 2.76	H 2.76				
CO2	H 2.7	H 2.7		H 2.7				
CO3	H 2.76	H 2.76	H 2.76	H 2.76				
CO4	H 2.7	H 2.7	H 2.7	H 2.7				
CO5	H 2.7	H 2.7	H 2.7	H 2.7				
AVERAGE OF COS FOR POS	2.724	2.715	2.73	2.724				
AVERAGE OF POS	2.7168	2.715	2.7225	2.7168				
AVERAGE	2.717775							

COURSE OUTCOME MAPPING

MAPPING COURSE OUTCOMES LEADING TO THE ATTAINMENT OF PROGRAM OUTCOMES

COURSE TITLE: SOFT SKILLS

COURSE CODE: MDS21301

CREDITS: 2

DEPARTMENT: M.Sc. DATA SCIENCE

PROGRAMME OUTCOMES Or POS(MDS):
PROGRAM OBJECTIVES (POs)
PO1: Engage in continuous reflective leaning in the context of technology and scientific advancement.
PO2: Identify the need and scope of the Inter disciplinary area.
PO3: Understand the professional, ethical, and social responsibilities.
PO4: Enhance disciplinary competency, employability, and technical skills.

PROGRAMME SPECIFIC OUTCOME:
PROGRAM SPECIFIC OUTCOMES (PSOs)
PSO1: Abstract Thinking: Ability to understand the abstract concepts that lead to various data science theories in Mathematics, Statistics and Computer science.
PSO2: Problem Analysis and Design Ability: To identify analyse and design solutions for data science problems using fundamental principles of mathematics, Statistics, computing data sciences, and relevant domain disciplines.
PSO3: Modern software tool usage: Acquire the skills in handling data science programming tools towards problem solving and solution analysis for domain specific problems.
PSO4: Societal and Environmental Concern: Utilize the data science theories for societal and environmental concerns.
PSO5: Professional Ethics: Understand and commit to professional ethics and cyber regulation

	COURSE OUTCOMES	BLOOM'S TAXONOMY LEVEL
CO	**CO :** The student will be able to develop effective communication skills, presentation skills, inter-personal skills, team management skills, and leadership skills.	III(APPLYING)

Table 1: CO, PO, PSO MAPPING

Course outcomes	Programme Outcomes								Program Specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	P08	PSO1	PSO2	PSO3	PSO4	
1	H	S	H	H					H	S	S	S	
2	H	H	S	H					H	S	S	S	
3	H	H	H	H					H	H	H	H	
4	H	H	H	H					H	H	H	S	

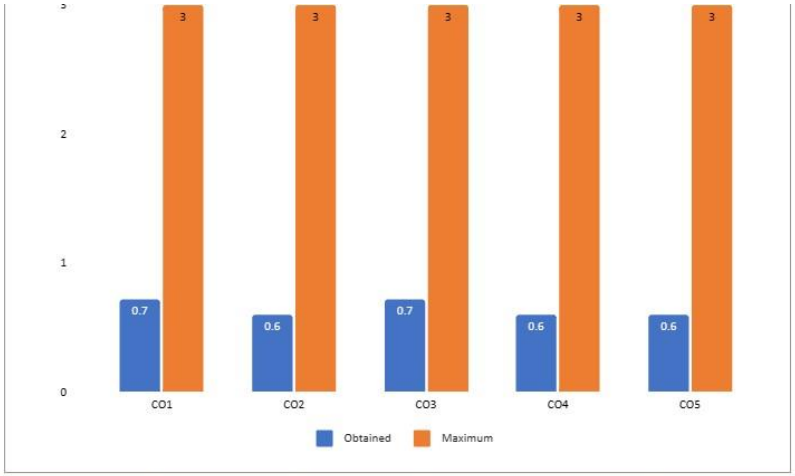
5	H	H	H	H					S	H	H	H	

H: Highly Supportive **S: Supportive**

Table 2: COURSE OUTCOME ATTAINMENT

ATTAINMENT SCALE:

Pass percent of 85% and above= 3
Pass percent between 75% - 85%= 2
Pass percent between 75%- 65%= 1
Pass percent of less than 65%= 0



co	mid exam 1		mid exam 2		group discussion		assignment		viva		Attendence			External Exam			
	pass%	Attainment level	pass %	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	pass%	Attainment level	co wise internal average	pass%	Attainment level	co wise external average	co wise total average
CO1	100.0	3.0			0.0	0.0	100.0	3.0	100.0	3.0	52.8	0.0	1.8	0.0	0.0	0.0	0.7
CO2	100.0	3.0			0.0	0.0			100.0	3.0	52.8	0.0	1.5	0.0	0.0	0.0	0.6
CO3	100.0	3.0	100.0	3.0	0.0	0.0			100.0	3.0	52.8	0.0	1.8	0.0	0.0	0.0	0.7
CO4			100.0	3.0	0.0	0.0			100.0	3.0	52.8	0.0	1.5	0.0	0.0	0.0	0.6
CO5			100.0	3.0	0.0	0.0			100.0	3.0	52.8	0.0	1.5	0.0	0.0	0.0	0.6

AVERAGE	AVERAGE
0	0.648

RESULT ANALYSIS: (Only write a comment on the total CO attainment for the course and areas of improvement, how less it is from 3, which exam are they losing marks in, how can we attain 3)

The total CO attainment of the course is satisfactory. Performance in the mid semester exam needs to improve to improve overall course outcome attainment level.

Table 3: PROGRAMME OUTCOME MAPPING

Instruction:

1. Copy the completed table 1.

2. Retain only the POs and the Highly supportive (H) points. [Delete the PSO columns and the 'S' points]

3. Write the respective CO-wise total average (column K in table 2) wherever each CO is mapped as (H) under each PO.]

OUTCOME	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H 0.72		H 0.72	H 0.72				
CO2	H 0.6	H 0.6		H 0.6				
CO3	H 0.72	H 0.72	H 0.72	H 0.72				
CO4	H 0.6	H 0.6	H 0.6	H 0.6				
CO5	H 0.6	H 0.6	H 0.6	H 0.6				
AVERAGE OF COS FOR POS	0.648	0.63	0.66	0.648				
AVERAGE OF POS	0.6336	0.63	0.645	0.6336				
AVERAGE	0.63555							