

Course Code	STA1MN111				
Course Title	Fundamentals of data analysis				
Type of Course	Minor				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Competence in basic algebraic concepts, knowledge of basic data visualization techniques.				
Course Summary	Provide students with a comprehensive understanding of different types of data, methods of data collection, frequency distributions, graphical representation techniques, measures of central tendency and dispersion, positional values, and utilization of statistical tools like R for data analysis.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Differentiate between quantitative and qualitative data and identify suitable methods for their collection and critically evaluate ethical implications of statistical methods aligning with human values.	U	C	Instructor-created exams / Quiz
CO2	Construct frequency distributions for both discrete and continuous variables.	U	c	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Calculate measures of central tendency including mean, median, mode, geometric mean, and harmonic mean and analyze data to help entrepreneurial decisions using critical thinking skills.	U	F	Seminar Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Understand what dispersion means in the context of statistics and why it matters.	U	C	Instructor-created exams / Home Assignments
CO5	Apply positional values such as quartiles, deciles, and percentiles to analyze data distribution.	Ap	F	One Minute Reflection Writing assignments/ Instructor-created exams
CO6	Utilize R as a calculator, statistical software, and programming language for data analysis.	Ap	P	Viva Voce/ Instructor-created exams
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)</p>				

Detailed Syllabus:

Module	Unit	Content	Hrs (45 +30)	Marks (70)
I	Introduction of data		9	15
	1	Types of data- Primary data, Secondary data, Quantitative data, Qualitative data, Discrete data, Continuous data	2	
	2	Frequency distributions for discrete and continuous variables- Cumulative frequency distribution	2	
	3	Histogram, Frequency Polygon	3	
	4	Frequency Curve, Ogives	2	
	Sections from References: Unit 1: 2.2-2.5 [Ref 3] Unit 2: 3.3 [Ref 3] Unit 3&4: 4.3-4.4 [Ref 3]			
II	Measures of central tendency		9	15
	5	Mean	2	
	6	Median, Mode	3	
	7	GM	2	
	8	HM	2	
	Sections from References: Unit 5: 2.5 [Ref 1] Unit 6: 2.6&2.7 [Ref 1] Unit 7: 2.8[Ref 1] Unit 8: 2.9[Ref 1]			
III	Measures of dispersion		19	25
	9	Positional values – Quartiles	2	
	10	Deciles	3	
	11	Percentiles	1	

	12	Range	1	
	13	Quartile deviation	2	
	14	Mean deviation	3	
	15	Standard deviation	3	
	16	Coefficient of variation	1	
	17	Coefficient of dispersion	3	
	Sections from References: Unit 9,10&11: 2.10,2.11[Ref 1] Unit 12,13,14&15: 2.12,2.13[Ref 1] Unit 16&17: 2.14[Ref 1]			
IV	Introduction to R programming		8	15
	18	Installation & Basic Mathematical Operations	2	
	19	R Preliminaries, Methods of Data Input	2	
	20	Graphical Representations (R Code)	2	
	21	Diagrammatic Representations (R Code)	1	
	22	Descriptive Measures (Mean, Median, Mode)	1	
	Sections from References: Unit 18&19: 1.2&1.3 [Ref 2] Unit 20: 1.4 [Ref 2] Unit 21: 1.5&1.6 [Ref 2] Unit 22: 1.8,2.3 [Ref 2]			
V	PRACTICUM		30	
	Do practice problems in R Software from any 5 units of the given list and one additional problem decided by the teacher-in-charge, related to the content of the course. Other units listed here may be used as demonstrations of the concepts taught in the course.			
	<ol style="list-style-type: none"> 1. Basic mathematical operations 2. Frequency distributions for organizing and summarizing data 3. Histogram 4. Frequency curve 			

		5. Pie diagram 6. Arithmetic mean 7. Median 8. Mode		
	Sections from References: Unit 1: 1.8 Ref[2] Unit 2: 1.9 Ref[2] Unit 3: 2.1 Ref[2] Unit 4: 2.2 Ref[2] Unit 5:2.2 Ref[2] Unit 6: 2.3 Ref[2] Unit 7: 2.3 Ref[2] Unit 8: 2.3 Ref[2]			
Books and References: 1. Gupta, S. C. and Kapoor, V. K. (2020). Fundamentals of Mathematical Statistics, 12 th edition, Sulthan Chand, New Delhi. 2. Sudha G Purohith, Sharad D Core, Shailaja R Deshmukh (2015), Statistics Using R. 3. Gupta, S. C.(2015). Fundamentals of Statistics, Himalaya Publishing House.				

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	-	-	-	-	-	2	-	-	-	-	-	2
CO 2	-	2	-	3	1	-	-	-	1	-	-	-
CO 3	-	-	2	-	-	1	-	-	2	-	3	-
CO 4	1	2	-	-	-	-	2	-	-	-	-	-

CO 5	-	-	-	-	-	2	-	3	-	-	-	-
CO 6	-	1	-	-	-	3	-	-	-	2	-	3

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4	✓	✓		✓
CO 5		✓		✓
CO 6	✓			