

Programme	B.Sc. Statistics
Course Code	STA2MN110 (P)
Course Title	Data analysis foundations in statistics
Type of Course	Minor
Semester	II
Academic	100-109

Level					
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Basic mathematical skills				
Course Summary	Equip students with the theoretical foundation and practical skills				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Demonstrate the components of a time series and distinguish between additive and multiplicative models, understanding their applications in time series analysis.	Ap	C	Instructor-created exams / Quiz
CO2	Demonstrate the concept and significance of index numbers, and apply different types of simple and weighted index numbers to analyze changes in economic variables over time and analyze data to help entrepreneurial decisions using critical thinking skills.	Ap	F	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Interpret scatter diagrams and analyze	Ap	C	Seminar

	the strength and direction of relationships between variables using correlation and regression and critically evaluate ethical implications of statistical methods aligning with human values.			Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Apply basic mathematical operations, methods of data input and graphical representations in R	Ap	F	Instructor-created exams / Home Assignments
CO5	Demonstrate the concept of correlation and use R to calculate correlation coefficients.	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
I	Time series analysis		9	15
	1	Time series analysis: Components of time series, additive and multiplicative models	1	
	2	Measurement of trend- Graphic method, Semi average method	3	
	3	Method of moving averages	3	
	4	Method of least squares- Straight line trend	2	
	Sections from References: Unit 19: 11.1&11.3 [Ref 1] Unit 20:11.2 [Ref 1] Unit 21&22:11.5 [Ref 1]			
II	Index numbers		10	15
	5	Meaning and definition, uses and types, problems in the construction of index numbers	3	
	6	Different types of simple index numbers	3	
	7	Different types of weighted index numbers	2	
	8	Test for an ideal index number, time and factor reversal test	2	
	Sections from References: Unit 5: 10.1,10.2,10.4[Ref 1] Unit 6: 10.3 [Ref 1]			

	Unit 7&8: 10.5[Ref 1] Unit 8: 10.6.2,10.6.3 [Ref 1]		
III	Correlation and Regression	18	25
	9	Scatter diagram	2
	10	Correlation	2
	11	Types of Correlation	1
	12	Pearson's coefficient of correlation	3
	13	Spearman's rank correlation	3
	14	Spearman's rank correlation with repeated ranks	3
	15	Regression	1
	16	Linear Regression	1
	17	Properties of regression lines	2
	Sections from References: Unit 9: 10.3 [Ref 2] Unit 10&11: 10.2 [Ref 2] Unit 12: 10.4 [Ref 2] Unit 13&14: 10.7[Ref 2] Unit 15: 11.1[Ref 2] Unit 16&17: 11.2[Ref 2]		
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 19: 1.2&1.3 [Ref 3] Unit 20: 1.4 [Ref 3] Unit 21: 1.5&1.6 [Ref 3] Unit 22: 1.8,2.3 [Ref 3]		
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.		
	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[3] Unit 2: 1.9 Ref[3] Unit 3: 2.1 Ref[3] Unit 4: 2.2 Ref[3] Unit 5:2.2 Ref[3] Unit 6: 2.3 Ref[3] Unit 7: 2.3 Ref[3] Unit 8: 2.3 Ref[3]		
Books and References: 1. Gupta, S. C. (2015). Fundamentals of Statistics, Himalaya Publishing House 2. Gupta, S.C. and Kapoor,V.K. (2002). Fundamentals of Mathematical Statistics. , 11th edition, Sulthan Chand, New Delhi. 3. Sudha G Purohith, Sharad D Core, Shailaja R Deshmukh (2015), Statistics Using R..			

Mapping of COs with PSOs and POs :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	0	0	0	0	0	2
CO2	0	0	1	0	2	0	2
CO3	0	0	0	0	0	3	2
CO4	2	0	2	0	2	0	1
CO5	0	0	0	3	2	0	2

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
CO1	✓	✓		✓
CO2	✓	✓		✓
CO3	✓	✓		✓
CO4	✓	✓		✓
CO5	✓			