

Programme	BSc Statistics				
Course Code	STA2MN110 (P)				
Course Title	Data analysis foundations in statistics				
Type of Course	Minor				
Semester	II				
Academic Level	100 - 199				
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				

necessary to analyze and interpret time-series data.
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Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Define the components of a time series and distinguish between additive and multiplicative models, understanding their applications in time series analysis.	U	C	Instructor-created exams / Quiz
CO2	Explain 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.	U	C	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Construct scatter diagrams and analyze the strength and direction of relationships between variables using correlation analysis and critically evaluate ethical implications of statistical methods aligning with human values.	U	F	Seminar Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Apply arithmetic and geometric sequences and series to analyze financial data, including calculations related to simple interest, compound interest, and annual percentage rates.	Ap	C	Instructor-created exams / Home Assignments
CO5	Calculate annuities and analyze debt repayment schedules, sinking funds, and other financial instruments.	Ap	F	One Minute Reflection Writing assignments/ Instructor-created exams
CO6	Explain the concept of correlation and use R to calculate correlation coefficients.	Ap	P	Viva Voce/ Instructor-created exams
* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C) # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)				

Detailed Syllabus:

Module	Unit	Content	Hrs (45 +30)	Marks (70)
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	PRATICUM		30	
	1	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[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: <ol style="list-style-type: none"> 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 :

	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	3	2	-	-	-	-	3	-	-	-	-	-
CO 2	-	-	-	-	-	2	-	-	1	-	2	-
CO 3	-	-	2	-	-	-	-	-	-	-	-	3
CO 4	-	-	-	-	-	2	-	1	-	-	-	-
CO 5	-	2	-	1	3	-	-	-	1	-	-	-
CO 6	-	-	2	-	-	2	-	-	-	3	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
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓			✓
CO 4		✓		✓
CO 5	✓	✓		✓
CO 6	✓			