

Programme	B.Sc. Statistics				
Course Code	STA2MN111 (P)				
Course Title	Statistical modelling and sampling techniques				
Type of Course	Minor				
Semester	II				
Academic	100-199				
Level					
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Knowledge of fundamental statistics including measures of central tendency and dispersion. Basic knowledge of computer				
Course Summary	Equip students with the theoretical foundation and practical skills necessary for understanding and applying statistical methods related to moments, measures of skewness and kurtosis, fitting different types of curves, analyzing relationships between variables through correlation and regression, understanding sampling techniques, and utilizing R programming for data computation and visualization.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Define and compute skewness and kurtosis to analyze a distribution, and explain their significance in describing the shape and characteristics of the data.	Ap	C	Instructor-created exams / Quiz
CO2	Determine the required sample size and assess sampling errors in survey design and analysis, exploring various sampling techniques.	U	C	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Use curve fitting methods, such as straight	Ap	C	Seminar

	lines and parabolas, to model and predict data, applying correlation and regression techniques for analysis.			Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Use R software to calculate the correlation coefficient, interpret its strength and direction, and compute measures of dispersion to analyze data variability.	Ap	F	One Minute Reflection Writing assignments Instructor-created exams / Home Assignments
CO5	Apply R programming to calculate and visualize univariate and bivariate data using box plots, bar plots, and scatter plots..	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	Skewness and Kurtosis		9	15
	1	Skewness, Kurtosis definitions and different types	2	
	2	Pearson's coefficient of skewness	2	
	3	Bowley's coefficient of skewness	2	
	4	Percentile coefficient of kurtosis	3	
	Sections from References: Unit 1:3.13 Ref[2] Unit 2: 3.14 Ref[2] Unit 3: 3.13 Ref[2] Unit 4: 3.14 Ref[2]			
II	Sampling Theory		9	15
	5	Sample size, sampling errors, methods of sampling. Census and Sampling, principal steps in sample survey	2	
	6	Organization and execution of large sample surveys, sampling and non-sampling errors	3	
	7	Preparation of questionnaire	2	
	8	Simple random sampling, Stratified random sampling, Systematic Sampling	2	
	Sections from References:			

	Unit 5: 15.2-15.8 [Ref 2] Unit 6&7: 15.915.10[Ref2] Unit 8: 15.11-15.13 [Ref 2]		
III	Correlation and Regression	19	25
	9	Fitting a straight line	2
	10	Fitting a Parabola	2
	11	Scatter diagram	1
	12	Correlation, Types of correlation	3
	13	Pearson's coefficient of correlation	3
	14	Spearman's rank correlation	3
	15	Regression	1
	16	Linear Regression	1
	17	Properties of regression lines	3
	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	R programming	8	15
	18	Range	2
	19	Inter Quartile Range	2
	20	Standard Deviation	2
	21	Pearson's correlation	1
	22	Loops- Brief explanation	1
	Sections from References: Unit 18&19: 2.1-2.3[Ref 3] Unit 20: 7.5 [Ref 1] Unit 21: 6.2 [Ref 1] Unit 22: 7.3 [Ref 1]		
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	Range	
	2	Mean Deviation	
	3	Quartile Deviation	
	4	Standard Deviation	
	5	Variance	
	6	Covariance	
	7	Correlation	
	8	Rank Correlation	
	Sections from References: Unit 1,2: 2.1 [Ref 3] Unit 3: 2.2 [Ref 3]		

	Unit 4,5: 2.3 [Ref 3] Unit 6,7,8: 6.2-7.5 [Ref 2]		
Books and References:			
1. Douglas, Alex, Deon Roos, Francesca Mancini, Ana Couto, and David Lusseau. (2020), An Introduction to R. https://intro2r.com/index.html .			
2. Gupta, S.C. and Kapoor, V.K. (1997) Fundamentals of Mathematical Statistics. Sultan Chand and Sons, 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	1	0	0	0	0	0	2
CO2	2	0	0	0	0	0	2
CO3	1	0	1	0	0	0	2
CO4	2	0	1	0	0	0	2
CO5	2	0	1	0	0	0	1

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	✓	✓		✓