

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

Programme	BSc Statistics
Course Code	STA1MN105 (P)
Course Title	Descriptive statistics
Type of Course	Minor
Semester	I
Academic	100 - 199

Level					
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Familiarity with different types of data, understanding of common data visualization techniques, basic algebraic concepts.				
Course Summary	Build a foundation in data understanding, covering primary/secondary, quantitative/qualitative data, along with graphical representation like bar diagrams, central tendency, and dispersion measures, leading to practical survey and software applications.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand data types and sampling techniques and critically evaluate ethical implications of statistical methods aligning with human values.	U	C	Instructor-created exams / Quiz
CO2	Master diagrammatic representation and frequency distribution	U	F	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Apply measures of central tendency with practical examples and analyze data to help entrepreneurial decisions using critical thinking skills.	Ap	C	Seminar Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Grasp measures of dispersion and their applications	U	C	Instructor-created exams / Home Assignments
CO5	Conduct a survey and apply acquired skills using software	U	F	One Minute Reflection Writing assignments/ Instructor-created exams
CO6	Explain how to calculate measures of central tendency and dispersion using JASP software.	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
I	A basic idea about data		6	15
	1	Primary and secondary data	3	
	2	Quantitative and qualitative data	1	
	3	Population and sample, Sampling and census	1	
	4	Discrete and continuous data	1	
	Sections from References: Unit 1: 2.2 [Ref 2] Unit 2: 11.1 [Ref 2] Unit 3: 12.1 [Ref 1] Unit 4: 2.1 [Ref 2]			
II	Diagrammatic representation of data		15	15
	5	Bar diagrams, pie diagram, Pictograms	5	
	6	Four types of classification	1	
	7	Frequency distribution, discrete and continuous frequency tables	6	
	8	Terms used in a frequency distribution, Cumulative frequency tables	3	
	Sections from References: Unit 5: 4.3(4.3.2 to 4.3.7) [Ref 2] Unit 6: 5.3 Ref[2] Unit 7: 3.3[Ref 2] Unit 8: 3.5 [Ref 2]			
III	Measures of central tendency		14	20

	9	Mean, Median, Mode	9	
	10	Geometric mean and Harmonic mean with simple applications	4	
	11	Empirical relation connecting mean, median and mode	1	
	Sections from References: Unit 9: 2.5,2.6,2.7 [Ref 1], Chapter 2 [Ref 3] Unit 10: 2.8,2.9 [Ref 1] Unit 11: 2.7 [Ref 1]			
IV	Measures of dispersion		10	20
	12	Range, Standard deviation,	4	
	13	Quartile deviation	4	
	14	Coefficient of variation	2	
	Sections from References: Unit 12: Section 1 and 4, Chapter 3 [Ref 3] Unit 13: Section 2, Chapter 3 [Ref 3] Unit 14: 3.8.1 [Ref 1]			
V	PRACTICUM		30	
	Do practice problems in JASP 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	Installing JASP		
	2	Loading data in JASP		
	3	Quitting JASP		

	4	Calculating mean in JASP		
	5	Calculating Median in JASP		
	6	Calculating mode in JASP		
	7.	Calculating range in JASP		
	8	Calculating interquartile range in JASP		
	Sections from References: Unit 1: 3.1 Ref[4] Unit 2: 3.3 Ref[4] Unit 3: 3.6 Ref[4] Unit 4: 4.1.2 Ref[4] Unit 5: 4.1.3 Ref[4] Unit 6: 4.1.6 Ref[4] Unit 7: 4.2.1 Ref[4] Unit 8: 4.2.2 Ref[4]			
Books and References: 1. Gupta, S.C. and Kapoor, V.K. (1997) Fundamentals of Mathematical Statistics. Sultan Chand and Sons, New Delhi 2. S.P Gupta (2021),Statistical Methods 46 th Edition 3. Garrett, H.E. and Woodworth, R.S. (1973) Statistics in Psychology and education. Vakils, Feffer and Simons Private Ltd, Bombay. 4. Navarro, D.J., Foxcroft, D.R., & Faulkenberry, T.J. (2019). Learning Statistics with JASP: A Tutorial for Psychology Students and Other Beginners. (Version).				

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	3	-	-	-	2	3	2	-	-	-	3
CO 2	-	2	3	-	-	2	2	2	-	-	3	-
CO 3	3	-	2	-	3	3	3	2	2	3	-	-
CO 4	-	-	-	-	-	3	2	3	-	-	-	-
CO 5	2	-	-	-	-	-	2	1	-	-	-	2
CO 6	-	3	-	-	-	2	1	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	✓			

Programme	BSc Statistics				
Course Code	STA2MN105 (P)				
Course Title	Introduction to Probability				
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	Understanding of fundamental probability concepts. Ability to manipulate and analyse basic data sets, perform simple calculations.				
Course Summary	Deepen statistical knowledge with correlation types, regression properties, and probability theory, including the relationship between correlation and regression coefficients, alongside introducing probability concepts, random variables, and distribution functions, applied through practical exercises.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Comprehend types of correlation and scatter diagrams and analyze data to help entrepreneurial decisions using critical thinking skills.	U	C	Instructor-created exams / Quiz/ Instructor-created exams
CO2	Understand properties of regression coefficients and critically evaluate ethical implications of statistical methods aligning with human values.	U	C	Practical Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Introduce and apply probability theory concepts.	U	C	Seminar Presentation / Group Tutorial Work
CO4	Grasp the definition and types of	U	C	Instructor-crea

	random variables.			ted exams / Home Assignments
CO5	Develop critical thinking skills to interpret and communicate results of statistical analysis effectively.	U	F	One Minute Reflection Writing assignments/ Instructor-creat ed exams
CO6	Describe how to draw scatter plot for correlation in JASP.	Ap	P	Viva Voce/ Instructor-creat ed 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	Correlation		12	15
	1	Bivariate Distribution, Correlation	2	
	2	Scatter Diagram	1	
	3	Karl Pearson coefficient of correlation	2	
	4	Limits for Correlation Coefficient	2	
	5	Assumptions Underlying Karl Pearson's Correlation Coefficient	1	
	6	Rank Correlation	3	
	Sections from References:			
	Unit 1: 10.1 Ref[2]			
	Unit 2: 10.2 Ref[2]			
	Unit 3: 10.3 Ref[2]			
	Unit 4: 10.3.1 Ref[2]			
	Unit 5: 10.3.2 Ref[2]			
	Unit 6: 10.6 Ref[2]			

II	Regression		14	20
	7	Regression	2	
	8	The two regression lines	3	
	9	Regression coefficients	3	
	10	Properties of regression coefficients	3	
	11	Relation between coefficient of correlation and regression coefficients	3	
	Sections from References: Unit 7: 10.7 Ref[2] Unit 8: 10.7.1 Ref[2] Unit 9: 10.7.3 Ref[2] Unit 10: 10.7.4 Ref[2] Unit 11: 10.7.4 Ref[2]			
III	Introduction to Probability		10	15
	12	Terms in Probability	3	
	13	Mathematical or Classical Probability	1	
	14	Statistical or Empirical Probability	1	
	15	Axiomatic approach to Probability	2	
	16	Addition theorem for two events (statement only)	1	
	17	Conditional Probability	2	
	18	Independence of events		

	Sections from References: Unit 12: 4.3 Ref[2] Unit 13: 4.3.1 Ref[2] Unit 14: 4.3.2 Ref[2] Unit 15: 4.5 Ref[2] Unit 16: 4.6.2 Ref[2] Unit 17: 4.7 Ref[2] Unit 18: 4.7.3 Ref[2]			
IV	Random variables		9	20
	19	Definition of random variable	2	
	20	Probability mass function	2	
	21	Probability density function	2	
	22	Distribution function	3	
	Sections from References: Unit 19: 5.1 Ref[2] Unit 20: 5.6 Ref[2] Unit 21: 5.4.1 Ref[2] Unit 22: 5.4 Ref[2]			
V	PRACTICUM		30	
	Do practice problems in JASP 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	Problems on plotting scatter plots		
	2	Correlation calculation		
	3	Interpretation of correlation coefficient in JASP		

	4.	Finding Rank correlation		
	5	Introduce correlation matrix in JASP		
	6	Linear regression model		
	7	Model checking		
	8	Model selection		
	Sections from References: Unit 1: 11.1.1 Ref[4] Unit 2: 11.1.3 Ref[4] Unit 3:11.1.5 Ref[4] Unit 4: 11.1.6 Ref[4] Unit 5: 11.2 Ref[4] Unit 6: 11.3 Ref[4] Unit 7:11.10 Ref[4] Unit 8:11.11 Ref[4]			
Books and References: 1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I , 8th Edn. The World Press, Kolkata. 2. Gupta, S.C. and Kapoor, V.K. (1997) Fundamentals of Mathematical Statistics. Sultan Chand and Sons, New Delhi 3. Garrett, H.E. and Woodworth, R.S. (1973) Statistics in Psychology and education. Vakils, Feffer and Simons Private Ltd, Bombay. 4. Navarro, D.J., Foxcroft, D.R., & Faulkenberry, T.J. (2019). Learning Statistics with JASP: A Tutorial for Psychology Students and Other Beginners. (Version).				

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	3	2	-	-	2	2	1	-	-	3	-

CO 2	2	-	-	-	-	-	1	2	-	-	-	3
CO 3	-	3	-	2	2	2	2	1	2	-	-	-
CO 4	3	2	-	-	-	3	3	2	-	-	-	-
CO 5	2	-	-	-	-	-	2	2	-	-	-	-
CO 6	2	2	3	-	-	3	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	✓			

Programme	BSc Statistics				
Course Code	STA3MN205 (P)				
Course Title	Inferential statistics				
Type of Course	Minor				
Semester	III				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Awareness of different types of data sets, basic understanding of probability theory				
Course Summary	Discover statistical testing basics, including null and alternative hypotheses, critical regions, and test statistics like z, t, F, and Chi-square, with applications such as t-tests, ANOVA, and practical software exercises.				

Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand testing fundamentals and hypotheses.	U	C	Instructor-created exams / Quiz
CO2	Grasp test statistics and critical values.	U	C	Practical

				Assignment / Observation of Practical Skills/ Instructor-created exams
CO3	Apply t-tests and chi-square tests and analyze data to help entrepreneurial decisions using critical thinking skills.	Ap	F	Seminar Presentation / Group Tutorial Work/ Instructor-created exams
CO4	Ability to calculate probabilities using normal distribution.	U	C	Instructor-created exams / Home Assignments
CO5	Comprehend Analysis of Variance and critically evaluate ethical implications of statistical methods aligning with human values.(ANOVA)	U	F	One Minute Reflection Writing assignments/ Instructor-created exams
CO6	Conduct one sample tests in JASP software.	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 (48+30)	Marks 70
I	Fundamentals of Testing		12	15
	1	Tests of significance-Introduction	2	
	2	Null hypothesis	1	
	3	Alternative hypothesis	1	
	4	Errors in hypothesis testing	3	
	5	Critical region and Level of Significance	3	
	6	One and two tailed tests	2	

	Sections from References: Unit 1: 12.4 Unit 2:12.5 Unit 3:12.5.1 Unit 4: 12.6 Unit 5:12.7 Unit 6: 12.7.1		
II	Distribution Theory	10	15
	7 Normal distribution-Properties	2	
	8 Properties of Normal distribution	1	
	9 Standard normal distribution	1	
	10 Problems with table values	2	
	11 Statistic of Chi-square distribution	2	
	12 Statistic of Student's t distribution	1	
	13 Statistic of F distribution	1	
	Sections from References: Unit 7:8.2.2 Ref[2] Unit 8: 8.2.2 Ref[2] Unit 9: 8.2.14 Ref[2] Unit 10: 8.2.14 Ref[2] Unit 11: 13.1 Ref[2] Unit 12: 14.2 Ref[2] Unit 13: 14.5 Ref[2]		

III	Tests of Hypothesis		14	20
	14	Steps for testing of hypothesis	2	
	15	t test for single mean	3	
	16	t test for difference of means	3	
	17	Chi square tests for Goodness of fit	3	
	18	Chi square test for independence of two attributes	3	
	Sections from References: Unit 14:12.7.3 Ref[2] Unit 15: 14.2.9 Ref[2] Unit 16: 14.2.10 Ref[2] Unit 17: 13.7.2 Ref[2] Unit 18: 13.7.3 Ref[2]			
IV	Analysis of variance		9	20
	19	Introduction to Analysis of variance	1	
	20	Assumptions	2	
	21	Techniques of ANOVA	2	
	22	One way ANOVA	4	
	Sections from References: Unit 19: 5.5 Ref[1] Unit 20:5.6 Ref[1] Unit 21: 5.7 Ref[1] Unit 22:5.7 Ref[1]			

V	PRACTICUM		30	
	Do practice problems using JASP 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	Chi-square goodness of fit test		
	2	Chi-square test for independence		
	3	One sample t test		
	4	How ANOVA works in JASP		
	5	Running ANOVA in JASP		
	6	An illustrative data set		
	7	Assumptions of one way ANOVA		
	8	Continuity correction		
	Unit 1:9.1Ref[3] Unit 2: 9.2 Ref[3] Unit 3: 10.2 Ref[3] Unit 4:12.2 Ref[3] Unit 5:12.3 Ref[3] Unit 6:12.1 Ref[3] Unit 7: 12.6 Ref[3]			

Books and References:

1. S.P Gupta (2021), Statistical Methods 46 th Edition Gupta, S.C. and Kapoor, V.K. (1997)
2. Fundamentals of Mathematical Statistics. Sultan Chand and Sons, New Delhi
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CO 1	-	2	-	-	-	2	2	2	-	-	-	-
CO 2	3	3	-	-	-	3	3	1	-	-	-	-
CO 3	-	-	2	-	-	2	2	2	-	-	3	-
CO 4	2	3	2	-	-	3	3	2	-	3	-	-
CO 5	-	2	-	2	3	-	2	2	1	-	-	3
CO 6	3	-	3	-	-	-	2	1	-	3	-	-

Correlation Levels:

Level	Correlation
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-	Nil
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Mapping of COs to Assessment Rubrics :

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CO 1	✓	✓		✓
CO 2	✓			✓
CO 3	✓			✓
CO 4	✓	✓		✓
CO 5		✓		✓
CO 6	✓			