Mahatma Gandhi University

Kottayam

Programme	**BSc (Hons) Statistics**					
Course Name	**Introduction to Statistical Modelling**					
Type of Course	**DSC A**					
Course Code	**MG2DSCSTA100**					
Course Level	**100**					
Course Summary	To acquire the basic knowledge of theory of random variables, various probability functions and their applications. Also spreadsheet functions are used to solve numerical problems associated with the topics discussed.					
Semester	**2**	**Credits**			**4**	**Total Hours**
Course Details	**Learning Approach**	**Lecture**	**Tutorial**	**Practical**	**Others**	
		3		**1**		**75**
Pre-requisites						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1	Examine major components of random variable theory and distribution theory.	U	1
2	Develop skills required to effectively understand various distributions.	S	2
3	Analyse several applications and advantages of distributions.	An	2

4	Evaluate fitting procedure of distribution and its simulation using spreadsheet.	A,E & S	2
Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom Transaction (Sub-units)

	Course Description	Hours	CO No.
Module1	**Random Variable Theory**	**15**	
1.1	Describe univariate random variables in discrete and continuous cases.	2	1
1.2	Demonstrate probability mass function, probability density function and their properties, distribution function of a random variable: Definition and properties.	3	1
1.3	Demonstrate functions of random variable, transformations of random variable (univariate).	2	1
1.4	Describe bivariate random variable, demonstrate joint probability mass function, joint probability density function and their properties, describe joint distribution function and its properties.	4	1
1.5	Demonstrate marginal and conditional distributions (bivariate case), demonstrate independence of random variables (bivariate case).	4	1
Module 2	**Mathematical Expectation**	**15**	
2.1	Demonstrate mathematical expectation, its properties and simple problems.	4	1

2.2	Describe Arithmetic Mean (AM), Geometric Mean (GM), Harmonic Mean (HM), Mean Deviation and Variance in terms of expectation and evaluate simple problems.	5	1
2.3	Describe generating functions: Moment generating function, characteristic function, their properties and simple problems.	6	1
Module 3	**Discrete and Continuous Distributions**	**15**	
3.1	Discrete uniform distribution and Bernoulli distribution, explain binomial distribution and its properties, simple problems.	3	2
3.2	Explain Poisson distribution and its properties, simple problems. Explain geometric distribution, its characteristics and lack of memory property.	4	2
3.3	Explain continuous uniform distribution and its properties.	2	2
3.4	Explain exponential distribution, gamma distribution and their characteristics. Lack of memory property of exponential distribution.	3	2
3.5	Explain normal distribution and its properties. Discuss standard normal distribution and use of standard normal tables, problems.	3	3
Module 4	**Spreadsheet for Statistical Computing** (A practical record with minimum 10 problems has to be submitted).	**30**	
4.1	Use spreadsheet functions to solve numerical problems associated with topics covered in various modules.	30	4
Module 5	**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, Interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.
Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** ***Formative assessment*** **Theory: 15 marks** Quiz, Assignments **Practical: 15 marks** Lab involvement, Practical Record,Viva voce ***Summative assessment*** **Theory: 10 marks** Written tests
	B. End Semester Evaluation (ESE) **Theory : 50 marks** i) Short answer type questions: Answer any 7 questions out of 10 (7*2=14). ii) Short essay type questions: Answer any 4 questions out of 6 (4*6=24). iii) Essay type questions: Answer any 1 question out of 2 (1*12=12). **Practical: 35 marks** Problem solving skills: 30 marks Record: 5 marks

References:

1. Mukhopadhaya, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd., Calcutta.
2. Beverly J. Dretzke. (2008). Statistics with Microsoft Excel, Fourth Edition, Pearson.
3. Gupta, S.C. and Kapoor, V.K. (2002). Fundamentals of Mathematical Statistics. Sulthan Chand, New Delhi.

Suggested Readings:

1. Bhat, B.R., Venkata Ramana, T. and Rao Madhava, K.S. (1977). Statistics: A Beginners Text Vol-2, New Age International (P) Ltd., New Delhi.
2. Goon, A. M., Gupta, N.K., and Das Gupta, B. (1999). Fundamentals of Statistics-Vol.2. World Press, Kolkatha.
3. Rohatgi, V.K. and Saleh, A.M.E. (2001). An Introduction to Probability and Statistics. 2nd Edition. John Wiley & Sons, Inc, New York.
4. Wilks, S.S. (1964). Mathematical Statistics, John Wiley, New York.