



**B.Sc. Degree Program**  
**Faculty of Applied Sciences**  
**University of Sri Jayewardenepura**

<b>Course Title</b>	<b>Mathematical Statistics I</b>
<b>Course Code</b>	<b>AMT 112 2.0</b>
<b>Credit Value</b>	02
<b>Status</b>	Core
<b>Year / Level</b>	Year 1
<b>Semester</b>	Semester 1
<b>Theory: Practical: Independent Learning</b>	26:00: 68
<b>Other: Pre-requisite Course/s</b>	None

**Aim of the Course:**

To provide a basic understanding about statistics and its role in day today life by introduction to the probability and distribution theory, familiarizing students with the concepts of events, random variables and some common probability distributions.

**Intended Learning Outcomes:**

*On the successful completion of this course, the student should be able to:*

- 1) Explain the concepts of probability and solve problems.;
- 2) Explain the concepts of random variable, pmf, pdf, cumulative distribution function, moment generating function and calculate the descriptive measures associated with random variables;
- 3) Define basic univariate distributions, be able to apply them and solve simple cases;
- 4) Solve problems regarding distributions of functions of random variables.

**Course Content:**

Events and Probability, Events and probability, Conditional events and conditional probability, Classical probability and empirical probability, Probability rules, Interpretation of probability  
Random variables, Probability mass/ density functions, the cumulative distributive function, Descriptive measures of random variables: Mean, variance etc. Moment generating function  
Binomial distribution, Poisson distribution, Uniform distribution, Normal distribution  
Covariance and coefficient of correlation  
Distributions of transformations of discrete random variables, Distributions of transformations of continuous random variables, Sampling distributions arising from normal data, Central limit theorem

## Scope and Schedule of Teaching - Learning Activities:

Session No.	Topic / Sub Topic	No. of Hrs.			Teaching Method	Assessment Criteria	ILO Alignment
		T	P	IL			
1	<b>1 Elements of Probability</b> 1.1 Introduction to Statistics and role of probability in Statistics 1.2 Events and probability	2	0	6	Lecture / Chapter 1		1,2
2	1.3 Probability rules 1.4 Interpretation of probability 1.5 Classical probability and empirical probability	2	0	4	Lecture / Chapter 1		1,2
3	1.6 Conditional events and conditional probability 1.7 Independence	2	0	4	Lecture / Chapter 1		1,2
4	1.8 Multiplicative law 1.9 Total probability law 1.10 Bayes' Theorem	2	0	4	Lecture / Chapter 1		1,2,3
5	<b>2 One Dimensional Random Variables and their Probability Distributions</b> 2.1 Random variables	2	0	6	Lecture / Chapter 2		1,2,3
6	2.2 Probability mass/ density functions 2.3 The cumulative distributive function	2	0	4	Lecture / Chapter 2		1,4
7	2.4 Descriptive measures of random variables: Mean, variance etc.	2	0	6	Lecture / Chapter 2		1,2,3,4
8	2.5 Moment generating function	2	0	4	Lecture / Chapter 2		1,2,3,4
9	<b>Mid-Semester Examination</b>	0	0	0	Mid-Sem. Examination	30% of Final Marks	
10	<b>3 Some special Univariate Distributions</b> 3.1 Binomial distribution 3.2 Poisson distribution	2	0	6	Lecture / Chapter 3		1,2,3,4
11	3.3 Uniform distribution 3.4 Normal distribution	2	0	6	Lecture / Chapter 3		1,2,3,4
12	<b>4 Covariance and coefficient of correlation</b>	2	0	6	Lecture / Chapter 4		1,4
13	<b>5 Distributions of Functions of Random Variables</b> 5.1 Distributions of transformations of discrete random variables 5.2 Distributions of transformations of continuous random variables	2	0	6	Lecture / Chapter 5		1, 4
14	5.3 Sampling distributions arising from normal data 5.4 Central limit theorem	2	0	6	Lecture / Chapter 5		1, 4
<i>Total</i>		26	0	68			

## Linking Program Outcomes with ILOs:

### Programme Learning Outcomes:

1. Demonstrate competency in theoretical knowledge and practical and/or technical skills in respective subject areas.
2. Communicate efficiently and effectively in the respective subject areas using written, oral, visual and/or electronic forms.
3. Facilitate, and participate as an empathetic and emotionally intelligent team player with leadership qualities, in a group, diverse team or organization.
4. Apply subject based knowledge and skills creatively in making appropriate judgments in changing situations.
5. Integrate creativity and innovation to achieve entrepreneurial competencies.
6. Implement solutions in keeping with ethical, societal and environmental norms and need for sustainable development.
7. Secure life goals through lifelong learning with the aim of strengthening professional skills, and ensuring the betterment of the community.

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
ILO 1	***	**	*	*			**
ILO 2	***	**		**		*	**
ILO 3	***	**		**	*	*	**
ILO 4	***	**		**	*	*	***

\*\*\* - Strongly Linked; \*\* - Medium linked; \* Weakly linked

### Mode of Assessment:

**Formative Assessment (FA):** FA1 30% = 30% of Total Marks

**Summative Assessment (SA):** End Semester Examination: 2-hour paper = 70% of Total Marks

### References

- Introduction to the Theory of Statistics – Alexander M. Mood, Franklin A. Graybill, Duane C. Boes
- Introduction to Mathematical Statistics – Paul G. Hoel
- Introduction to Mathematical Statistics – Robert V. Hogg, Joseph McKean, Allen T. Craig
- Any other books on Probability and Distribution Theory, Mathematical Statistics
- Online reading - <https://newonlinecourses.science.psu.edu/stat414/node/5/>