



Department of Computer Applications National Institute of Technology Tiruchirappalli

1. Course Outline			
Course Title	Probability and Stastical Methods		
Course Code	CA719		
Department	CA	No. of Credits	3
Pre-requisites Course Code	NIL	Faculty Name	1. Dr. U. Srinivasulu Reddy 2. Dr. S. Domnic
PAC Chairman	Dr. V. Gayathri		
E-mail	usreddy@nitt.edu domnic@nitt.edu	Telephone No.	+91-431-2503745
Course Type	Core Course		

2. Course Overview
<p>The Probability theory is the branch of mathematics that deals with modelling uncertainty. It is important because of its direct application in areas such as genetics, finance and telecommunications. It also forms the fundamental basis for many other areas in the mathematical sciences including statistics, modern optimisation methods and risk modelling. This course provides an introduction to probability theory, random variables, probabilistic modeling. The statistical part of the course offers an advanced level exploration of statistical techniques for data analysis, with an emphasis on developing computational tools and an understanding of when and how to use them. Interpretation of the results and analysis of assumptions is a key part of the course. As such, the course is appropriate for mathematically inclined students who wish to learn hands-on computational techniques for data analysis.</p>
3. Course Objectives
<ul style="list-style-type: none"> • To learn basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables. • To derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions. • To calculate probabilities, and derive the marginal and conditional distributions of random variables. • To learn to model various probability distribution functions and translate real-world problems into probability models. • To explore the statistical techniques for data analysis, with an understanding of when and how to use them. • To learn statistical methods for: (1) Collection, summary and display of data, (2)

estimation, hypothesis testing, and confidence statements, and (3) simple and multiple linear regression.

4. Course Outcomes (CO)

Student will be able to:

- Describe the concepts of mutually exclusive events, conditional probability, dependent and independent events.
- Calculate and interpret confidence intervals for estimating population proportions and means.
- Formulate null and alternative hypotheses and conduct hypothesis tests for population proportions and means.
- Identify when and how to use the t-test, F-test and Chi-Square Test and Analysis of variance – one way and two way classifications.

5. Course Outcome (CO)	Aligned Programme Outcome (PO)											
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
Describe the concepts of mutually exclusive events, conditional probability, dependent and independent events.		L	H					M				
Calculate and interpret confidence intervals for estimating population proportions and means.	L			M		H						
Formulate null and alternative hypotheses and conduct hypothesis tests for population proportions and means.		H			L				M			
Identify when and how to use the t-test, F-test and Chi-Square Test and Analysis of variance – one way and two way classifications.		M		H						L		

L-Low

M-Medium

H-High

6. Course Teaching and Learning Activities

Week	No. of Classes	Topic Covered	Mode of Delivery
1	Class-I	Introduction to probability	Chalk and Talk , Power Point Presentation
	Class-II	Probability Spaces and Elementary theorems	Chalk and Talk , Power Point Presentation
	Class-III	Ven Diagrams and Basic principle of counting	Chalk and Talk , Power

			Point Presentation
2	Class-I	Conditional Probability	Chalk and Talk , Power Point Presentation
	Class-II	Conditional Probability	Chalk and Talk , Power Point Presentation
	Class-III	Bayes' Formula	Chalk and Talk , Power Point Presentation
3	Class-I	Independent Events	Chalk and Talk , Power Point Presentation
	Class-II	Random Variables	Chalk and Talk , Power Point Presentation
	Class-III	Types of Random Variables	Chalk and Talk , Power Point Presentation
4	Class-I	Jointly Distributed Random Variables	Chalk and Talk , Power Point Presentation
	Class-II	Independent Rondaom Variables	Chalk and Talk , Power Point Presentation
	Class-III	Expectation	Chalk and Talk , Power Point Presentation
5	Class-I	Variance and Covariance	Chalk and Talk , Power Point Presentation
	Class-II	Markov's and Chebyshev's Inequality	Chalk and Talk , Power Point Presentation
	Class-III	Binomial, Poisson and Normal Distributions	Chalk and Talk , Power Point Presentation
6	Class-I	Fitting of Probability Distributions	Chalk and Talk , Power Point Presentation
	Class-II	Fitting of Probability Distributions	Chalk and Talk , Power Point Presentation
	Class-III	Correlations and regression	Chalk and Talk , Power Point Presentation
7	Class-I	Linear regression and correlation coefficient	Chalk and Talk , Power Point Presentation
	Class-II	Introduction to Statistics	Chalk and Talk , Power Point Presentation
	Class-III	Distribution Theory for Statistics	Chalk and Talk , Power Point Presentation
8	Class-I	Descriptive Statistics	Chalk and Talk , Power Point Presentation
	Class-II	Measuers of Central tendency	Chalk and Talk , Power Point Presentation
	Class-III	Estimatation: Unbiasedness, Consistency	Chalk and Talk , Power Point Presentation
9	Class-I	Methods of moments and maximul likelihood estimatiom	Chalk and Talk , Power Point Presentation
	Class-II	Problems of normal populations	Chalk and Talk , Power Point Presentation
	Class-III	Test of Hypothesis	Chalk and Talk , Power Point Presentation
10	Class-I	Means of Normal Population	Chalk and Talk , Power Point Presentation
	Class-II	F-test and Chi-Square test	Chalk and Talk , Power

			Point Presentation
	Class-III	One-way and two-way analysis of variance	Chalk and Talk , Power Point Presentation

7. Course Assessment Methods – Theory				
Sl. No.	Mode of Assessment	Week/Date	Duration	Weightage(%)
1.	Cycle Test –1	6 th week	60 mins	20
2.	Cycle Test –2	12 th week	60 mins	20
3.	Assignment	7 th and 10 th week	7 days	10
4.	End Semester Exam	-	180 mins	50
Total				100

8. Essential Readings (Textbooks, Reference books, Websites, Journals, etc.)

REFERENCES:

1. John.E.Freund, Irwin Miller, Marylees Miller, "Mathematical Statistics with Applications", 8th Edition, Printice Hall of India, 2012.
2. Yannisviniotis, "Probability and Random Processes for Electrical Engineers", McGraw-Hill International Edition, 1998.
3. Ross, Sheldon. M, " Introduction to Probability and Statistics for Engineers and Scientists", Academic Press, 2009.

9. Course Exit Survey (mention the ways by which the feedback about the course is assessed and indicate the attainment level)

1. The students through the class rep may give their feedback at any time to the course co-ordinator which will be duly addressed.
2. The students may also give their feedback during Class Committee meeting.
3. 'Course Outcome Survey' form will be distributed on the last working day to all the students and the feedback on various rubrics will be analyzed.
4. The COs will be computed after arriving at the final marks.

10. Course Policy (including plagiarism, academic honesty, attendance, etc.)

- **Plagiarism**

The students are expected to come out with their original code for problems given assignments during the class work, and tests/examinations. If found to copy from internet/other students, zero marks will be assigned and action will be taken.

- **Attendance**

100% is a must. However, relaxation will be given for leave on emergency requirements (medical, death, etc.) and representing institute events. Minimum 75% is required.

- **Academic Honesty**

- i. Possession of any electronic device, if any, found during the test or exam, the student will be debarred for 3 years from appearing for the exam and this will be printed in the Grade statement/Transcript.
- ii. Tampering of MIS records, if any, found, then the results of the student will be with held and the student will not be allowed to appear for the Placement interviews conducted by the Office of Training & Placement, besides (i).

11. Additional Course Information

- The students can get their doubts clarified at any time with their faculty member with prior appointment.

For Senate's Consideration



1. Dr. Srinivasalu Reddy

Course Faculty


Dr. V. Gayathri

Class Committee Chairperson


2. Dr. S. Dominic


Dr. A. Vadivel
HOD