



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 | Arish. P |
| PAC Chairman | Dr.U.Srinivasulu Reddy | | |
| E-mail | arish@nitt.edu | Telephone No. | +91-9677376606 |
| Course Type | Core Course | | |

| 2. Course Overview |
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| <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, probalistic modeling. The statistical part of the course offers an advanced level exploration of statistical techniques for dataanalysis, with an emphasis on developing computational tools and an understanding of when andhow to use them. Interpretation of the results and analysis ofassumptions is a key part of the course. As such, the course is appropriate for mathematicallyinclined 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 continous random variables as well as be familiar with common named discrete and continous 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 lean 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 statiscal methods for: (1) Collection, summary and display of data, (2) estimation, hypothesis testing, and condence 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 |

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|----|-----------|--|---|
| 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, Poision 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. Yannisiviniotis, "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**

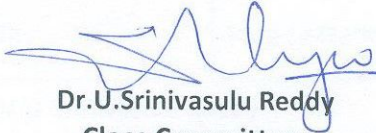
- i. Possession of any electronic device, if any, found during the test or exam, the student will be debarred for 3 years from appearing for the exam and this will be printed in the Grade statement/Transcript.
- ii. Tampering of MIS records, if any, found, then the results of the student will be with 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


Arish. P
Course Faculty


Dr. U. Srinivasulu Reddy
Class Committee
Chairperson


Dr. S. R. Balasundaram
HOD