

**SCHOOL OF TECHNOLOGY  
WOXSEN UNIVERSITY  
Kamkole, Sadasivpet, Hyderabad, Telangana**

**COURSE PLAN**

**Programme : I-B. Tech(Common for All)**

**Course : Probability and Random Variables**

**Course Code :**

**No. of credits : 03**

**Semester : II**

**Session : I**

**Batch : 2023-2027**

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# **COURSE PLAN**

## **A. PREREQUISITE:**

- a. 12<sup>th</sup> level Mathematics

## **B. PROGRAM OUTCOMES (POs) and PROGRAM SPECIFIC OUTCOMES (PSOs) for**

### **B1. PROGRAM OUTCOMES (POs):** Engineering Graduates will be able to:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **B2. Program Specific Outcomes (PSOs):** Graduates will be able to:

**PSO1: Problem Solving Skills** – Graduate will be able to apply computational techniques and software principles to solve complex engineering problems pertaining to software engineering.

**PSO2: Professional Skills** – Graduate will be able to think critically, communicate effectively, and collaborate in teams through participation in co and extra-curricular activities.

**PSO3: Successful career**- Graduates will possess a solid foundation in computer science and engineering that will enable them to grow in their profession and pursue life- long learning

through post-graduation and professional development.

### C. COURSE OBJECTIVES

1. To introduce the theory and practice of data computation.
2. To estimate and analyse the data.
3. To introduce probability distributions and its applications.

### D. COURSE OUTCOMES (CO)

**On completion of this course, the students will be able to**

- CO1. Analyze statistical data using Microsoft Excel.
- CO2. Identify an appropriate probability distribution and use its properties to calculate probabilities.
- CO3. Construct a function which closely fits given n-points.

**Table: Correlation of POs and PSOs v/s COs**

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1									1		2	2
CO2	3	2	1									1		2	2
CO3	3	2	1									1		2	2
Avg	3	2	1									1		2	2

1: Weakly mapped

2: Moderately mapped

3: Strongly mapped

### E. PEDAGOGY

- **Lecture (L) / Discussion (D) / Deliberation (De)**
- **Voiceover Presentation & Video Lectures (vL),**
- **NPTEL videos,**

### F. COURSE COMPLETION PLAN

<b>Total Class room sessions</b>	45
<b>Total Tests</b>	3
<b>Total Assignments</b>	1

One Classroom Session=60 minutes

### G. EVALUATION & GRADING

Students will be evaluated based on the following 3 points.

S. No.	Assessment	Weightage	Schedule
1	Internal Assessment (IA)	60%	Detailed Below
2	End-semester Examination (ESE)	40%	Academic Calendar

**F1. INTERNAL ASSESSMENT:****WEIGHTAGE – 60%**

Internal Assessment shall be done based on the following:

S. No.	Description	% of Weightage out of 60%	Date of Examination (Tentative )
1	Test-1	15%	22.02.2024
2	Test-2	15%	21.03.2024
3	Test-3	15%	18.04.2024
4	Assignment/ MOOC Course+ Quiz	10%+5%	30.04.2024

**F2. Internal Assessment Record Sheet** will be displayed online at the end of semester i.e. last week of regular classroom teaching.

**F3. CLASS TESTS:** Two Class Tests based on descriptive type theoretical & numerical questions based on objective type questions will be held; one class test and one quiz at least ten days before the Mid Term Examination and second class test and second quiz at least ten days before the End Term Examination. Those who do not appear in Viva-Voce and quiz examinations shall lose their marks.

*The marks obtained by the students will be displayed on LMS a week before the start of Mid Term and End Term Examinations respectively.*

**F4. ASSIGNMENTS:** After completion of a concept, there will be home assignments based on theory and numerical problems. Those who fail to submit the assignments by the due date shall lose their marks.

**F5. GENERAL DISCIPLINE:** Based on student's regularity, punctuality, sincerity and participation in the interactions.

*The marks obtained by the students will be displayed on LMS at the end of semester.*

**F6. END TERM EXAMINATION:****WEIGHTAGE – 40%**

End Term Examination shall be Three Hours duration and shall be a combination of Short and Long theory/numerical Questions.

**F7. GRADING:**

The overall marks obtained at the end of the semester comprising all the above three mentioned shall be converted to a grade.

**H. Slow and Advanced Learners**

Identification of slow & advanced learners and supporting methodology.

## I. COURSE DELIVERY PLAN

Class	TOPICS	Course Outcome	Assessment
	<b>UNIT-I: DESCRIPTIVE STATISTICS</b>		
1	Introduction of Syllabus and Data collection,	CO1	
2	Types of data	CO1	
3	Tutorial	CO1	
4	Graphical representation of data	CO1	
5	Descriptive measures for grouped & ungrouped Data- Mean, Median, Mode	CO1	
6	Tutorial	CO1	
7-8	Descriptive measures for grouped & ungrouped Data-Mean Deviation, variance, standard deviation	CO1	
9	Tutorial	CO1	
10	Descriptive measures for grouped & ungrouped Data- quartile deviations, central moments	CO1	
11	Descriptive measures for grouped & ungrouped Data-Skewness and Kurtosis	CO1	
12	Tutorial	CO1	<b>Test-1</b>
	<b>UNIT-II: BASIC PROBABILITY</b>		
13	Basic terminology related to probability	CO2	
14	Independent events, mutually exclusive and exhaustive events,	CO2	
15	Tutorial	CO2	
16	Addition theorem and Multiplication theorem	CO2	
17	Bayes theorem	CO2	
18	Tutorial		
19	Discrete and continuous random variables	CO2	
20	Probability distributions, and their properties: expectation, variance, MGF	CO2	
21	Tutorial		
22-23	Probability distributions, and their properties: CGF, characteristic function.	CO2	<b>Test-2</b>
	<b>UNIT-III: SPECIAL DISTRIBUTIONS</b>		
24	Tutorial- Introduction to special distributions		

25	Discrete Uniform and Bernoulli Distributions	CO2	
26	Discrete Binomial Distribution	CO2	
27	Tutorial		
28	Discrete Poisson Distributions	CO2	
29	Discrete Geometric Distribution		
30	Tutorial		
31	Continuous Normal distribution	CO2	
32	Continuous Exponential distribution	CO2	
33	Tutorial	CO2	
34	Continuous Gamma Distribution	CO2	<b>Test-3</b>
	<b>UNIT-IV: CURVE FITTING</b>		
35	Introduction & Scatter diagram	CO3	
36	Tutorial	CO3	
37	Method of Least squares	CO3	
38	Fitting of a straight line	CO3	
39	Tutorial	CO3	
40	Fitting of second and kth degree polynomials	CO3	
41	Fitting of exponential curve	CO3	<b>Assignment/ MOOC certificate submission</b>
42	Tutorial	CO3	
43	Conversion of data to linear form	CO3	
44	Selection of type of curve to be fitted	CO3	
45	Tutorial	CO3	

## **SUGGESTED READINGS:**

### **Text Books:**

1. Gupta, S. C., & Kapoor, V. K. (2020). *Fundamentals of mathematical statistics*. Sultan Chand & Sons.
2. Agarwal, B. L. (2007). *Programmed statistics (question-answers)*. New Age International.
3. P. G. Hoel, S. C. Port and C. J. Stone, *Introduction to Probability Theory*, Universal Book Stall, 2003 (Reprint).

### **Reference Books:**

1. S. Ross, *A First Course in Probability*, 6th Ed., Pearson Education India, 2002.
2. W. Feller, *An Introduction to Probability Theory and its Applications*, Vol. 1, 3rd Ed., Wiley, 1968.
3. N.P. Bali and Manish Goyal, *A text book of Engineering Mathematics*, Laxmi Publications, Reprint, 2010.
4. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 35th Edition, 2000.
5. Veerarajan T., *Engineering Mathematics (for semester III)*, Tata McGraw-Hill, New Delhi, 2010.

### **Video Resources:**

[V1]. <https://www.youtube.com/watch?v=riXcZT2ICjA>

[V2]. [https://nptel.ac.in/noc/individual\\_course.php?id=noc18-cs53](https://nptel.ac.in/noc/individual_course.php?id=noc18-cs53)

[V3]. <https://www.khanacademy.org/partner-content/pixar/crowds/crowds2/v/combinatorics11>

## **GUIDELINES:**

***Cell Phones and other Electronic Communication Devices:*** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices **MUST** be turned off in the class room.

***Attendance:*** Students are required to have **minimum attendance of 80%** in each subject. Students with less than said percentage shall **NOT** be allowed to appear in the end semester examination.

***Course outcome assessment:*** To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement Capping.

***Passing criterion:*** Student has to secure minimum 40% marks of “highest marks in the class scored by a student in subject” individually in both ‘End-Semester examination’ and ‘Total Marks’ in order to pass in that paper.

- Passing Criterion for B. Tech: Minimum 40% of the marks in the end semester.

@ @End the Structure@ @