

**SCHOOL OF TECHNOLOGY WOXSEN UNIVERSITY**

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**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**

## PREREQUISITE:

* 1. 12th level Mathematics

1. **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.

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

## 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

## PEDAGOGY

* **Lecture (L) / Discussion (D) / Deliberation (De)**

## Voiceover Presentation & Video Lectures (vL),

* **NPTEL videos,**

## COURSE COMPLETION PLAN

|  |  |
| --- | --- |
| **Total Class room sessions** | 45 |
| **Total Tests** | 3 |
| **Total Assignments** | 1 |

One Classroom Session=60 minutes

## 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.

## Slow and Advanced Learners

Identification of slow & advanced learners and supporting methodology.

## COURSE DELIVERY PLAN

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **TOPICS** | **Course**  **Outcome** | **Assessment** |
|  | **UNIT-I: DESCRIPTIVE STATISTICS** | | |
| 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 | **Test-1** |
|  | **UNIT-II: BASIC PROBABILITY** | | |
| 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 | **Test-2** |
|  | **UNIT-III: SPECIAL DISTRIBUTIONS** | | |
| 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 | **Test-3** |
|  | **UNIT-IV: CURVE FITTING** |  |  |
| 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 | **Assignment/ MOOC certificate submission** |
| 42 | Tutorial | CO3 |  |
| 43 | Conversion of data to linear form | CO3 |  |
| 44 | Selection of type of curve to be fitted | CO3 |  |
| 45 | Tutorial | CO3 |  |

1. **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>

[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@@