# GUJARAT TECHNOLOGICAL UNIVERSITY

**Master of Engineering Syllabus**

**Subject Code : 3716503**

**Subject Name : Applied Statistics**

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| WEF Academic Year : | 2023 – 24 |
| Semester : | 1 |
| Category of the Course : | Open Elective |

**Teaching and Examination Scheme :**

| Teaching Scheme | | | Credits | Examination Marks | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| L | T | P | C | Theory Marks | | Practical Marks | | |
| | | | | ESE (E) | PA(M) | ESE (V) | PA(I) | |
| 3 | 1 | 0 | 4 | 70 | 30 | 20 | 30 | 150 |

**Objective :** To enable the students apply statistics in various areas of environmental engineering like sampling and analysis, stochastic modeling etc.

**Course Content :**

| Sr. No. | Topic | Teaching Hours |
|---|---|---|
| 1 | **MODULE 1 :**<br><br>**Probability Distributions :** Probability mass functions and probability density function, mean and variance. Binomial, Poisson, Exponential, Gamma, Lognormal and normal distribution: Fitting of the distributions. | 12 |
| 2 | **MODULE 2 :**<br><br>**Sampling techniques :** Simple random sampling, stratified sampling, systematic sampling, sample size determination- application in Environmental Engineering.<br><br>**Regression and correlation :** Linear Regression and correlation, multiple correlation coefficient, standard error of estimate, curvilinear regression- Applications. | 11 |
| 3 | **MODULE 3 :**<br><br>**Statistical inference :** Intervals estimation, Confidence interval for mean, variances and regression coefficients. Sampling Distribution, Test of significance of (i) Means (ii) Mean of two samples (iii) Proportions (iv) | 11 |

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|---|---|---|
| | Variance (v) Two variances (vi) Two observed correlation coefficients (Fishers' z-transformation), (vii) Paired T-test (viii) Regression coefficients (ix) Chi-square test of goodness of fit, Skewness and Kurtosis tests. | |
| 4 | **MODULE 4 :**<br><br>**Applications :** Analysis of variance (i) Completely randomized designs (ii) Randomized block designs. Latin squares. Grecco Latin square design. Factorial experiments. Graphical presentation techniques.. Scilab software. | 11 |

**References :**

1. Gupta. S. C. and Kapoor.V.K, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, 1978.
2. Benjamin, Jack. R and Come11.C, Allin, Probability, Statistics and Decision for Civil Engineers, Mc-Graw Hill.
3. Kadiyali.L.R, Traffic Engineering and Transport Planning, Khanna Publishers.
4. Wohl, Martin and Martin, Brian.V, Traffic Systems analysis for Engineers and Planners, Mc-Graw Hill.
5. Richard.A. Johnson: Miller and Freunds, Probability and Statistics for Engineers (6th edition)Pearson.
6. Elhance: fundamentals of Statistics.

**Course Outcomes :** After completion of this course , student will be able to

| Sr. No. | CO Statement |
|---|---|
| CO-1 | Apply various probabilistic distribution to the given data. |
| CO-2 | Carry out linear and multiple regression analysis. |
| CO-3 | Calculate confidence interval and test the goodness of fit of the given distribution. |
| CO-4 | Apply various sampling techniques to engineering problems. |

**List of Tutorials :**

1. Problems on Probability Distribution Binomial and poison
2. Problems on Simple random sampling
3. Problem on regression and correlation
4. Problem on Test of significance
5. Problem on Analysis of Variance

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