

M.Sc. STATISTICS COURSE OUTCOMES

Semester 1

Course Code : MST1C01

Course Name : ANALYTICAL TOOLS FOR STATISTICS – I

CO 1: Develop skills in generalizing the concepts in univariate calculus to multivariate setup

CO 2: Acquire the basic concepts of complex plane

CO 3: Determine derivatives and integrals in the case of functions in the complex plane

CO 4: Determine Poles and residue of complex functions.

CO 5: Find Laplace transform of a given function.

CO 6: Express a given function as a Fourier Series.

Course Code : MST1C02

Course Name : ANALYTICAL TOOLS FOR STATISTICS – II

CO1: Illustrate vector space, subspaces, independence of vectors, basis and dimension, direct sum, complement and orthogonality with examples.

CO2: Examine linear independence and to construct orthogonal and orthonormal vectors.

CO3: Find rank and nullity, for analysis of matrices.

CO4: Determine eigen values and eigen vectors of a given matrix.

CO5: Establish the relation between algebraic and geometric multiplicity.

CO5: Execute the decomposition of a matrix.

CO6: Derive solution of homogeneous equations and their applications in real life situations and use of g inverse.

CO7: Classify quadratic forms.

Course Code : MST1C03

Course Name : DISTRIBUTION THEORY

CO1: Describe different types of discrete probability distributions

CO2: Explain the properties and applications of continuous distributions

CO3: Derive probability distributions of the different functions of discrete and continuous random variables

CO4: Describe different Sampling distributions and their interrelations

CO5: Illustrate real data modeling using probability distributions.

Course Code : MST1C04

Course Name : : PROBABILITY THEORY

CO1: Use algebra of sets in statistics

CO2: Describe basic concepts of Random variable from measure point of view

CO3: Explain the concept of distribution function, Characteristic function and their relationships and importance

CO4: Distinguish different types of convergence.

CO5: Acquire knowledge in some of the very important theorems like WLLN, CLT and their applications.

Course Code : MST1L01

Course Name : STATISTICAL COMPUTING-I

CO1: Develop scientific and experimental skills.

CO2: Apply the principles of Analytical Tools for Statistics- II and Distribution Theory using real data sets.

CO3: Know the formulas to be applied for the analysis.

CO4: Write the R codes for the analysis of the given data.

CO5: To install and load the packages required to run the R codes.

MST2C05: DESIGN AND ANALYSIS OF EXPERIMENTS

Course Outcomes:

On completion of the course, students should be able to:

CO1: Explain the Principles of planning of an experiment.

CO2: Discuss and compare different complete block designs with and without ancillary variables.

CO3: Analyze experiments with and without missing values.

CO4: Apply incomplete block designs and balanced incomplete block designs.

CO5: Explain factorial experiments, total confounding and partial confounding.

CO6: Describe Response surface design and method of steepest ascent.

Semester 1I

MST2C06: ESTIMATION THEORY

Course Outcomes:

On completion of the course, students should be able to:

CO1: Describe the properties of estimators: unbiasedness, consistency and sufficiency.

- CO2:** Explain exponential family and Pitman family of distributions, with illustrations.
- CO3:** Describe the method of finding sufficient statistics, minimum variance unbiased estimators, consistent estimators and consistent and asymptotically normal estimators.
- CO4:** Relate sufficient statistic and ancillary statistic using Basu's theorem.
- CO5:** Determine UMVUE using complete sufficient statistic using Rao-Blackwell, and Lehmann-Scheffe theorems.
- CO6:** Determine the estimators using method of moments, method of percentiles, maximum likelihood method and Bayesian method.

MST2C07: SAMPLING THEORY

Course Outcomes:

On completion of the course, students should be able to:

- CO1:** Distinguish between Probability and Non-Probability Sampling
- CO2:** Apply the sampling methods: simple random sampling, systematic sampling, stratified sampling and cluster sampling.
- CO3:** Estimate the population parameters for variables and attributes under the above procedures.
- CO4:** Estimate the population parameters concerning the study variables under auxiliary information (Ratio and regression methods)
- CO5:** Discuss probability proportional to size (PPS) sampling strategies.
- CO6:** Explain the concepts of ordered and unordered estimators and its properties.

MST2C08: TESTING OF STATISTICAL HYPOTHESES

Course Outcomes:

On completion of the course, students should be able to:

- CO1:** Explain the problem of testing of hypotheses and the concept of p value.
- CO2:** Construct most powerful tests using Neyman-Pearson lemma, one-sided and two-sided UMP tests and UMP unbiased tests.
- CO3:** Describe the concept of α -similar tests and construct such tests.
- CO4:** Apply nonparametric tests for testing goodness of fit, homogeneity and independence.
- CO5:** Develop SPRT for different problems

MST2L02: STATISTICAL COMPUTING-II

Course Outcomes:

On completion of the course, students should be able to:

- CO1:** Develop scientific and experimental skills of the students.
- CO2:** Apply the principles of Design of experiments, Estimation Theory, Sampling Theory, and Testing of Statistical Hypotheses using real data sets.
- CO3:** Know the formulas to be applied for the analysis.

CO4: Write the R codes for the analysis of the given data.

CO5: Enter the data given for the analysis.

CO7: Explain how to make conclusions and write the inference for the data analysis based on the output obtained.

SEMESTER III

MST3C09: APPLIED REGRESSION ANALYSIS

Course Outcomes:

On completion of the course, students should be able to:

CO1: Illustrate the concept of linear regression model.

CO2: Estimate and test the significance of regression parameters and explain properties estimators.

CO3: Check the model adequacy of regression models using residual analysis.

CO4: Discuss polynomial, step-wise and non-parametric regression models.

CO5: Explain logistic and Poisson regression models for binary and count data and estimate their parameters.

CO6: Discuss generalized linear models and estimation of its parameters.

MST3C10: STOCHASTIC PROCESSES

Course Outcomes:

On completion of the course, students should be able to:

CO1: Recollect the basic concepts of random variables and conditional probabilities.

CO2: Explain Markov Chain with illustrations.

CO3: Classify the States of a Given Markov Chain.

CO4: Describe inter arrival time and waiting time distributions and their properties.

CO5: Explain generalized Poisson process and their properties.

CO6: Describe the concept and applications of renewal process.

CO7: Explain the basic characteristics of queues and the properties of Brownian motion.

MST3E02: TIME SERIES ANALYSIS

Course Outcomes:

On completion of the course, students should be able to:

CO1: Describe the basics of time series data, its auto-covariance, auto-correlation and stationarity.

CO2: Illustrate test for trend and seasonality.

CO3: Explain the smoothing methods for determining trend of the data.

CO4: Describe the properties of linear time series models.

CO5: Fit linear models for time series data sets.

CO6: Describe the maximum likelihood, Yule-Walker and least square estimation methods.

CO7: Learn to validate a model using residual analysis.

CO8: Define ARCH and GARCH models and derive their

MST3E13: BIOSTATISTICS

Course Outcomes:

On completion of the course, students should be able to:

CO1: Discuss types of Biological data and Principles of Bio Statistical design of medical studies.

CO2: Explain the concepts of survival time functions of important parametric models and compare two survival distributions using LR test and Cox's F-test.

CO3: Explain censoring and estimation of parameters using censored data.

CO4: Describe competing risk theory and estimate the probabilities of death by ML method.

CO6: Discuss the Basic biological concepts in genetics and clinical trials.

MST3L03: STATISTICAL COMPUTING-III

Course Outcomes:

On completion of the course, students should be able to:

CO1: Develop scientific and experimental skills of the students.

CO2: Apply the principles of Design of experiments, Estimation Theory, Sampling Theory, and Testing of Statistical Hypotheses using real data sets.

CO3: Use the formulas to be applied for the analysis.

CO4: Write the R codes for the analysis of the given data.

CO5: Enter the data given for analysis.

CO6: Explain how to make conclusions and write the inference for the data analysis based on the output obtained.

IV- SEMESTER

MST4C11: MULTIVARIATE ANALYSIS

Course Outcomes:

On completion of the course, students should be able to:

CO1: Describe the development and uses of multivariate normal distribution.

CO2: Learn the various characterization properties of multivariate normal distributions

CO3: Get idea about sampling distributions of various multivariate statistics and know how the results are utilized in inference procedure.

- CO4: Apply different aspects of testing of statistical hypothesis in multivariate set up.
- CO5: Identify the most appropriate statistical techniques for a multivariate dataset.
- CO6: Apply commonly used multivariate data analysis techniques, and interpret the results

MST4P01: PROJECT/DISSERTATION

Course Outcomes:

On completion of the course, students should be able to:

- CO1: Discuss the applications of various statistical techniques learned in the entire course in the form of project work.
- CO2: Manage a real practical situation where a statistical analysis is sought.
- CO3: Develop professional approach towards writing and presenting an academic report.
- CO4: Get more insight about the opportunities in research/career.

MST4E18: DATA MINING TECHNIQUES

Course Outcomes:

On completion of the course, students should be able to:

- CO1: Apply classification techniques and concept of decision trees.
- CO2: Discuss clustering techniques in statistical and data mining viewpoints.
- CO3: Explain and apply unsupervised and supervised learning and data reduction techniques.
- CO4: Explain and apply artificial neural networks and extensions of regression models.
- CO5: Discuss data warehousing and online analytical data processing.
- CO6: Explain and apply the techniques of association rules and prediction.

MST4V01: Comprehensive Viva voce

Course Outcomes:

On completion of the course, students should be able to:

- CO1: Communicate the concepts of each course precisely
- CO2: Communicate the importance and applications of the subject Statistics in a broad sense
- CO3: Get more insights into the subject areas.
- CO4: Face interviews without fear and communicate their ideas effectively.

MST4L04: STATISTICAL COMPUTING-IV

Course Outcomes:

On completion of the course, students should be able to:

- CO1: Develop scientific and experimental skills of the students and to correlate the theoretical principles with application based studies.

CO2: Learn to apply the multivariate techniques using R or Python.

CO3: Validate results by simulation of artificial data sets using R or Python.

CO4: Learn to import and analyze multivariate data from other source of data files like spreadsheet or web page.

CO5: Prepare the complex raw data into manageable format to analyze