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 tranform 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 accent.

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 thorem.
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.
C07: 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 unsupervised 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