ST. JOSEPH'S COLLEGE, DEVAGIRI, CALICUT
(AUTONOMOUS)

POST GRADUATE DEGREE PROGRAMME

ST. JOSEPH'S CHOICE BASED CREDIT SEMESTER SYSTEM
(SJCBCSSUG)

MASTER OF SCIENCE
IN
STATISTICS

Course Outcome
(2019Admn Onwards)

COURSE OUTCOMES
CORE COURSES

SEMESTER I
FMST1C01: MEASURE THEORY AND INTEGRATION

COs	COURSE OUTCOMES
CO1	Students will be able to understand the basic concepts of measure and integration theory.
CO2	Help learners for understanding the theoretical basis of probability and statistics.
CO3	Help learners to understand the theory on the basis of examples of application.
CO4	Students will be able to use abstract methods to solve problems and cultivate ability to use a wide range of references and critical thinking.

SEMESTER I
FMST1C02: ANALYTICAL TOOLS FOR STATISTICS – I

COs	COURSE OUTCOMES
CO1	Student will get a good exposure to the basic and some relevant advanced concept in maths.
CO2	To acquire in depth knowledge in the convergence of sequence of function and series of function.
CO3	Understanding the application of Mean value theorem and Taylors Theorem.

SEMESTER I
FMST1C03: ANALYTICAL TOOLS FOR STATISTICS - II

COs	COURSE OUTCOMES
CO1	Student will be able to use computational techniques and algebraic skills essential for the study of system of linear equations,matrix algebra, vector spaces, eigenvalues and eigen vectors, orthoganality and diagonalisation.
CO2	Critically analyze and construct mathematical arguments that related to the study of introductory linear algebra.

SEMESTER I
FMST1C04: SAMPLING THEORY

COs	COURSE OUTCOMES
CO1	Demonstrates a structure to data collection.
CO2	The learners will get an idea on how to make a representative sample to avoid bias and the necessity of sampling in statistics.
CO3	The learners will be familiar with different sampling techniques such as srs, systematic, stratified and cluster sampling.
CO4	The learners will be able to obtain an estimate of population parameter using sample information under different sampling techniques.
CO5	Students will be able to use auxiliary information to improve the sampling plan or to enhance estimation of the variable of interest.
CO6	Introduce multistage and multiphase sampling

SEMESTER I
FMST1C05: DISTRIBUTION THEORY

COs	COURSE OUTCOMES
CO1	Introduce several discrete distributions and their important characteristics.
CO2	Introduce several continuous distributions and their important characteristics.
CO3	Exploring the relationship between different distributions using Jacobian transformation, characteristic functions and limit theorems.
CO4	To study various sampling distributions and their properties.

SEMESTER II
FMST2C06: ESTIMATION THEORY

COs	COURSE OUTCOMES
CO1	To explain clearly the role of sufficient statistic in estimation.
CO2	Discuss desirable properties of good estimators such as unbiasedness , efficiency, consistency and asymptotic normality.
CO3	Describing various methods of estimation.
CO4	Suggesting interval estimates for various population parameters.

SEMESTER II
FMST2C07: REGRESSION ANALYSIS

COs	COURSE OUTCOMES
CO1	Develop a deeper understanding of the linear regression model and its limitations.
CO2	Know how to diagnose and apply corrections to some problems with the generalized linear model found in real data.
CO3	Use and understand generalization of the linear model to binary and count data.

SEMESTER II
FMST2C08: PROBABILITY THEORY

COs	COURSE OUTCOMES
CO1	Understand the axiomatic formulation of modern probability theory and think of random variable as an intrinsic need for the analysis of random phenomena.
CO2	Studying various characteristics of random variables using moments, moment generating functions and inequalities.
CO3	Studying different types of convergence of random variables and their application to law of large numbers and centeral limit theorem.

SEMESTER II
FMST2C09: DESIGN AND ANALYSIS OF EXPERIMENTS

COs	COURSE OUTCOMES
CO1	Introduce the theory of linear estimation and its application to the analysis of experimental designs.
CO2	Make use of the basics of the Design of Experiments such as randomization blocking and local control.
CO3	Identify commonly used designs such as RBD,LSD,GLSD,BIBD,PBIBD and various factorial designs and their construction.
CO4	Perform an appropriate statistical analysis of different types of designs.

SEMESTER II
FMST2C10: STATISTICAL COMPUTING-I
(Practical Course)

COs	COURSE OUTCOMES
CO1	To develop sceintific and experimental skills of the students and to correlate the theoretical principles with application based studies.
CO2	The learners will be familiarize with R software.

SEMESTER III
FMST3C11: STOCHASTIC PROCESSES

COs	COURSE OUTCOMES
CO1	The student will be familiar with the concept of the stochastic process, which describes many phenomena that involve random situations. He / she will be able to make various calculations and make the appropriate conclusion when the stochastic process describes a particular applied problem.
CO2	Markov process, one of the most important topic in stochastic process will become familiar to the students and they will become capable of applying this into queueing theory, inventory management, branching process.
CO3	Student will get a thorough exposure in Poisson process and its extensions.

SEMESTER III
FMST3C12: TESTING OF STATISTICAL HYPOTHESES

COs	COURSE OUTCOMES
CO1	Familiarize students with the Neymann-Pearson approach to testing of hypothesis.
CO2	Expertise students in constructing various nonparametric tests.
CO3	Examines various aspects of SPRT including its need , construction and implementation.

SEMESTER III
FMST4C13: MULTIVARIATE ANALYSIS

COs	COURSE OUTCOMES
CO1	To study various aspects of multivariate normal density.
CO2	To derive maximum likelyhood estimates of various parameters and their sampling distributions.
CO3	To create various test procedures and their implementation.
CO4	Introduce and analyse some special techniques such as principle component analysis, factor analysis and canonical correlation.

SEMESTER IV
FMST4P01: PROJECT/DISSERTATION

COs	COURSE OUTCOMES
CO1	To help them how to practically design a sampling procedure and conduct a survey.
CO2	To get a training in analyzing the data so collected making use of a software.
CO3	To make a relevant conclusion based on the analysis of the data.

SEMESTER IV
FMST4C14: STATISTICAL COMPUTING-II
(Practical Course)

COs	COURSE OUTCOMES
CO1	To develop sceintific and experimental skills of the students and to correlate the theoretical principles with application based studies.
CO2	The learners will be familiarize with R software.

SEMESTER IV
FMST4 V01: VIVA-VOCE

COs	COURSE OUTCOMES
CO1	To give students a practice in facing an interview.
CO2	To let them know how much they have understood from each course.

ELECTIVES

E01: OPERATIONS RESEARCH

COs	COURSE OUTCOMES
CO1	Describe linear programming;
CO2	Discuss simplex method, Big-M method and Two-phase method;
CO3	Explain the concept of duality, related theorems and dual simplex method;
CO4	Discuss transportation problem, assignment problem and sequencing problems and parametric and sensitivity analysis
CO5	Explore integer programming problem
CO6	Describe game theory

E02: ECONOMETRIC MODELS

COs	COURSE OUTCOMES
CO1	Explain the meaning and methodology of econometrics.
CO2	Discuss the Leontief input output models and explain the optimization problems in Economics.
CO3	Explain the optimization problems with equality constraints and discuss various production functions like Cobb-Douglas production function and CES production function.
CO4	Discuss the Domar growth model, Solow growth model and Cobweb model.
CO5	Explain the meaning of Multi collinearity, Heteroscedasticity, Autocorrelation and discuss various dynamic econometric models.

E03: STATISTICAL QUALITY CONTROL

COs	COURSE OUTCOMES
CO1	Understanding of the link between SQC and business analysis or business planning .
CO2	Understand the philosophy and basic concepts of quality improvement.
CO3	Demonstrates the ability to use the methods of statistical process control.
CO4	Demonstrates the ability to design, use and interpret control charts for attributes and variables.

E04: ABSTRACT ALGEBRA

COs	COURSE OUTCOMES
CO1	Student will get a good exposure to the basic and some relevant advanced concept in maths.
CO2	To acquire in depth knowledge in the area of group, ring and field.
CO3	Understanding the application of Sylow theorems.

E05: ADVANCED PROBABILITY

COs	COURSE OUTCOMES
CO1	Understand the axiomatic formulation of modern probability theory and think of random variable as an intrinsic need for the analysis of random phenomena.
CO2	Studying various characteristics of random variables using moments, moment generating functions and inequalities.
CO3	Studying different types of convergence of random variables and their application to law of large numbers and centeral limit theorem

E06: BIOSTATISTICS

COs	COURSE OUTCOMES
CO1	Explain the need of statistics in biological areas;
CO2	Describe the basic concepts and applications of survival distributions;
CO3	Compare two survival distributions using different parametric methods;
CO4	Distinguish the concept of different types of censoring;
CO5	Estimate the survival , hazard function using parametric and nonparametric methods;
CO6	Estimate the probabilities of death under competing risk

E07: OFFICIAL STATISTICS

COs	COURSE OUTCOMES
CO1	Describe the Indian and International Statistical systems;
CO2	Explain the nature of population growth in developed and developing countries;
CO3	Explain the concept of economic development, growth in per capita income and distributive justice;
CO4	Define the indices of development like Human development index etc;.
CO5	Estimate national income through income and expenditure approaches

E08: STATISTICAL ECOLOGY AND DEMOGRAPHY

COs	COURSE OUTCOMES
CO1	Understand the concept of population dynamics
CO2	Discuss the simpson's index and related topics.
CO3	Understand the sources of demographic data
CO4	Discuss the structure of population and various population theories

E09: LONGITUDINAL DATA ANALYSIS

COs	COURSE OUTCOMES
CO1	Understand the concept of longitudinal data
CO2	Discuss the generalized linear models.
CO3	Understand the concept of classification
CO4	Discuss the structure of multivariate longitudinal data

E10: GENERALIZED LINEAR MODELS

COs	COURSE OUTCOMES
CO1	To study various aspects of multivariate normal density.
CO2	To derive maximum likelihood estimates of various parameters and their sampling distributions.
CO3	To create various test procedures and their implementation.
CO4	Introduce and analyze some special techniques such as principle component analysis, factor analysis and canonical correlation.

E11: TIME SERIES ANALYSIS

COs	COURSE OUTCOMES
CO1	Define time series in time and frequency domain;
CO2	Describe various types of smoothing techniques;
CO3	Assess the stationarity of time series;
CO4	Identify suitable ARMA models for the stationary component of the given time series;
CO5	Estimate the parameters of the identified models;
CO6	Discuss the validity of the model by residual analysis;

E12: COMPUTER ORIENTED STATISTICAL METHODS

COs	COURSE OUTCOMES
CO1	Explain the basic concepts of R software;
CO2	Create vectors and matrices and carry out basic matrix operations using R;
CO3	Visually display, analyze, clarify and interpret numerical data , functions and other quantitative structures ;
CO4	Use various types of looping techniques;

E13: STATISTICAL DECISION THEORY AND BAYESIAN ANALYSIS

COs	COURSE OUTCOMES
CO1	To understand clearly the relevance of various aspects of decision theory such as loss function, prior information and different principles of decision theory.
CO2	To study how utility function can be constructed in real life situations and transform it into a loss function.
CO3	To study the relevance of various loss function such as squared error loss function, zero-one loss function and linear loss function.
CO4	To study the logic of Bayesian decision theory, its analysis and significance.

E14: RELIABILITY MODELING

COs	COURSE OUTCOMES
CO1	Explain the reliability concepts and measures;
CO2	Discover the system reliability using the concept of structure functions;
CO3	Explain various lifetime probability distributions and their structural properties;
CO4	Describe various concepts and different notions of ageing used in reliability analysis and their inter relations;
CO5	Estimate the reliability function for complete and censored samples

E15: LIFETIME DATA ANALYSIS

COs	COURSE OUTCOMES
CO1	Explain the basic concepts and ideas of lifetime/survival analysis;
CO2	Examine the structural properties and methods for standard lifetime probability distributions;
CO3	Analyze complete and censored lifetime data with and without covariates;
CO4	Estimate survival functions using parametric and non-parametric methods;
CO5	Apply and interpret semi-parametric and parametric regression models for survival data