Department of Statistics

PROGRAM OUTCOMESS (POs)

Upon completion of the programme, the students will attain the ability to:

PO1: Examine various hypotheses involved, and identify and consult relevant resources to find their rational answers.

PO2: Develop capability to identify logical flaws and loopholes in the arguments of practicing Statisticians, analyse and synthesize data from a variety of sources and accordingly draw conclusions

PO3: Develop original thinking for formulating new problems and providing their solutions

PO4: Develop effective and confident Communication skill after completion of the course.

PO5: Identify ethical issues, avoid unethical behavior such as fabrication, falsification or misrepresentation and misinterpretation of data

PROGRAM SPECIFIC OUTCOMESS (PSOs)

Upon completion of the programme, the students will attain the ability to:

PSO1: Apply for M. B.A. courses by passing state eligibility test (SET) or qualifying competitive examinations of reputed universities

PSO2: Pursue the career of an actuary by passing the Actuarial Common Entrance Test (ACET).

PSO3: Pursue the career of Data Analytics, Data Scientist in corporate world

PSO4: Prepare for PG in Biostatistics to pursue their career in clinical research

PSO5: Prepare for qualifying Indian Statistical service examination

Semester I

STAT CC101 (Descriptive Statistics)

Course Outcomess:

After Completion of the course, student will be able to :-

CO1: Understand the statistical data, types of data, tabular and graphical presentation of data, scales of measurement, measures of central tendency, measures of dispersion, moments, Skewness and Kurtosis, Coefficient of variation,

CO2: Comprehend the Correlation (Simple, Multiple and Partial), Rank Correlation, Intra-class correlation etc.

CO3: Apply regression analysis, principle of least squares and fitting of different polynomials and exponential curves.

CO4: Understand the consistency of data and independence of attributes, measures of association of attributes.

Semester I

STAT CC 102 (Calculus)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Understand the fundamental concepts of functions with several variables, its derivatives in partial form with other important related concepts, their applications in maxima - minima problems.

CO2: Apply the principles of integral to solve a variety of practical problems in science and different fields.

CO3: Recognize Ordinary Differential Equations (ODEs) and system of ODEs concepts that are encountered in the real world, understand and able to communicate the underlying mathematics involved helping another person gain insight into the situation.

CO4: Distinguish between linear, nonlinear, partial and ordinary differential equations and use correct mathematical terminology, notation, and symbolic processes in order to engage in work, study and conversation on topics involving differential equations with colleagues in the field of mathematics and sciences.

<u>**Semester II**</u>

STAT CC203 (Probability and Probability Distributions)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Understand random experiments, Algebra of sets, sample space, algebra of events, definition of Probability, some theorems on probability, Bayes' theorem and its applications.

CO2: Know random variables, p.m.f., p.d.f., distribution function for one dimensional and two dimensional random variables and its properties, transformation of one-dimensional and two-dimensional random variables.

CO3: Know about mathematical expectation and its properties, moment generating function, Cumulant generating function, characteristic function and probability generating function, uniqueness and inversion theorems, Conditional expectations and Conditional variance.

CO4: Understand Standard Probability Distributions: Binomial, Poisson, geometric, negative binomial, hypergeometric, multinomial, normal, uniform, gamma, beta, exponential, Cauchy and bivariate normal distribution.

Semester II

STAT CC 204 (Algebra)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Develop knowledge of basic concepts of the linear algebra.

CO2: Understand all the concepts of linear algebra and matrices.

CO3: Linear Algebra plays an important role to solve problem in applied mathematics.

CO4: Apply the methods taught in Problem arising out in further studies.

Semester III

STAT CC305 (Sampling Distribution)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Understand the basic concepts of statistics and parameters.

CO2: Understand the distribution of sample mean, median and range,

CO3: Understand the distribution of order statistics, law of large numbers and central limit theorem.

CO4: Understand the derivation of various exact sampling distributions like t, F and chi-square.

Semester III

STAT CC306 (Survey Sampling and Indian Official Statistics)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Understand the principal steps in sample survey, basic principle of sample survey, errors in sampling, complete enumeration versus sampling, simple random sampling with and without replacement, procedure of selecting a sample and determination of sample size.

CO2: Know the concept of stratified random sampling, proportional and optimum allocations and their comparisons with SRS, practical difficulties in allocation, estimation of gain in precision, systematic sampling.

CO3: Know about ratio, product and regression method of estimation, cluster sampling for equal clusters, two-stage sampling.

CO4: Know about Official Statistical System in India through MoSPI, CSO, NSSO, National Statistical Commission and Government of India's Principal publications

Semester III

STAT CC 307 (Mathematical Analysis)

Course Outcomes:

After Completion of the course, student will be able to :-

CO1: Understand over all concept of algebraic structures.

CO2: Apply Mathematical Analysis plays an important role in solving problem in pure

mathematics.

CO3: Real analysis are important part of pure mathematics. Stress is laid on development

of analytical abilities of the students.

CO4: Numerical Analysis is a topic of the day and here students are taught some programming methods and solve linear and non-linear equation and analyse & evaluate the accuracy.

Semester IV

STAT CC408 (Statistical Inference)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Use various methods of estimation such as method of moments and method of maximum likelihood etc. to find an estimate for unknown population parameter

CO2: Understand the concepts of testing of hypothesis, critical region and related theorems with applications as well as decision problems.

CO3: Perform various tests of significance for mean, proportion etc.

CO4: Develop knowledge of sequential analysis and sequential probability ratio test.

Semester IV

STAT CC409 (**Linear Models**)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Predict the unknown value of dependent variable for known value of independent variable.

CO2: Use the techniques of analysis of for testing the dependence of a quantitative variable on a qualitative variable.

CO3: Use analysis of covariance (one way) technique for testing the dependence of a quantitative variable on a qualitative variable when we have given a quantitative auxiliary (independent) variable.

CO4: Overcome the problems such as multicollinearity and heteroscedasticity which arises due to the violation of assumptions of a linear model.

Semester IV

STAT CC410 (Statistical Quality Control)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Know the dimension of quality, history of quality, ISO quality standards, quality registration, causes of variation, seven tools of statistical process control and basis of 3σ control charts.

CO2: Aware about control charts for variables and attributes, comparison between control charts for variables and attributes. Analysis of patterns on control chart and estimation of process capability.

CO3: Understand the acceptance sampling plan, single and double sampling plans and their OC, AQL, LTPD, AOQ, AOQL, ASN, ATI functions with graphical interpretation, use and interpretation of Dodge and Romig's sampling inspection plan tables.

CO4: Understand the concept of six-sigma, lean manufacturing and total quality management (TQM).

Semester IV

STAT CC511 (Stochastic Processes and Queuing Theory)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Predict the future results in terms of probability for the given stochastic models.

CO2: Compute the probability of recurrence of an event.

CO3: Compute the expected duration of game.

CO4: Compute Waiting time distributions for various queuing models

Semester V

STAT CC 512 (Statistical Computing using C programming)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Develop various basic concepts, features and components related to C programming language.

CO2: Define data types and use them in simple data processing applications.

CO3: Design and develop C programs, analyses and interpret the concept of control statements, array, pointer, function, structure, declaration, initialisation, operators and their uses.

CO4: Develop their basic programming skill using 'PYTHON' in data analysis.

Semester VI

STAT CC 613 (Design of Experiments)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Apply the concepts of basic designs like CRD, RBD & LSD in agricultural and industrial design of experiments.

CO2: Draw the inferences about the dependency of a variable on an attribute.

CO3: Apply the knowledge of incomplete block design in experiments when block size is less than the number of treatments under study.

CO4: Implement factorial experiment to analyse the effects of varying levels of two or more factors simultaneously.

Semester VI

STAT CC614 (Multivariate Analysis and Non-parametric Methods)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Understand bivariate normal distribution, bivariate and multivariate data, random vector, p.m.f., p.d.f., distribution function, mean vector and dispersion matrix, marginal and conditional distributions.

CO2: Know the concept of multivariate normal distribution and its properties, sampling distribution of mean vector, concept of multiple and partial correlation coefficient and their properties.

CO3: Know the applications of multivariate analysis in discriminant analysis, principal components analysis and factor analysis.

CO4: Know about non-parametric test which includes the test of randomness, empirical distribution function, Kolmogorov Smirnov test, sign test and Wilcoxon-Mann-Whitney test, median test and Wilcoxon-Mann-Whitney test.

Semester V

STAT DSE (501 Operations Research)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Develop the knowledge of formulation of practical problems using the linear programming method and its extensions.

CO2: Understand the theoretical basics of different computational algorithms used in solving linear programming and related problems.

CO3: Apply the knowledge of game theory concepts to articulate real-world decision situations for identifying, analysing and practicing strategic decisions to counter the consequences.

CO4: Develop the comprehensive study of various application area of inventory models through case studies and relevant examples.

Semester V

STAT DSE502(Economic Statistics and Psychological and Educational Statistics)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Understand the concept of times series data and its application in various fields, components of a times series, decomposition of time series, measurement of trend by different methods, detrending, effect of elimination of trend on other components of the time series.

CO2: Know about the seasonal component of time series and its estimation by different methods, deseasonalisation of data, cyclic component, random component and forecasting.

CO3: Recognize the concept of index numbers, construction of index numbers, different types of index numbers, chain index numbers, conversion of fixed based to chain based index numbers, criteria of a good index number and Consumer price index numbers.

CO4: Understand the application of statistical methods in Psychology and Education, scaling, z-scores, standard score, normalised score, T- score, reliability and validity of scores, methods of comparison between reliability and validity.

Semester VI

STAT DSE603 (Econometrics)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Understand the Fundamental concept of econometrics.

CO2: Develop knowledge of Specification of the model.

CO3: Develop Knowledge on Multiple linear regression.

CO4: Apply Multicollinearity, heteroscedasticity, autocorrelation and autoregressive with their required testing procedure and remedies to overcome these problems

Semester VI

STAT DSE604 (Demography and Vital Statistics)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Comprehend the basic concepts and definitions in demography.

CO2: Understand the core social demographic variables, and how these variables influence population growth, composition and structure.

CO3: Develop knowledge of the basic measures of mortality & fertility in order to understand the population dynamics as well as for the development planning process.

CO4: Discuss global demographic regimes and impact on public health.

CO5: Understand the techniques for measuring longevity - Life tables which deals with computations of future population size and it can also be used in actuarial science.

<u>**Semester IV**</u>

STAT SEC 402   Minitab (Statistical data analysis using statistical software packages)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Learn how to analyse the data, identify the problems and choose the relevant techniques to apply.

CO2: Develop the skills to know when and where to use the various types of control charts available in Minitab for own processes.

CO3: Gets an idea how Minitab makes it simpler than ever to get deep insights from the data.

<u>**Semester I**</u>

STAT GE 101 (Statistical Methods)

Course Outcomes:

After Completion of the course, student will be able to:-

After Completion of the course student would be able to :-

CO1: Understand the concept of descriptive Statistics.

CO2: Understand the statistical data, types of data, tabular and graphical presentation of data, scales of measurement, measures of central tendency, measures of dispersion, moments, Skewness and Kurtosis, Coefficient of variation.

CO3: Understand the Correlation (Simple, Multiple and Partial), Rank Correlation, Intra-class correlation and regression analysis, principle of least squares and fitting of different polynomials and exponential curves.

CO4: Understand the consistency of data and independence of attributes,measures of association of attributes

Semester II

STAT GE 202 (Introduction Probability)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Understand the concept of probability and the law related to it.

CO2: Comprehend random experiments, sample space, events, various concepts associated with theory of probability, random variables, p.m.f and p.d.f. for univariate random variables, distribution function.

CO3: Understand the concepts of mathematical expectations, variance, moments and m.g.f..

CO4: Apply standard probability distributions for discrete and continuous random variables.

Semester III

STAT GE303 Basic Applied Statistics

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Understand the concepts of testing of hypothesis, test of significance for mean, proportion using parametric and non-parametric tests.

CO2: Analyse point and interval estimates for an unknown parameter

CO3: Use the techniques of analysis of variance for testing the dependency of a quantitative variable on a qualitative variable.

CO4: Understand the concepts and principle of design of experiment also with planning of a suitable design to conduct an experiment under different conditions.

Semester IV

STAT GE 404 (Applied Statistics)

Course Outcomes:

After Completion of the course, student will be able to:-

CO1: Know components of time series, decomposition of time series, measurement of trend by different methods, measurement of seasonal variations by ratio to trend method.

CO2: Understand about Index numbers, criteria for a good index number, different types of index numbers, construction of index numbers, consumer price index number, uses and limitations of index numbers.

CO3: Perceive the concept of statistical quality control, importance of statistical methods in industrial research and practice, determination of tolerance limits, causes of variations in quality, general theory of control charts, process and product control, Control charts for variables and attributes.

CO4: Grasp the demographic methods, measurement of rates and ratios of vital events, measurement of CDR, SDR, IMR, SDR, life tables, measurement of CBR, GFR and TFR, measurement of GRR and NRR.