FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018

2021 - 2022

1.1.1 Curricula developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme specific outcomes (PSOs) and Course Outcomes (COs), of the Programmes offered by the Institution.

Name of the Programme: B.Sc. STATISTICS

Programme Outcomes:

PO 1:	Apply acquired scientific knowledge to solve complex issues.
PO 2:	Attain Analytical skills to solve complex cultural, societal and environmental issues.
PO 3:	Employ latest and updated tools and technologies to analyse complex issues.
PO 4:	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

Programme Specific Outcomes:

PSO1:	Apply the knowledge of Statistics, Mathematics and Computer science to become competent professionals at global level
PSO 2:	Apply statistical knowledge to analyze and solve complex problems using appropriate statistical methodology and interpret results in a variety of settings
PSO 3:	Demonstrate the ability of critical observation, logical, analytical and problem-solving skills
PSO 4:	Write code to extract and reformat real data and to utilize statistical programming environments
PSO 5:	Effectively present statistical findings to an audience lacking statistical expertise and work collaboratively
PSO 6:	Excel as socially committed statistics students having mutual respect, effective communication skills, high ethical values and empathy for the needs of society

Course Outcomes:

Course Code	Course Title	Nature of the Course (Local/National /Regional/ Global)	Course Description	Course Outcomes
19ST1CC1	Basic Statistics	National	This course introduces the historical development of statistics, presentation of data, descriptive measures and fitting mathematical curves to the data	CO1.Recognizes investigation, investigator, enumerator and enumeration and explain different methods of data collection. CO2. Identifies the need of Classification and Tabulation. CO3. Construct and analyze graphical display to summarize data. CO4. Explain and evaluate various measure of central tendency. CO5. Compute and interpret

				measure of centre and spread of data.
19ST1CC2	Probability Theory	Global	This course introduces the concepts of functions and its properties, theorems related to random variables.	CO1. Identify from a probability scenario events that are simple, complementary, mutually exclusive, and independent. CO2. Recognize multiplication rule for two independent events, the addition rule for union of two events, and the complement rule. CO3. Describe the main properties of probability distribution and Construct discrete and continuous random variables. CO4. Apply general properties

				of the expectation and variance operators. CO5. Identify and examine generating functions and law of large numbers.
19ST1AC1	Calculus	Global	This course covers differentiation and integration of functions of one variable.	CO1. Explain higher derivatives and apply Leibnitz theorem to find the n^{th} derivative of functions. CO2. Explain multiple points, Envelopes, nodes and conjugate points. CO3. Construct reduction formula for trigonometric functions. CO4. Define Jacobian, double & triple integrals and apply the knowledge of

				change of variables to solve the problems in double and triple integrals. CO5. Construct Fourier series by recalling integration.
19ST2CC3	Descriptive Statistics	National	This course introduces measurement of relationship in terms of quantitative and qualitative data.	CO1. Evaluates and interprets the nature of skewness and kurtosis. CO2. Identify the direction and strength of a correlation between two factors. CO3. Compute and interpret the coefficient of determination and spearman correlation coefficient. CO4. Recognize regression analysis applications for purpose of description and prediction. CO5. Explain the methods of association of attributes.

19ST2CC4	Discrete Probability Distributions	National	This course introduces probability functions for random variables that are defined for different probabilistic situations	CO1. Recognize cases where the Binomial distribution could be an appropriate model. CO2. Apply the Poisson distribution to a variety of problems. CO3. Explore the key properties such as the moment generating function, cumulant of a negative binomial distribution. CO4. Describe and derive the formula for the geometric and hyper geometric probability mass function. CO5. Explain and evaluate multinomial and power

				series distribution.
19ST2AC2	Algebra	National	This course introduces the concept of classical algebra to the students of Statistics.	CO1. Identify binomial series and solve problems in binomial expansion. CO2. Identify logarithmic and exponential series and solve problems. CO3. Relate the roots and co-efficients of the equations and Recognize the important methods in finding roots of the given polynomial. CO4. Explain the transformations of equations. CO5. Examine the nature of the roots and solve algebraic

				equations using Newton's method and Horner's method.
21ST1NME / 21ST2NME	Fundamentals of Statistics	National	This course is designed to make the students learn the basics of statistics	CO1. Summarize the origin of statistics and its relation with other disciplines. CO2. Explain and evaluate various measure of central tendency CO3. Examine the various measures of dispersion. CO4. Identify the direction and strength of a correlation between two factors. CO5. Form regression equation of lines and solve.

19ST3CC5	Continuous Probability Distributions	National	This course is designed to expose the students various important continuous probability models	CO1. Recognize cases where the normal distribution could be an appropriate. CO2. Understand and derive the moments, moment generating functions, characteristic functions of rectangular, beta and gamma distribution. CO3. Explore the key properties such as the moment generating function and cumulants of exponential and Cauchy distribution. CO4. Derive chi square distribution and apply in real life problem. CO5. State and apply the definitions of the t and F distributions.
19ST3CC6	Sampling Theory	Global	This course is introduced to the students to impart	CO1. Illustrate census and sampling and their advantages and

			the basic knowledge of statistical sampling concepts.	disadvantages. CO2. Differentiates the SRSWOR, SRSWR, methods of SRS – lottery method and random number table method. CO3. Understand and identify stratified random sampling. CO4. Understand and identify systematic sampling. CO5. Analyse ratio estimator.

19ST3AC3	Linear Programming	National	The course provides appropriate methods for the efficient computation of optimal solutions to problems which are modeled by objective function and linear constraints	CO1. Formulate linear programming problems and solve by graphical method. CO2. Classify simplex method to solve linear programming problems. CO3. Identify and solve two phase and Big – M method. CO4. Recognize and formulate transportation and find the optimal solution. CO5. Recognize and formulate assignment problems and find the optimal solution.

19ST3SB1	Practical Statistics - I	Global	The course provides problems related to measure of central tendency, measure of dispersion, and measures of association of attributes.	CO1. Calculate measures of central tendency. CO2. Classify measures of dispersion, skewness and kurtosis. CO3. Compute correlation, regression and measures of association of attributes.
19ST4CC7	Estimation Theory	Global	This course introduces the concepts of statistical estimation theory	CO1. Explain and compute point estimation. CO2. Estimate maximum likelihood estimator. CO3. Analyse minimum variance unbiased estimator. CO4. Compute interval estimation in large

				samples using normal distribution CO5. Distinguish Interval estimation in small samples based on F, chi square and t distribution

19ST4CC8	Applied statistics	Global	This course provides some of the applications of statistics which includes topics such as curve fitting, time series, index numbers, interpolation and extrapolation, birth and death rates.	CO1. Construct curve fitting. CO2. Define and explain analysis of time series. CO3. Explain index numbers CO4. Classify interpolation and extrapolation CO5. Evaluate birth, death rate, infant mortality and neo natal mortality rate.

19ST4AC4	Linear Algebra	National	This course will focus on matrix as linear transformations relative to a basis of a vector space.	CO1. Define Vector Space and explain its various concepts. CO2. Explain basis and dimension. CO3. Illustrate Inner Product Spaces. CO4. Define basic concepts of matrices and solve linear equations, Appraise Eigen Value and Eigen Vectors of matrices. CO5. Describe bilinear forms and quadratic forms.

19ST4SB2	Practical Statistics - II	Global	The course provides an application related to the concepts of sampling theory, & sampling distribution for large & small samples.	CO1. Interpret discrete and continuous distributions. CO2. Calculate the sampling distributions for large samples. CO3. Compute the sampling distributions for small samples.
19ST5CC9	Statistical Inference – II	Global	The course provides the basics of hypothesis testing with emphasis on some commonly encountered hypothesis tests in statistical data	CO1.Describe the process of hypothesis testing and given a statement of a research question, construct an appropriate null and alternative hypothesis to use for hypothesis testing. CO2. Explain best critical region and carry out UMP test for the

			analysis.	parameters of univariate normal and exponential distribution. CO3. Explain LRT and its properties and test mean and variance of normal population CO4. Analyse the basic properties of non parametric statistical techniques Illustrate the significance level as the probability of rejecting a true null hypothesis CO5. Illustrate Sequential probability ratio test.

19ST5CC10	Design of Experiments	Global	This course is introduced to the students to understand the fundamental principles of experimental designs.	CO1. Define and recognize the terminology of experimental design. CO2. Apply and interpret the methods of analysis of variance. CO3. Analyse CRD, RBD AND LSD. CO4. Analyse missing plot technique I RBD and LSD. CO5. Design and conduct two level functional factorial designs, split plot design.
19ST5CC11	Demography	Global	This course begins by focusing on understanding the core social demographic	CO1. Explain sources of demographic data. CO2. Apply fertility measurements such as CBR, TFR, GRR and NRR.

			variables such as fertility, mortality and migration and how these variables influence population growth, composition and structure.	CO3. Compute mortality measures CDR, SDR and infant mortality rate. CO4. Construct the demographic table. CO5. Explain the factors affecting migration and the basic ideas of Stationary and Stable population.

19ST5CC12	Real Analysis	Global	This course introduces the basic concepts in analysis and to enable the students understand fundamental ideas and theorems in analysis.	CO1. Describe fundamental ideas and theorems on sequences. CO2. Distinguish convergent and divergent sequences. CO3. Elucidate types and operations on series. Also, analyze the convergent and divergent series using comparison, root, and ratio test. CO4. Expound the concepts on limits, metric space and its related properties. CO5. Explain the concept of connectedness, completeness, compactness and their roles in the real line. Also, organize theorems in a correct mathematical way.

19ST5ME1	Computer Programming in C	Global	This course provides skills in designing and writing simple programs in C.	CO1. Explain various data types and operators in C CO2. Summarize Decision Making Branching, looping statements CO3. Inscribe C program to access arrays CO4. Describe Strings and String Handling Functions CO5. Create C program using functions for real life problems

19ST5ME2	Multivariate Analysis	Global	The course covers multivariate normal distribution, hotelling T^2 statistics, multivariate classification and discrimination analysis, principal components and cluster analysis.	CO1. Derive the important properties of multivariate normal distribution. CO2. Compute hotelling T^2 statistics test on mean vector and multivariate normal population. CO3. Understand how to assess the efficacy of classification and discrimination analysis. CO4. Introduce principal components analysis and clustering methods. CO5. Explain and Analyse contingency tables.

19ST5SB3	Practical Statistics - III	Global	The course provides an application based on MLEs, analysis of time series, index numbers and vital statistics & cure fitting.	CO1. Analyze the problems based on confidence interval for proportions, mean, variances and correlation coefficient. CO2. Apply and interpret the methods of curve fitting and time series. CO3. Analyze the problem based on vital statistics.
19ST5SB4	Statistical Software – SPSS	Global	To expose the students on the applications of statistical analysis using SPSS	CO1. Understand how to start SPSS and recode variables and prepare data for analysis. CO2. Conduct descriptive and basic inferential statistics. CO3.Carry out statistical analysis that can test hypothesis and analyze factorial experiments.

19ST6CC13	Statistical Quality Control	National	This course is designed to introduce students to statistical quality control emphasizing those aspects which are relevant for SQC's practical implementation	CO1. Describe the use of control charts. CO2. Demonstrate the ability to design, use and interpret control charts for variables. CO3. Identify the difference between $\bar{X}$, R, p, np and C charts. CO4. Explain the process of acceptance sampling and describe the use of OC curve. CO5. Make use of the concept of reliability and examine its uses in problems of quality and cost.
19ST6CC14	Stochastic Processes	Global	This course covers Markov chains in discrete time, the	CO1. Explain the concept of stochastic processes and stationary and appreciate their

			Poisson process and the Markov processes in continuous time	significance. CO2. Compute probabilities of transition between states and identify classes of states in Markov chains and characterize the classes. CO3. Explain Poisson process and its related distributions. CO4. Demonstrate the knowledge in Pure and Death process. CO5. Compute moving averages using various methods.

19ST6CC15	Actuarial Statistics	National	The course covers the applications of insurance and finance.	CO1. Calculate quantities such as SI & CI, nominal and effective rates of interest and simple discount. CO2. Recognize simple assurance and annuities contracts and develop formulae for the present value of payments. CO3. Explain the concepts of redemption of loans. CO4. Construct the demographic statistics and premiums. CO5. Describe the policy values and its types.
19ST6ME3	Numerical Methods	Global	This course enables the students to solve equations	CO1. Solve algebraic and transcendental equations using

			using various Numerical Methods	various methods CO2. Identify the various methods of solving simultaneous linear algebraic equations CO3. Recognize difference operators and apply the concept of interpolation CO4. Compute the values of the derivatives at some point using numerical differentiation and integration. CO5. Compute numerical solution of differential equation

19ST6ME4	Regression Analysis	Global	This course focuses on building a greater understanding on statistical tools for applying the linear regression model and its generations.	CO1. Classify and compute simple, multiple and partial correlation. CO2. Evaluate the regression model and estimate the standard error. CO3. Apply multiple linear regression analysis and classify simple linear regression analysis and multiple linear regression analysis. CO4. Test equality of regression coefficients.
19ST6ME5	Operations Research	National	This helps in solving in different environments that needs decisions.	CO1. Define sequencing problem and apply it to solve real life problems. CO2. Solve problems in decision

				making. CO3. Apply inventory control to solve practical problems. CO4. Classify queuing models. CO5. Explain CPM and PERT to plan schedule and control project activities.

19ST6ME6	Industrial Statistics	National	This course is concerned with maintaining and improving the quality of goods and services	CO1. Summarize the concept of deterministic models when the demands occur uniformly with and without shortage costs. CO2. Explain the policy for production planning when inventory levels are reviewed periodically. CO3. Demonstrate the concept of forecasting and its applications in manufacturing and non manufacturing industrial situations. CO4. Classify survival functions and hazard functions.
19ST6SB5	Practical Statistics - IV	Global	The course provides an application	CO1. Analyze the problems based on statistical quality control

			related to statistical quality control, non parametric tests & design of experiments	CO2. Examine various non parametric tests. CO3. Apply and interpret the methods of ANOVA, factorial experiments, CRD, RBD and LSD.
19ST6SB6	Statistical Software - R	Global	The course is introduced to learn a programming language which helps to handle all aspects of statistical software.	CO1. To impart efficient Data Handling Techniques. CO2. To equip students to Statistical Programming Skills based on real life examples and datasets. CO3. Able to explore results using ANOVA and ANOCOVA.