

Janta Vedic College Baraut

Department of Statistics

Course Outcomes and programme outcomes

Purpose of the programme (programme outcomes)

The Courses in the Department of Statistics will enable the student

- to develop the skills to analyse complex statistical data coming from the various fields like industry, marketing, finance, agriculture and business.
- to implement data analysis strategies to develop efficient models for various theoretical postulations.
- understand the intricacies of statistical testing and its applications in real life problems
- to develop, design and analyse experiments in empirical research.
- to develop soft skills and practicing professional ethics.
- analyse very large data sets in the context of real-world problems and interpret results using data analytics.
- understand the optimization and computational techniques for the solution of the real-life problems.

Course Outcomes

Each course, in all the Programmes, has been designed and kept in accordance with the instructions of UGC and fulfills the requirements of the academic and industrial needs. By opting these courses students may be able to qualify the various esteemed competitive examinations like CSIR-NET, UGC-NET, GATE, ISS, IAS, PCS and many others. These programmes offered by the department are highly employable and enable the students to take positions in various Institutes/Universities/Industries for research and development and serve the society.

Janta Vedic College Baraut Department of Statistics
PROGRAM- B Sc. Statistics 1st Year

Courses	Course Outcomes	Program Outcomes
B-194 Statistical Methods	<p>1: Understand the concept of a statistical population and a sample from a population.</p> <p>2: Classification and tabulation of data. Different types of data. Diagrammatical and graphical representation of data.</p> <p>3: Measures of central tendency, Dispersion, Skewness and Kurtosis and Moments.</p> <p>4: Concept of correlation, correlation coefficients - Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, multiple and partial correlation coefficients, Intraclass correlation.</p>	<p>After successfully completing this program, students will be able to: To impart knowledge on different topics of Statistics, expected from a Graduate in Statistics.</p>

B-195 Probabilty	<p>1: Understand discrete and continuous distributions and identify their characteristics. Students will be able to identify the type of statistical situation to which different distributions can be applied. Use the different distributions in solving statistical problems.</p> <p>2: Basic idea of Box Plot, QQ Plot and PP Plot.</p> <p>3: Gain knowledge in sampling distribution theory and their applications in statistical inference. Chi- square, t and F distribution, Chebyshev's inequality, Weak Law of Large numbers and the Central Limit Theorem.</p> <p>4: Gain knowledge in the concepts of Theory of estimation and distinguish various types of estimation. Know the properties of estimators and construction of point and interval estimators.</p> <p>5: Understand the process of hypothesis testing and its significance. Distinguish various test used in sampling theory. Use the different test in solving statistical problems.</p>	After successfully completing this program, students will be able to: To impart knowledge on different topics of Statistics, expected from a Graduate in Statistics.
B-196 Probability Distribution and theroy of attributes		

B Sc. Statistics

2nd Year

	B-294 Statistical Inference	<p>Statistical inference: Drawing conclusions about the whole population on the basis of a sample. Statistical inference is the process of deducing properties of an underlying probability distribution by analysis of data. Inferential statistical analysis infers properties about a population, this includes testing hypotheses and deriving estimates.</p>	
	B-295 Survey Sampling	<p>Survey Sampling provides the tolls/ techniques for selecting a sample of elements from a target population keeping in mind the objectives and nature of population. Most of the research work is done through Sample Survey. The students are able to know about Indian Official Statistical System</p>	<p>After completing the course, students should have developed clear understanding of :</p> <ul style="list-style-type: none"> • Basic concepts of survey sampling • Principles of survey sampling and main steps involved in selecting a sample • Simple random sampling • Stratified random sampling • Systematic sampling • Ratio and Regression method of estimation • Cluster sampling (equal cluster size) • Concepts of sub sampling • Indian Official Statistical System
	B-296 Analysis of variance and Design of experiment	<p>DOE is a tool to develop an experimentation strategy that maximizes learning using a minimum of resources. Extensively used by engineers and</p>	<p>After completing Course in DOE students should have developed a clear understanding of:</p> <ul style="list-style-type: none"> • The fundamental concepts of design of experiments.

		<p>scientists involved in the improvement of manufacturing processes to maximize yield and decrease variability. It is widely used in many fields with broad application across all the natural and social sciences, to name a few: Biostatistics, Agriculture, Marketing, Software engineering. Industry etc.</p>	<ul style="list-style-type: none"> • Introduction to planning valid and economical experiments within given resources. • Completely randomized design. • Randomized block design. • Latin square design. • Balanced incomplete block design. • Full and confounded factorial designs with two and three levels. • Fractional factorial designs with two levels.
<p>B Sc. Statistics 3rd Year</p>	<p>B-394 Non parametric methods</p>	<p>The learning objectives include:</p> <ol style="list-style-type: none"> 1) Study of theoretical concepts of Bivariate Normal and Multivariate Normal Distributions along with their properties. 2) Analyze multivariate data. 3) Application of Wald's SPRT and Non-Parametric methods of testing of hypothesis 	<p>On completion of the course, students should have achieved the following</p> <ol style="list-style-type: none"> 1) The understanding of basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution. 2) Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis. 3) Classification method namely Discriminant Analysis. 4) Application of Wald's SPRT for testing simple null hypothesis vs simple alternative hypothesis along with the study of the O.C. function and the ASN function for various underlying continuous and

			discrete distributions. 5) Testing of hypothesis using Non-Parametric tests like Median test, Runs test, U test, Kruskal Wallis test etc. and ability to use them judiciously for the testing of given data.
	B-395 Applied Statistics	<p>1. This course will help students to know the applications of Statistics and learn and apply these techniques in the core course of their study.</p> <p>2. This course will give exposure to four applied fields of statistics viz. Time Series, Index Numbers, Statistical Quality Control and Demographic methods.</p> <p>3. They will be having hands on practice of working on the data and interpreting the results related to above mentioned fields.</p>	After successfully completing this program, students will be able to: To impart knowledge on different topics of Statistics, expected from a Graduate in Statistics.
	B-396 Linear programming and computational techniques	<p>1. In this course students learn to write code in C to do statistical computing and its role in problem solving. C is a powerful, structured programming language widely used in all areas of study.</p> <p>2. Student will understand basic data structures and develop logics which will help them to create well-structured programs using C language. It develops</p>	After successfully completing this program, students will be able to: To impart knowledge on different topics of Statistics, expected from a Graduate in Statistics.

		<p>the analytical as well as logical thinking of the student.</p> <p>3. It also opens the adaptability to learn any other programming language and using computer languages/software as a tool to analyze data statistically.</p>	
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Program Specific Outcome (PSOS):

The courses in the Department are designed to inculcate analytic and decision-making aptitude among the students. Having an advanced and upgraded knowledge of Statistics from both the theoretical and practical aspects, the students who pass out are well equipped in managing and analysing various types of data. The education imparted in Statistics is aimed to inculcate statistical thinking in young minds for better future planning and welfare of society and to contribute to the society through excellence in statistical education and research. Students after completing these courses may be able to start their career with various Academia and Industry Interface. It may provide a platform to all the students to get experiential learning in this material world.

PROGRAM SPECIFIC OUTCOMES (PCOS)	
Certificate in Descriptive Statistics and Theory of Probability	
First Year	<p>After completing this course a student will have:</p> <ol style="list-style-type: none"> 1. Knowledge of Statistics, its scope and importance in various fields. 2. Ability to understand concepts of sample vs. population and difference between different types of data. 3. Knowledge of methods for summarising data sets, including common graphical tools (such as boxplots, histograms and stemplots). Interpret histograms and boxplots. 4. Ability to describe data with measures of central tendency and measures of dispersion. 5. Ability to understand measures of skewness and kurtosis and their utility and significance.

	<ol style="list-style-type: none"> 6. Ability to understand the concept of probability along with basic laws and axioms of probability. 7. Ability to understand the terms mutually exclusive and independence and their relevance. 8. Ability to identify the appropriate method (i.e. union, intersection, conditional, etc.) for solving a problem. 9. Ability to apply basic probability principles to solve real life problems. } 10. Ability to understand the concept of random variable (discrete and continuous), concept of probability distribution.
	COURSE TITLE
SECOND YEAR DIPLOMA	<p>Diploma in sampling Techniques,testing of Hypothesis and Applied Statistics</p> <p>After completing this course a student will have:</p> <ol style="list-style-type: none"> 1. Knowledge of the terms like null and alternative hypotheses, two-tailed and onetailed alternative hypotheses, significant and insignificant, level of significance and confidence, p value etc. 2. Ability to understand the concept of MP, UMP and UMPU tests 3. Ability to understand under what situations one would conduct the small sample and large sample tests (in case of one sample and two sample tests). 4. Familiarity with different aspects of Applied Statistics and their use in real life situations. 5. Ability to understand the concept of Time series along with its different components. Knowledge of Index numbers and their applications along with different types of Index numbers. 6. Familiarity with various demographic methods and different measures of mortality and fertility. 7. Ability to understand the concept of life table and its construction. 8. Knowledge to understand the concept of statistical quality control and different control charts for variables and attributes.

THIRD YEAR B Sc. Statistics	<p>1: Understand the basic concepts of vital statistics. Mortality rates, fertility rates and their measurements. Have a basic idea about migration and population projection.</p> <p>2: Understand the concepts of quality control, control charts for variables and attributes. Know about the different types of control charts for variables and attributes and their construction. Producer's and consumer's risk, Acceptance sampling plans.</p> <p>3: Acquire knowledge on Index numbers and their applications. Have a clear understanding about the different indices, criteria of a good index, cost of living index number and calculate indices from given data.</p> <p>4: Understand the concepts of time series, the different models, measurement of trend and seasonal variations.</p> <p>5: Gain knowledge about demand analysis. Law of demand and supply. Price elasticity of demand, Pareto distribution, Lorenz curve and Gini's coefficient.</p> <p>6: Know about Indian Official Statistical system. The different methods of collection of official statistics and their reliability. Principal publications and the various official agencies responsible for data collection and their main functions.</p>
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Janta Vedic College Baraut Department of Statistics
PROGRAM-M Sc. Statistics 1st Sem

COURSE	Course outcome	Program outcome
H-1032 Probability Theory	The students will be able to distinguish between probability models appropriate to different chance events and calculate probability according to these methods.	In our day-to-day lives, we deal with the uncertainties. Scientists and Researchers cope-up with these doubts by using the concept of probability. Probability theory and its models serve as a link between the descriptive and inferential statistics, methodologies for assessing and quantifying chance

H-1033 Statistical Distributions	The students will be able to formulate the mathematical/statistical models for real data set arising in various fields in order to analyse in respect of various useful characteristics of the populations.	After studying the concept of random variable; in probability theory, the knowledge of Statistical distributions is of prime need. It gives the idea, how the total probability is distributed among the possible values of random variables.
H-1034 Sampling Techniques	The course will equip a student with the knowledge of adopting a suitable sampling plan in a variety of situations and develop statistical inferences about the population.	Sampling is that part of statistical practice concerned with the selection of individual observations intended to yield some knowledge about a population of concern, specially for the purpose of Statistical Inference.
H-1036 Computer Fundamentals and Programming in C Language	After this course a student will be fully equipped with the techniques of developing his own computer programmes for most of the mathematical as well as Statistical methods.	In the modern age of computing, Statistician uses computers for large and fast calculations. The advanced knowledge of computers and a scientific programming language is must for a student of Statistics.

PROGRAM-M Sc. Statistics 2nd Semester

COURSE	COURSE OUTCOME	PROGRAM OUTCOME
H-2032 Design of Experiments and Linear Estimation	Students should be able to understand the random behavior of experimental processes, particularly, scientific, engineering and industrial.	In many areas like Industrial, Biological, Agricultural, etc, the prime focus is to formulate the layout of the design of experiment so that appropriate information regarding the population can be gathered and analyzed. Thus, it is must to have the knowledge of the experimental techniques such as CRD, RBD, LSD, BIBD and factorial designs.

H-2033 Inference-I: Point Estimation and Testing of Hypothesis	This course will make a student learn the various properties of a good estimator as well as techniques to develop such estimators from both classical and Bayesian point of view.	In Statistics population parameters describe the characteristics under study. These parameters need to be estimated on the basis of collected data called sample.
H-2034 Matrices & Linear Difference Equations	After studying this course the students will be able to understand the basic concepts of matrices, their types and their mathematical operations leading to the estimation of parametric models.	This course forms the mathematical background for courses such as multivariate analysis, design of experiments, quadratic forms etc. So, the study of the course is of prime need.
H-2035 Real and Complex Analysis	The students will be able to apply the tools studied in the course in his further studies of statistical courses and research investigation.	It is a branch of mathematical analysis dealing with the set of real and complex numbers which plays the vital role to follow the complexities of statistical topics in their research studies.

M sc. Statistics 3rd Semester

COURSE	COURSE OUTCOME	PROGRAM OUTCOME
H-3032 Inference-II: Interval Estimation, Sequential Analysis & Non-Parametric Inference	The students will be able to demonstrate knowledge and understanding of the principles and theory of statistical inference and the ability to formulate statistical hypothesis and to use theory to estimate model parameters.	Sometimes, the number of observations required by the procedure to reach a decision is not fixed in advance of the experiment. In such cases, inferences can be drawn by the use of the sequential procedure. More so, when we do not know the form of the population, non-parametric statistical tools like Sign, Run, Median, Mann-Whitney, K-S and Chi-square tests are used to infer about the characteristics of the population.
H-3033 Engineering Statistics, Quality Control and Reliability	The students will be able to apply the fundamental tools/methods in various industrial plants.	In engineering and manufacturing, the knowledge of this course deals with assurance and failure testing in design and production of products or services to meet or exceed customer requirements.
H-3034 Operations Research-I	The knowledge of the contents of this course will help businessman/industrial	It is purely applied course having wide applicability towards business/industries.

	managers to take optimum decisions/solutions to the executive type of problem.	
H-3035 Decision Theory & Bayesian Inference	After learning this course a student must be able to develop tests and confidence intervals for population parameters.	A part from estimating parameters, Statistics also attempts to test the conventional wisdom or guesses or conjectures made by experienced experimenters. Testing of hypothesis does exactly that.

PROGRAM-M Sc. Statistics 4th Semester

COURSE	COURSE OUTCOME	PROGRAM OUTCOME
H-4032 Multivariate Analysis	The students should be able to demonstrate knowledge and understanding of parametric and nonparametric tests, discriminant analysis, factor analysis, and principal component analysis in medical, industrial, engineering, business and many other scientific areas.	Due to the multi-dimensional nature of the data arising from the various fields, it is then primary need to infer about the multivariate techniques such as factor analysis, discriminate analysis, cluster analysis, and principal component analysis, etc. which are used in reduction, factorization and classification and analysis of the high-dimensional data.
H-4033 Economic Statistics and Demography	After studying this course one learns the most important technique of forecasting used in economic analysis. It will also equip a student with tools used in population studies.	Time series is a sequence of data points measured at, often uniform, intervals. It is needed to forecast the future events. For social and economic purposes one needs to study the societies or groups in view of their birth and mortality rates. Demography studies the measurement of population processes.
H-4034 Operations Research-II	To develop the ability to formulate fairly complex optimization problems in the context of practical problems.	The course is designed to introduce students to idea of various types of programming, sequencing and replacement problem of items that deteriorate.
H-4036 Advanced Experimental Designs	Keeping the knowledge of the course, one can apply the techniques of advanced design in Biological and Agriculture research in order to see the significant effect of different new drugs/treatments.	Experimental designs are those by which the knowledge of various statistical topics can be applied in agriculture field for improving the crop-plants through genetic-techniques.

