Sant Gadge Baba Amravati University, Amravati

Faculty of Science and Technology
Programme: B. Sc. (Statistics)

POs

At the time of graduation, Students will be able to

PO1.Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO2.Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PSOs:
Upon completion of the programme, students would be able to

1. recall basic facts about statistics and should be able to display knowledge of conventions such as notations, terminology.
2. get adequate exposure to global and local concerns that explore them many aspects of mathematical sciences.
3. Be equipped with statistical modeling ability, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
4. apply their skills and knowledge that is translate information presented verbally into statistical form, select and use appropriate statistical formulae or techniques in order to process the information and draw the relevant conclusion.
5. develop a positive attitude towards statistics as an interesting and valuable subject of study.
6. acquire basic knowledge of diagrammatic & graphical representation of Data with and without software.

Employability Potential of the programme:

The programme offers many such scenarios where one statistician can work.

By completing this programme, students are able to:

- Analyse the things
- Understand patterns in them by asking different questions to it
- Compete with the current demand of field
- To solve a specific problem

This “skill” is a key requirement for many analysis type jobs like,

1. Statisticians
2. Business Analyst
3. Mathematician
4. Professor
5. Risk Analyst
6. Data Analyst
7. Content Analyst
8. Statistic Trainer

Besides all these students can work in various banking sector.

Students can also work in government sector :

- Indian statistical services (ISS)
- Staff selection services(SSC)
- Reserve Bank of India (Junior statistical officer)

By taking the course, students are able to:

- Analyse numbers
- Understand patterns in them by asking different questions to it
- Go about it in a systematic fashion
- To solve a specific problem

This "skill" is a key requirement for many analysis type jobs.

Career Options::

Data Analytics #1: Students could get into any Analytics firm, and can assist customers in getting patterns out of data.

Data Analytics #2: For Data Analytics in banks, there can be algorithms developed for fraud deduction using the digital imprints. This requires analysing large amounts of data. That could a career choice - Digital Forensics.

Market Research: For doing a survey for customer expectations and behaviours, the data pours in, from online and offline channels - how students draw meaningful, actionable conclusions? Students need to use the statistical methods learnt. So, Market Research in a MR firm or a corporate entity can be a large area of focus.

Software Programmer: With analytical bent of mind, Students could take up a software programming job. It might not leverage learning but will leverage the "bent of mind" cultivated out of the education.

Students could focus on areas like: Visual Representation of Data (Tableau, Quilk, PowerBI), Data Reporting (Crystal Reports) - that are aligned to the core skills.

Government Statistician: Our country requires a lot of econometric and statistical data for its running. Acreage, Yields, Health Statistics and the like. Bright young idealistic people are required to run our country too.

Students could be a District Statistical Officer, who are in charge of collecting information from the district, analysing it and sharing with the State Authorities.

B.A/ B.Sc. I Year Semester I (CBCS)

Statistics Syllabus

Name of the paper: **Descriptive Statistics & Probability Theory**

No. of theory classes: 6 per week **Total credits – 4.5 credits**

Unit I

Introduction, scope and importance of statistics, Data & its type Primary, secondary, Qualitative, Quantitative Classification of data, Measures of central tendencies with simple applications, partition values quartiles deciles and percentiles. Scales of measurement- Nominal, Ordinal, Interval, &ratio, (12 Periods)

Unit II

Measures of dispersion- Range, Mean Deviation, Standard Deviation,Coefficient of variation, Central moments & raw moments, measures of skewness and kurtosis, numerical problems
(12 Period)

Unit III

Concept of Probability, Definitions related to probability, Mathematical, Statistical & Axiomatic definition of probability, Addition and Multiplication theorem of probability, Conditional probability, Boole's inequality, Bayes theorem, Simple problems on probability. (12 Periods)

Unit IV

Random variable- Discrete & Continuous random variable, Probability Mass function, & Probability Density function, Distribution function and its properties, Mathematical Expectation – Expectation of a function of random variable, Addition theorem of expectation, Multiplication theorem ofexpectation, Expectation of linear combination of random variables, Variance, covariance (12 Periods)

Unit V

Bivariate random variable – Discrete & Continuous random variable, Joint Probability Mass function, Joint Probability density function, Probability distribution function and its properties Marginal Probability function, conditional probability density function, Numerical problems.

Moment Generating function, Theorems on moment generating function, cumulant generating function and its properties, Probability generating function. (12 Period)

Unit VI Skill enhancement Course

Basics of excel – Data Entry, editing & saving, establishing and copying formulae, built in functions – Copy and paste, Find and Replace, Sorting, Study of statistical function in Excel. All numerical problems related to Unit-I and Unit-II should be perform in MS Excel. (12 Periods)

Examination duration: 3 Hrs.

Theory marks: Theory + MCQ: 80 + Internal: 20 =100

Books Recommended

1] Fundamentals of statistics (Vol. I) by Goon A. M, Gupta M.K, Dasgupta B, WorldPress (Pvt Ltd) Kolkata

2] Fundamental of Mathematical Statistics- V.K. Kapoor & S.C. Gupta Sultan Chand &Sons New Delhi

3] New Mathematical Statistics – Sanjay Arora & Bansilal, Satya Prakashan New Delhi4] Introduction to Probability theory & its applications (Vol. I)- William Feller Wiley

4] Applied Statistics with Microsoft Excel – Gerald Keller, Duxbury, Thomson learning

5] Statistics for managers using Microsoft excel - Levine, Stephen, Krehbiel, Berenson, (4th edition), Pearson publication.

6] Statistical analysis with MS Excel – Dr Asha Chawla, Dr Seema Malik AvichalPublishing Company

Course Outcome (CO)

Upon completion of this course successfully, students would be able to

1. Understand the basic knowledge and elaborative concept of statistical analysis
2. develop detailed statistical knowledge
3. use Probabilistic knowledge
4. apply Concepts regarding statistical analysis
5. CO for Skill Enhancement Course: Computer knowledge of thestudents is developed.

B.Sc. I Sem-I Practical Subject: STATISTICS **Practical credits: 2.25**

COs:

Upon completion of this course successfully, students would be able to solve/perform/demonstrate the following

List of Practical

1] Computation of various measures of central tendencies – Mean, Median, Mode

2] Computation of various measures of dispersion – Range, Mean deviation, Standard deviation3] Computation of various central moments and raw moments.

4] Computation of partition values – Quartiles, Deciles, Percentiles5] Simple problems on probability

6] Problems on various Measures of skewness7] Problems on various measures of kurtosis

8] Problems on Joint probability mass function and marginal probability function

9] Problems on Joint probability density function and marginal probability density function10] Computation of descriptive statistics by using MS excel

11Data visualizations through diagram

12] Computation of various measures of central tendencies by using MS Excel13] Computation of various measures of dispersion by using MS Excel

Practical examination duration: 3 Hrs. Practical total marks: Internal: 25 + External: 25 = 50

B.A/ B.Sc. I Year Semester II (CBCS)

Statistics Syllabus

Name of the paper: **Probability Distributions**

No. of theory classes: 6 per week **Total credits – 4.5 credits**

Unit I

Discrete distributions – Uniform & Bernoulli distributions- Definition, mean, variance, derivation of probability mass function of Binomial distribution, Poisson distribution, Mean,
variance, mgf, cgf, reproductive property, reallife applications (12 periods)

Unit II

Negative Binomial distribution- mean variance, mgf, cumulants of distribution, Geometric distribution, mgf of G.D., Hypergeometric distribution- mean and variance (12Period)

Unit III

Normal distributions- mean, mode, median, mgf, cgf, of Normal distributions, Linear combinations of independent normal variates, Points of inflexion of normal curve, Area property, Simple problems on area property (12 period)

Unit IV

Rectangular or Uniform distributions, moments, mgf, cgf,Exponential distribution- mgf, mean & variance, Beta distributions of first and second kind and there mean and variance. Gamma distribution and its mean and variance (12 periods)

Unit V

Bivariate data – Definition, scatter diagram, simple correlation, Karl Pearson's coefficient of correlation and its properties, Rank correlation coefficient, least square method for fitting of straight line. Regression, lines of regression, Regression coefficients, Properties of the regression coefficient. (12 periods)

Unit VI Skill Enhancement Course

Introduction to spreadsheet, reading data, manipulating data, Basic spreadsheets operations & functions – IF, nested IF, VLOOK UP, H LOOK UP, Introduction to charts in excel,scatter plot in excel, Correlation and regression analysis using MS Excel (14 Periods)

Examination duration: 3 Hrs.
Theory marks: Theory + MCQ: 80 + Internal: 20 =100

Books Recommended

1] Fundamentals of statistics (Vol. I) by Goon A. M, Gupta M.K, Dasgupta B, WorldPress (Pvt Ltd) Kolkata

2] Fundamental of Mathematical Statistics- V.K. Kapoor & S.C. Gupta Sultan Chand &Sons New Delhi

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5] Statistics for managers using Microsoft excel - Levine, Stephen, Krehbiel, Berenson, (4thedition), Pearson publication.

6] Statistical analysis with MS Excel – Dr Asha Chawla, Dr Seema Malik AvichalPublishing Company

Course Outcome (CO)

Upon completion of this course successfully, students would be able to

1. Develop Statistical distribution knowledge
2. Apply Advance statisticaldistribution knowledge
3. Use Statistical continuous distribution
4. Use Advanced statistical distribution knowledge
5. use the descriptive statistical knowledge
6. use Some advanced computer knowledge

List of Practical

COs:

Upon completion of this course successfully, students would be able to solve/perform/demonstrate the following

1] Problems on Binomial distribution2]
Fitting of Binomial distribution
3] Problems on Poisson distribution4]
Fitting on Poisson distribution
5] Fitting of Normal distribution
6] Problems on area property of normal distribution7] Fitting of straight line by least square method.
8] Computation of Karl Pearson's coefficient of correlation.
9] Computation of Rank correlation
10] Computation of regression coefficient
11] Fitting of regression line by method of least squares
12] Data visualizations through graphs through MS Excel

Practical examination duration: 3 Hrs. Practical total marks: Internal: 25 + External: 25 = 50

B. Sc. - I

Generic Elective – I (GOEC)

Name of Paper – **Data Presentation and Summarization**

2 Lectures per week & Credit -2

Contents:

Unit- I

Meaning of statistics as a science, importance of statistics

Data, its types: Qualitative and Quantitative data, Methods of collecting primary and secondary data. Presentation of data; classification and tabulation of data. Frequency table, cumulative frequency table, simple bar, subdivided bar and multiple bars, pie diagram, Histogram. Frequency curve, Frequency polygon, Ogive curve.

Unit-II

Measures of Central tendency:

Arithmetic mean, median, mode for discrete and continuous data. simple problems. Measures of dispersion: Range, mean deviation and standard deviation, variance.

College level examination should be conducted.
Duration of examination: 2 Hrs.
Total marks: 50
Passing marks: 20