Syllabus for First Year M.Sc. (CA&IT)
Semester-II

[Five Years' (Full-time) M.Sc. (CA&IT) Integrated Degree Course]

Offered in

K. S. School of Business Management and Information Technology

Gujarat University

2023–2024

As per

NEP2020 CURRICULUM AND CREDIT FRAMEWORK FOR UNDER GRADUATE PROGRAMMES, UGC

&

Resolution No. KCG/admin/2023-24/0607/kh.1

of

Education Department, Govt. of Gujarat

Semester-II

(B.Sc.(CA&IT) Programme)

Multi Disciplinary Courses

Gujarat University

K. S. School of Business Management and Information Technology
[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]
First Year M.Sc. (CA&IT) (Semester - II)

Course Name: Computer Oriented Statistical Methods-Theory

Course Code: MDC-IMSCIT-124T

Course Credit: 2

Course Outcomes:
After learning the course, the students should be able:

- Acquire a deep understanding of ancient Indian mathematicians, their methodologies, and contributions, enriching mathematical knowledge with insights from Indian Knowledge Systems.
- Apply ancient Indian methods of factorization, triangular numbers, and geometric progression to solve mathematical problems, demonstrating practical skills rooted in historical mathematical traditions.
- Gain cultural insights by analyzing the game of dice and its connections to game theory in the Mahabharata, providing a unique perspective on strategic decision-making in historical contexts.
- Recognize the historical roots of data analytics in ancient Indian mathematical practices, connecting traditional wisdom to contemporary applications in data analysis.
- Develop statistical proficiency with a focus on descriptive statistics and numerical methods, enabling the analysis and interpretation of data through measures of variability, association, and distribution, along with practical applications in regression modeling

Contents:

Unit No.	Course Content	Hours	Credits
1	**Computation in Indian Knowledge Systems (IKS)** Notable ancient Indian Mathematicians, Methods of Factorization, Basics of Determinations, Triangular numbers and calculation of Spheres, Quick Exponential calculations, Invention of Chess & Geometric Progression, Summation of Infinite Geometric Series, Permutation & Combinatorics in IKS, Concepts of Probability in IKS, Game of Dice, Game theory in Mahabharata, Data analytics and its roots in ancient India	**15**	**1**
2	**Descriptive Statistics: Numerical Methods** Measures of variability: range, inter quartile range, variance, standard deviation, coefficient of variation, Measures of association between two variables: covariance interpretation of the covariance correlation coefficient interpretation of the correlation coefficient, Measures of distribution: shape, relative location, and detecting outliers z-scores, empirical rule detecting outliers box plot. Simple and Multiple linear regression model, least squares method	**15**	**1**

Reference Books:

1. "Meru Prastaar",
   By Halai C.M., Garuda Prakashan
2. "Statistics for Business & Economics",
   By Anderson, David R., etal, Cengage learning
3. "Data analytics: models and algorithms for intelligent
   By Thomasa. Runkler. –Wiesbaden,
4. "Data analysis", Springer(cop.2012),
   By Verlag
5. Meta S. Brown, "Big data analytics"
   By Parag Kulkarni, Sarang Joshi,
6. "Data analytics and big-data",
7. By Soraya Sedkaoui, Wiley
8. "Data science and big data analytics",
   By Emc Education Services, Wiley
9. Heroor V., "Sridhara's Trisatika or Patiganitasara",
   By Old Chinmaya International Foundation

Accomplishments of the student after completing the Course:

After completion of this course Student would be able to

- Explore the achievements and methodologies of ancient Indian mathematicians, understanding their profound contributions to mathematical concepts that laid the foundation for computation in Indian Knowledge Systems.
- Delve into the strategic aspects of the game of dice in the Mahabharata, analyzing its connections to game theory. This topic provides insights into ancient decision-making strategies and their cultural significance.
- Investigate the historical roots of data analytics in ancient Indian mathematical practices, connecting traditional wisdom to contemporary applications. This topic highlights the enduring relevance of historical knowledge in the modern context.
- Master essential statistical concepts such as measures of variability, association, and distribution. Understand the practical application of numerical methods, including regression modeling, for effective data analysis and interpretation.
- Apply ancient Indian methods of factorization, triangular numbers, and geometric progression to solve mathematical problems. This hands-on exploration bridges historical knowledge with practical problem-solving skills, showcasing the applicability of ancient techniques in a contemporary setting.

Gujarat University

K. S. School of Business Management and Information Technology
[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]
First Year M.Sc. (CA&IT) (Semester - II)

Course Name: Computer Oriented Statistical Methods-Practical

Course Code: MDC-IMSCIT-124P

Course Credit: 2

Course Outcomes:
After learning the course, the students should be able:

- Understand the fundamental concepts of data, its types, and the distinctions between categorical and numerical data.
- Analyze univariate, bivariate, and multivariate data, summarizing information effectively.
- Create and interpret various types of charts, including bar charts, scatter plots, line charts, area charts, and pie charts.
- Utilize advanced visualization techniques such as stem-and-leaf display, dot plot, histogram, cumulative distributions, and Ogive. And Apply data pre-processing techniques, including handling missing values and normalizing data for consistent scaling.
- Conduct statistical analysis in Excel, including the use of charts, rank values, and the Data Analysis Tool Pack.
- Use Tableau Public for creating advanced visualizations and integrate them with Excel data.

Contents:

Unit No.	Course Content	Hours	Credits
1	**Data Pre-processing & Data Visualization** Introduction to data, Data Analytics/Mining/Science, data sets, features, data scales, categorical and numerical data, cross-sectional and time series data. Univariate, bivariate and Multivariate data. Summarizing data. Frequency Distribution Relative Frequency and Percent Frequency, distributions, cross-tabulations **Data Visualization:** Bar Charts, Scatter plots, line chart, area chart and Pie Charts, stem and leaf display. Dot Plot, Histogram Cumulative Distributions, Ogive. **Data Pre-processing:** Handling missing values, normalization of data	**30**	**1**
2	**Introduction to statistical analysis in excel** Charts for univariate and bivariate data, Rank values to establish percentages and percentiles, Data Analysis Tool pack, Descriptive Statistics, measures of central tendency, dispersion and association, Straight Line Analysis, Graphically estimate the relationship between two variables, Simple Linear Regression, Implementation of statistical functions in Spreadsheet Packages, Visualization using Tableau Public	**30**	**1**

Reference Books:

1. "C Programming: Including Numerical and Statistical Methods",
   By Pal, Madhumangal, Alpha Science International
2. "Excel statistics: A quick guide",
   By Salkind, Neil J., Sage Publications
3. "Microsoft Excel Data Analytics& Business Modeling",
   By Wayne Winston, Pearson
4. "Meru Prastaar",
   By Halai C.M., Garuda Prakashan

Accomplishments of the student after completing the Course:

After completion of this course Student would be able to

- Students will excel in conveying complex insights through compelling data visualizations.
- Their proficiency in creating diverse visual representations, from basic charts to advanced displays, will enable effective communication of data-driven narratives.
- Graduates will be accomplished in data pre-processing, ensuring the integrity and reliability of datasets.
- Students will showcase mastery in statistical analysis using Excel, employing a range of tools for univariate and bivariate data.
- Graduates will emerge as holistic decision-makers, combining their data visualization, statistical analysis, and data pre-processing skills.