

# DEPARTMENT OF STATISTICS

SYLLABUS FOR FOUR YEAR UNDERGRADUATE PROGRAMME

FIRST AND SECOND SEMESTER

(APPROVED BY ACADEMIC COUNCIL VIDE RESOLUTION NO. 3, DATED: 04 – 07 – 23)



ARYA VIDYAPEETH COLLEGE (AUTONOMOUS)

ARYA NAGAR, GUWAHATI – 16

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### Structure of Four Year Undergraduate Course

| Semester | Type   | Core      | Minor   | SEC     | IDC     | AEC     | VAC/FC                   | IN      |
|----------|--------|-----------|---------|---------|---------|---------|--------------------------|---------|
|          | Credit | 4         | 4       | 3       | 3       | 2       | 4(2 + 2)                 | 2       |
| I        |        | CE-1114   | MN-1114 | SE-1113 | ID-1113 | AE-1112 | VL-1112<br>(Two Courses) | -       |
| II       |        | CE-2114   | MN-2114 | SE-2113 | ID-2113 | AE-2112 | VL-2112<br>(Two Courses) | -       |
| III      |        | CE-3214   | MN-3214 | SE-3213 | ID-3213 | AE-3212 | -                        | -       |
|          |        | CE-3224   |         |         |         |         |                          |         |
| IV       |        | CE-4214   | MN-4214 | -       | -       | AE-4212 | -                        | IN-4212 |
|          |        | CE-4224   |         |         |         |         |                          |         |
|          |        | CE-4234   |         |         |         |         |                          |         |
| V        |        | CE-5314   | MN-5214 | -       | -       | -       | -                        | -       |
|          |        | CE-5324   |         |         |         |         |                          |         |
|          |        | CE-5334   |         |         |         |         |                          |         |
|          |        | CE-5344   |         |         |         |         |                          |         |
| VI       |        | CE-6314   | MN-6214 | -       | -       | -       | -                        | -       |
|          |        | CE-6324   |         |         |         |         |                          |         |
|          |        | CE-6334   |         |         |         |         |                          |         |
|          |        | CE-6344   |         |         |         |         |                          |         |
| VII      |        | CE-7414   | MN-7314 | -       | -       | -       | -                        | -       |
|          |        | CE-7424   |         |         |         |         |                          |         |
|          |        | CE-7434   |         |         |         |         |                          |         |
|          |        | CE-7444   |         |         |         |         |                          |         |
| VIII     |        | CE-8414   | MN-8314 | -       | -       | -       | -                        | -       |
|          |        | CE-8424** |         |         |         |         |                          |         |
|          |        | CE-8434** |         |         |         |         |                          |         |
|          |        | CE-8444** |         |         |         |         |                          |         |

**\*\*Students who secure more than 7.5 CGPA at the end of third year (6<sup>th</sup> semester) may opt for a research dissertation of 12 credits instead of the three core papers.**

**Course code:** First two letters is the abbreviation of course component

First digit implies semester number

Second digit implies course level

Third digit implies course number

Fourth digit implies credit points per course.

| Digit | Course Level |
|-------|--------------|
| 1     | 100 - 199    |
| 2     | 200 - 299    |
| 3     | 300 - 399    |
| 4     | 400 - 499    |

### Semester Wise Credit Distribution

| Semester | CREDIT DISTRIBUTION |       |       |       |       |        |       |       |
|----------|---------------------|-------|-------|-------|-------|--------|-------|-------|
|          | CORE                | MINOR | SEC   | AEC   | IDC   | VAC/FC | IN    | TOTAL |
| FIRST    | 1 x 4               | 1 x 4 | 1 x 3 | 1 x 2 | 1 x 3 | 2 x 2  | --    | 20    |
| SECOND   | 1 x 4               | 1 x 4 | 1 x 3 | 1 x 2 | 1 x 3 | 2 x 2  | --    | 20    |
| THIRD    | 2 x 4               | 1 x 4 | 1 x 3 | 1 x 2 | 1 x 3 | --     | --    | 20    |
| FOURTH   | 3 x 4               | 1 x 4 | --    | 1 x 2 | --    | --     | 1 x 2 | 20    |
| FIFTH    | 4 x 4               | 1 x 4 | --    | --    | --    | --     | --    | 20    |
| SIXTH    | 4 x 4               | 1 x 4 | --    | --    | --    | --     | --    | 20    |
| SEVENTH  | 4 x 4               | 1 x 4 | --    | --    | --    | --     | --    | 20    |
| EIGHT    | 4 x 4               | 1 x 4 | --    | --    | --    | --     | --    | 20    |

**SEC: SKILL ENHANCEMENT COURSE**

**AEC: ABILITY ENHANCEMENT COURSE**

**IDC: INTERDISCIPLINARY COURSE**

**VAC/FC: VALUE ADDED COURSE**

**IN: INTERNSHIP**

**Abbreviation of Course Components:**

**CE (Core), MN (Minor), SE(Skill Enhancement Course), AE (Ability Enhancement Course), VL (Value added Course), ID (Interdisciplinary Course), IN (Internship)**

**LIST OF PAPERS:**

**CORE:**

1. Statistical Methods (ST – CE – 1114 )
2. Basic Probability Theory (ST – CE – 2114 )

**MINOR:**

1. Statistical Methods (ST – MN – 1114 )
2. Basic Probability Theory (ST – MN – 2114 )

**MULTIDISCIPLINARY/INTERDISCIPLINARY COURSE:**

1. Basic Statistics (ST – ID – 1113 )
2. Applied Statistics (ST – ID – 2113 )

**SKILL ENHANCEMENT COURSE:**

1. Statistical Analysis Using Microsoft EXCEL (ST – SE – 1113 )
2. Statistical Analysis Using SPSS (ST – SE – 2113 )

# FIRST SEMESTER

**PAPER NAME: Statistical Methods**  
**PAPER CODE: ST – CE – 1114**  
**Total Credits: 4 (Theory: 3 + Practical/Tutorial: 1)**

**THEORY: 3 CREDITS**

**Total Lectures: 45**

**COURSE OBJECTIVE:**

*The course objectives are as follows:*

- *To summarize the mass of data, to extract salient features from it and interpretation of results.*
- *To understand the concept of interpolation and numerical integration.*
- *To understand the concept of relationship between two variables.*

**COURSE OUTCOME:**

*After completing this course, the students should have developed a clear understanding of:*

- *Concepts of statistical population and sample, variables and different scales of measurements.*
- *Diagrammatic and graphical presentation of data.*
- *Measures of central tendency, Dispersion, Moments, Skewness and Kurtosis.*
- *Interpolation techniques and Numerical Integration.*
- *Correlation and Regression.*

**Unit- I: Statistical Data(Lectures: 10)**

Introduction: Definition and scope of Statistics, concepts of statistical population and sample.  
Data: Univariate Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic.

**Unit 2: Descriptive Statistics (Lectures: 15)**

Measures of Central Tendency: AM, GM, HM, Median and Mode. Partition Values: Quartiles, Deciles and Percentiles. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

**Unit 3: Calculus of Finite Difference (Lectures:10)**

Finite Difference: Definition, Operators  $\Delta$  &  $E$ , their properties, Difference table, missing terms, Interpolation: Definition, Newton's Forward and Backward interpolation formula, Lagrange's interpolation formula. Numerical Integration: Introduction, General quadrature formula, Trapezoidal, Simpson's 1/3rd & 3/8th rules.

#### **Unit 4 : Bivariate Data: (Lectures: 10)**

Bivariate data: Definition, scatter diagram, simple correlation, principle of least squares, Simple linear regression.

#### **PRACTICAL:**

#### **CREDITS:1 (LECTURES: 30)**

1. Graphical representation of data
2. Problems based on measures of central tendency
3. Problems based on measures of dispersion
4. Problems based on combined mean and variance and coefficient of variation
5. Problems based on moments, skewness and kurtosis
6. Fitting of polynomials, exponential curves
7. Karl Pearson correlation coefficient
8. Correlation coefficient for a bivariate frequency distribution
9. Lines of regression, angle between lines and estimated values of variables.
10. Problems based on Newton's Forward and Backward interpolation formula .
11. Problems based on Lagrange's interpolation formula.

#### **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I, 8<sup>th</sup>Edn. The World Press, Kolkata.
2. Gupta S.C. and Kapoor V.K.(2002): Fundamental of Mathematical Statistics, 11<sup>th</sup> Edition. Sultan Chand and Sons, New Delhi.
3. Gupta P.P, Malik G.S. and Gupta S.,(2006), Calculus of Finite Differences and Numerical Analysis, 34<sup>th</sup>Edn, Krishna Prakashan Media (P) Ltd,Meerut.
4. Agarwal, B. (2007c). *Programmed Statistics (Question-Answers)*. New Age International.
5. Yule, G. U. (1911). An Introduction to the Theory of Statistics. Journal of the Royal Statistical Society, 101(1), 225.



**PAPER NAME: Statistical Methods**  
**PAPER CODE: ST – MN – 1114**  
**Total Credits: 4 (Theory: 3 + Practical/Tutorial: 1)**

**THEORY: 3 CREDITS**

**Total Lectures: 45**

**COURSE OBJECTIVE:**

*The course objectives are as follows:*

- *To summarize the mass of data, to extract salient features from it and interpretation of results.*
- *To understand the concept of interpolation and numerical integration.*
- *To understand the concept of relationship between two variables.*

**COURSE OUTCOME:**

*After completing this course, the students should have developed a clear understanding of:*

- *Concepts of statistical population and sample, variables and different scales of measurements.*
- *Diagrammatic and graphical presentation of data.*
- *Measures of central tendency, Dispersion, Moments, Skewness and Kurtosis.*
- *Interpolation techniques and Numerical Integration.*
- *Correlation and Regression.*

**Unit- I: Statistical Data(Lectures: 10)**

Introduction: Definition and scope of Statistics, concepts of statistical population and sample. Data: Univariate Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic.

**Unit 2: Descriptive Statistics (Lectures: 15)**

Measures of Central Tendency: AM, GM, HM, Median and Mode. Partition Values: Quartiles, Deciles and Percentiles. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

**Unit 3: Calculus of Finite Difference (Lectures:10)**

Finite Difference: Definition, Operators  $\Delta$  &  $E$ , their properties, Difference table, missing terms, Interpolation: Definition, Newton's Forward and Backward interpolation formula, Lagrange's interpolation formula. Numerical Integration: Introduction, General quadrature formula, Trapezoidal, Simpson's 1/3rd & 3/8th rules.

#### **Unit 4 : Bivariate Data: (Lectures: 10)**

Bivariate data: Definition, scatter diagram, simple correlation, principle of least squares, Simple linear regression.

#### **PRACTICAL:**

#### **CREDITS:1 (LECTURES: 30)**

1. Graphical representation of data
2. Problems based on measures of central tendency
3. Problems based on measures of dispersion
4. Problems based on combined mean and variance and coefficient of variation
5. Problems based on moments, skewness and kurtosis
6. Fitting of polynomials, exponential curves
7. Karl Pearson correlation coefficient
8. Correlation coefficient for a bivariate frequency distribution
9. Lines of regression, angle between lines and estimated values of variables.
10. Problems based on Newton's Forward and Backward interpolation formula .
11. Problems based on Lagrange's interpolation formula.

#### **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I, 8<sup>th</sup>Edn. The World Press, Kolkata.
2. Gupta S.C. and Kapoor V.K.(2002): Fundamental of Mathematical Statistics, 11<sup>th</sup> Edition. Sultan Chand and Sons, New Delhi.
3. Gupta P.P, Malik G.S. and Gupta S.,(2006), Calculus of Finite Differences and Numerical Analysis,34<sup>th</sup>Edn, Krishna Prakashan Media (P) Ltd,Meerut.
4. Agarwal, B. (2007c). Programmed Statistics (Question-Answers). New Age International.
5. Yule, G. U. (1911). An Introduction to the Theory of Statistics. Journal of the Royal Statistical Society, 101(1), 225.

**PAPER NAME: Basic Statistics**

**PAPER CODE: ST – ID – 1113**

**Total Credits: 3 (Theory)**

## **THEORY**

**Total Lectures: 45**

### **COURSE OBJECTIVE:**

*The objectives of the course are:*

- *To summarize the mass of data, to extract salient features from it and interpretation of results.*
- *To understand the concept of relationship between two variables.*

### **COURSE OUTCOME:**

*After completing this course, the students should have developed a clear understanding of:*

- *Concepts of statistical population and sample, variables, Diagrammatic and graphical presentation of data.*
- *Measures of central tendency, Dispersion and bivariate data*

### **Unit 1: Statistical Data and presentation (Lectures: 15)**

Introduction: Definition and scope of Statistics, concepts of statistical population and sample. Statistical Data: Primary and secondary data, raw data and grouped data, time series and cross sectional data, sample and census data, quantitative and qualitative data, tabular and graphical presentation, constants and variables.

### **Unit 2: Descriptive Statistics (Lectures: 15)**

Measures of Central Tendency, partition values. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, idea of Bivariate distribution and simple correlation, scatter diagram.

### **Unit 3: Bivariate data (Lectures: 15)**

Idea of Bivariate distribution, scatter diagram and simple correlation

### **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I, 8th Edn. The World Press, Kolkata.
2. Gupta S.C. and Kapoor V.K.(2002): Fundamental of Mathematical Statistics, 11th Edition. Sultan Chand and Sons, New Delhi.
3. Agarwal, B. (2007c). Programmed Statistics (Question-Answers). New Age International.

4. Yule, G. U. (1911). An Introduction to the Theory of Statistics. Journal of the Royal Statistical Society
5. Medhi, J. (2006). Statistical Methods: An Introductory Text. New age international publishers
6. Agarwal, B. (2007c). Programmed Statistics (Question-Answers). New Age International.
7. Yule, G. U. (1911). An Introduction to the Theory of Statistics. Journal of the Royal statistical society

**PAPER NAME: Statistical Analysis Using Microsoft EXCEL**

**PAPER CODE: ST – SE – 1113**

**Total Credits: 3 (Theory: 2 + Practical/Tutorial: 1)**

**THEORY:**

**Total Lectures: 30**

**COURSE OBJECTIVE:**

*The course objectives are as follows:*

- *To give a preliminary idea of Diagrammatic and Graphical Representation of Statistical data using Excel.*
- *To give them idea of measures of central tendency, dispersion, skewness and kurtosis.*
- *To handle bivariate data and test more than two means at a time.*

**COURSE OUTCOME:**

*After the successful completion of this course, students will be able to:*

- *Presenting data diagrammatically and graphically.*
- *Interpreting graphs and diagrams.*
- *Summarizing data using descriptive measures.*
- *Understanding relationship between variables and testing significance of the relationships.*

**Unit 1: Diagrammatic and Graphical Representations: (Lectures: 10)**

Diagrammatic representation: Bar diagram, scatter diagram, pie diagram, graphical representation: histogram, box plot, frequency polygon and frequency curve, Pivot Tables, Normal probability plot.

**Unit 2: Descriptive Statistics: (Lectures: 10 )**

Descriptive statistics: Mean , Standard Error, Median, Mode, Standard Deviation, Sample variance, Range, Skewness, Kurtosis

**Unit 3: Analysis: (Lectures: 10 )**

t, F, Chi-square, ANOVA (Analysis of Variance), correlation and lines of regression, p-values and confidence intervals

**PRACTICAL:**

**CREDITS:1 (LECTURES: 30)** Related to above topics

## **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): *Fundamentals of Statistics, Vol. I& Vol. II* 8<sup>th</sup>Edn. The World Press, Kolkata.
2. McFedries, P. (2022). *Excel Data Analysis For Dummies*. John Wiley & Sons.
3. Agarwal, B. (2007c). *Programmed Statistics (Question-Answers)*. New Age International.
4. Yule, G. U. (1911). An Introduction to the Theory of Statistics. *Journal of the Royal Statistical Society*, 101(1), 225.
5. Winston, W. L. (2014). *Marketing Analytics: Data-Driven Techniques with Microsoft Excel*. John Wiley & Sons.
6. Guerrero, H. (2018). *Excel Data Analysis: Modeling and Simulation*. Springer.

# SECOND SEMESTER

**PAPER NAME: Basic Probability Theory**

**PAPER CODE: ST – CE – 2114**

**Total Credits: 4 (Theory: 3 + Practical/Tutorial: 1)**

**THEORY: 3 Credits**

**TOTAL LECTURES: 45**

**COURSE OBJECTIVE:**

*To familiarize the students with the:*

- *Concept of Probability theory, different laws and events and related theorems.*
- *Concept of random variables, Mathematical expectation, p.m.f, p.d.f and generating functions.*
- *Idea of convergence in probability.*
- *Different standard probability distributions for both discrete and continuous random variables*

**COURSE OUTCOME:**

*On completion of this course, students are expected to have a clear understanding of:*

- *Basic probability theory, random experiment, algebra of events, theorems and laws of probability*
- *Random variables, their expectations, moments, generating functions and probability functions.*
- *Probability inequalities, Laws of convergence and applications of law of large numbers.*
- *Important Discrete and continuous probability distributions.*

**Unit 1: Probability: (Lectures: 15)**

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability and Bayes' theorem.

**Unit 2: Random Variables and Mathematical Expectation: (Lectures: 10)**

Random Variables: Discrete and continuous random variables, p.m.f., p.d.f. Illustrations of random variables and its properties. Expectation, variance and moment generating function.



### **Unit 3: Convergence in Probability: (Lectures: 10)**

Idea of convergence in probability, Chebyshev's inequality, weak law of large numbers, De-Moivre Laplace and Lindeberg-Levy Central Limit Theorem (C.L.T.) (statement only without proof).

### **Unit 4: Standard Probability Distributions: (Lectures: 10)**

Idea of standard probability distributions: Binomial, Poisson, Normal.

### **PRACTICAL:**

#### **CREDITS:1 (LECTURES: 30)**

1. Fitting of binomial distributions for  $n$  and  $p = q = 1/2$  given
2. Fitting of binomial distributions for  $n$  and  $p$  given
3. Fitting of binomial distributions computing mean and variance
4. Fitting of Poisson distributions for given value of  $\lambda$
5. Fitting of Poisson distributions after computing mean
6. Application problems based on binomial distribution
7. Application problems based on Poisson distribution
8. Fitting of normal distribution.

#### **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I, 8<sup>th</sup> Edn. The World Press, Kolkata
2. Gupta S.C. and Kapoor V.K.(2002): Fundamental of Mathematical Statistics, 11<sup>th</sup>Edn. Sultan Chand and Sons, New Delhi.
3. Agarwal, B. (2007c). *Programmed Statistics (Question-Answers)*. New Age International.
4. Feller, W. (1968b). *An Introduction to Probability Theory and Its Applications: Volume I*. John Wiley & Sons.
5. Gupta O.P, Chaudhary S.S. Applied Statistics: Kedar Nath Ram Nath
6. Mood, A. M., & Graybill, F. A. (1911). An Introduction to the Theory of Statistics. Nature, 87(2185), 345.

**PAPER NAME: Basic Probability Theory**

**PAPER CODE: ST – MN – 2114**

**Total Credits: 4 (Theory: 3 + Practical/Tutorial: 1)**

**THEORY: 3 Credits**

**TOTAL LECTURES: 45**

**COURSE OBJECTIVE:**

*To familiarize the students with the:*

- *Concept of Probability theory, different laws and events and related theorems.*
- *Concept of random variables, Mathematical expectation, p.m.f, p.d.f and generating functions.*
- *Idea of convergence in probability.*
- *Different standard probability distributions for both discrete and continuous random variables*

**COURSE OUTCOME:**

*On completion of this course, students are expected to have a clear understanding of:*

- *Basic probability theory, random experiment, algebra of events, theorems and laws of probability*
- *Random variables, their expectations, moments, generating functions and probability functions.*
- *Probability inequalities, Laws of convergence and applications of law of large numbers.*
- *Important Discrete and continuous probability distributions.*

**Unit 1: Probability: (Lectures: 15)**

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability and Bayes' theorem.

**Unit 2: Random Variables and Mathematical Expectation: (Lectures: 10)**

Random Variables: Discrete and continuous random variables, p.m.f., p.d.f. Illustrations of random variables and its properties. Expectation, variance and moment generating function.

### **Unit 3: Convergence in Probability: (Lectures: 10)**

Idea of convergence in probability, Chebyshev's inequality, weak law of large numbers, De-Moivre Laplace and Lindeberg-Levy Central Limit Theorem (C.L.T.) (statement only without proof).

### **Unit 4: Standard Probability Distributions: (Lectures: 10)**

Idea of standard probability distributions: Binomial, Poisson, Normal.

### **PRACTICAL:**

#### **CREDITS:1 (LECTURES: 30)**

1. Fitting of binomial distributions for  $n$  and  $p = q = 1/2$  given
2. Fitting of binomial distributions for  $n$  and  $p$  given
3. Fitting of binomial distributions computing mean and variance
4. Fitting of Poisson distributions for given value of  $\lambda$
5. Fitting of Poisson distributions after computing mean
6. Application problems based on binomial distribution
7. Application problems based on Poisson distribution
8. Fitting of normal distribution.

#### **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I, 8<sup>th</sup> Edn. The World Press, Kolkata
2. Gupta S.C. and Kapoor V.K.(2002): Fundamental of Mathematical Statistics, 11<sup>th</sup>Edn. Sultan Chand and Sons, New Delhi.
3. Agarwal, B. (2007c). *Programmed Statistics (Question-Answers)*. New Age International.
4. Feller, W. (1968b). *An Introduction to Probability Theory and Its Applications: Volume I*. John Wiley & Sons.
5. Gupta O.P, Chaudhary S.S. Applied Statistics: Kedar Nath Ram Nath
6. Mood, A. M., & Graybill, F. A. (1911). An Introduction to the Theory of Statistics. Nature, 87(2185), 345.

**PAPER NAME: Applied Statistics**

**PAPER CODE: ST – ID – 2113**

**Total Credits: 3 (THEORY)**

**Total Lectures: 45**

**COURSE OBJECTIVE:**

*The objectives of the course are:*

- *To familiarize the students with the:*
- *Concept of sampling theory, Idea of sample survey .*
- *Concept of Index numbers, its uses and limitations.*
- *Idea of time series analysis, Methods in obtaining a Time series.*

**COURSE OUTCOME:**

*On completion of this course, students are expected to have a understanding of:*

- *Population and sample, A few basic methods of Sampling.*
- *Definition and constructions of Index numbers, Idea of Consumer price Index number.*
- *Idea of Time series Analysis, Different components of Time Series, Measuring trend by various methods.*

**Unit 1: Idea of Sampling: (Lectures: 15)**

Concept of population and sample, complete enumeration versus sampling, sampling and non- sampling errors, Types of sampling: non-probability and probability sampling, basic principle of sample survey, simple random sampling with and without replacement, Idea of Stratified and Systematic sampling.

**Unit 2: Index Numbers: (Lectures: 15)**

Index numbers: Definition, Construction of index numbers of prices and quantities, different types of index numbers, tests of Index numbers, consumer price index number, uses and limitations of index numbers.

**Unit 3: Time series analysis: (Lectures: 15)**

Introduction to Time Series Analysis, Components of time series- Secular trend, seasonal variation, cyclical variation and irregular fluctuations with examples, Additive and multiplicative model with their merits and demerits, Measurement of trend by method of free-hand curve, method of semi-averages and Idea of Moving average method.

## **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. II. The World Press, Kolkata.
2. Medhi, J. (2006). Statistical Methods: An Introductory Text. New age international publishers.
3. Agarwal, B. (2007c). *Programmed Statistics (Question-Answers)*. New Age International.
4. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals of Applied Statistics, Sultan Chand and Sons
5. Gupta O.P, Chaudhary S.S. Applied Statistics: Kedar Nath Ram Nath

**PAPER NAME: Statistical Analysis Using SPSS**  
**PAPER CODE: ST – SE – 2113**  
**Total Credits: 3 (Theory: 2 + Practical/Tutorial: 1)**

**THEORY:**

**Total Lectures: 30**

**COURSE OBJECTIVE:**

*The course objectives are as follows:*

- *To give idea of Graphical Representation of Statistical data using SPSS.*
- *To give knowledge for analysis of bivariate data, fitting of curves using SPSS.*
- *To give idea for preparing project report using SPSS.*

**COURSE OUTCOME:**

On completion of this course, students will be able:

- *To plot graphs and diagrams, interpret them.*
- *To carry out simple correlation and regression analysis and to plot different curves.*
- *To write simple project reports using statistical tools with SPSS*

**Unit 1: Graphical Representation: (Lectures: 10)**

Data entry in spreadsheet, plotting graphs: histograms, box plot, stem-leaf, frequency polygon, pie chart, ogives

**Unit 2: Fitting Curves: (Lectures: 10)**

Random number generation and sampling procedures, Correlation and lines of regression Fitting of polynomials and exponential curves, Application Problems based on fitting of suitable distribution, Normal probability plot.

**Unit 3: Analysis: (Lectures: 10)**

Simple statistical analysis for projects, import data, Basics of statistical inference and confidence intervals.

**PRACTICAL:**

**CREDITS:1 (LECTURES: 30)** Related to above topics

## **RECOMMENDED BOOKS:**

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I& Vol. II 8thEdn. The World Press, Kolkata
2. Moore,D.S. and McCabe, G.P. and Craig, B.A.(2014): Introduction to the Practice of Statistics, W.H. Freeman
3. Cunningham, J. B., & Aldrich, J. O. (2012). Using SPSS: An Interactive Hands-On Approach. SAGE.
4. Salcedo, J., & McCormick, K. (2020). SPSS Statistics For Dummies. John Wiley & Sons.
5. MacInnes, J. (2016). An Introduction to Secondary Data Analysis with IBM SPSS Statistics. University of Edinburgh
6. Field, A. (2009). Discovering statistics using SPSS (3rd ed.). SAGE Publications.
7. Cleff, T. (2013). Exploratory Data Analysis in Business and Economics: An Introduction Using SPSS, Stata, and Excel. Springer Science & Business Media.