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**Lesson Materials prepared by**

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Paper I - BASIC BIOSTATISTICS

**I. Objective**

The subject will provide basic knowledge and fundamental exposure to the basic biostatistics at the descriptive level and solving problems applying to any biological science.

**II. Level of understanding :**

Application of the problems in the biological sciences.

**III. Syllabus :**

**I : DESCRIPTIVE STATISTICS:**

**Unit i : Introduction to Biostatistics : Role of Statistics in Clinical Medicine, Role of Statistics in Public health.**

**Unit ii : Frequency Distribution :**

Formation of frequency distribution table, characteristics of a frequency distribution table.

**Unit iii : Graphical representation :**

Histogram, Frequency Polygon, Frequency Curve, Ogives.

**Unit iv : Presentation of data :**

Basic principles, Elements of a table, Classifications, presentation by space and attribute comparison, special diagrams for clinical research such as Multiple Bar chart, pie diagram, box plot, stem & leaf diagram.

**Unit v :**

Time comparison, analysis of time series, line diagram.

**Unit vi : Measures of central tendency :**

Arithmetic mean, median, mode, position of averages, selection of the appropriate measure of central tendency, geometric mean, harmonic mean ..

**Unit vii : Percentiles and Quartiles : Ungrouped and Grouped data**

**Unit viii : Measures of Dispersion ;**

Range, interquartile range, mean deviation, variance and standard deviation, coefficient of variation.

**Unit ix : Correlation & Regression :**

Scatter diagram, Correlation analysis

**Unit x : Regression Analysis :**

Introduction, Two Regression equation :

**IV Recommended text books :**



1. P.S.S. Sundar Rao, J. Richard (2004)- An introduction to Biostatistics – a manual for students in health sciences iii – Edition Prentice – Hall of India private limited.

2. V,K. Kapoor and S.P. Gupta – Fundamentals of mathematical statistics – Sultan Chand & Sons, New Delhi.

**V Suggested reference books:**

1. K. Park (2004) : The book of preventive and social medicine – 18 th Edition Banarsidar Bhanot, Jabalpur India.

2. Altman, D.G. (1992) Practical statistics for medical research, Chapman and hall.

3. Bland, m. (1986) : An introduction to medical statistics, London: ELBS.

4. Draper, N.R., and Smith, H (1981) : Applied regression analysis, Newyork : John Wiley & Sons.

5. Kirkwood, B.R. (1988) : Essentials of medical statistics, London: Blackwell scientific publications.



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P.G. Diploma (BioStatistics) Non- Semester

Syllabus

Paper 2 - PROBABILITY, PROBABILITY DISTRIBUTION & SAMPLING

I. Objective

The subject will provide basic knowledge and fundamental exposure to the probability and distributions and solving problems applying to biological science.

II. Level of understanding :

Application of the problems in the biological sciences.

III. Syllabus :

Probability :

Unit i :

Sets and classes of events, Random variables, Definition of probability.

Unit ii :

Properties of probability. Laws of probability for independent events, Additional theorem of Probability, Multiplication theorem of probability, Conditional probability. Bayes theorem, Application of Bayes theorem

Probability distribution :

Unit iii :

Introduction to the theory of Distribution

Unit iv :

Binomial distribution, Probability density function, Recurrence formula, Application of binomial distribution.

Unit v :

Poisson distribution, probability density functions, Recurrence formula, Application of Poisson distribution.

Unit vi :

Normal distribution, Properties of Normal distribution and its application.

Unit vii :

Other distribution : t, F and Chi squared distribution and their applications.

Sampling :

Unit viii :

Definitions, Sampling variation and bias, types of population, listing of population, non probability sampling.

Unit ix : Sampling techniques.

Unit x : Determination of sample size



#### IV Recommended text books :

1. P.S.S. Sundar Rao, J. Richard (2004)- An introduction to Biostatistics – a manual for students in health sciences prentice – Hall of India private limited.
2. V,K. Kapoor and S.P. Gupta – Fundamentals of mathematical statistics – Sultan Chand & Sons.
3. Lwanga, S.K., and Lemeshow, S. (1991) Sample size determination on health studies, Geneva, who.
4. Cochran, W.G. (1977) : Sampling techniques : New York : John Wiley and sons.

#### V Suggested reference books :

1. Feller, W (1969) : An introduction to probability theory and its applications. Vols i & ii ; New Delhi : Wiley eastern
2. Altman, D.G. (1992) Practical statistics for medical research, Chapman and hall
3. Kirkwood, B.R. (1988) : Essentials of medical statistics, London: blackwell scientific publications.



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**Paper 3 - HEALTH STATISTICS, HEALTH DATA MANAGEMENT & DEMOGRAPHY**

**I. Objective**

The subject will provide basic knowledge and fundamental exposure to the vital, health statistics and demography and solving problems applying to any biological science.

**II. Level of understanding :**

Application of the problems in the biological sciences.

**III. Syllabus :**

**Vital statistics:**

**Unit i :**

Sources and Uses of vital statistics, Collection of vital statistics, Basic formula for calculation of vital statistics.

**Health statistics:**

**Unit ii :**

Sources and uses of health statistics, difficulties of measurements, Morbidity measurements.

**Unit iii :**

**Hospital statistics :**

Medical Terminology, some Indices, International Classification of Diseases: Coding and Indexing.

**Health data base management:**

**Unit iv :**

Microsoft office : Excel, Access, powerpoint, Foxpro, Creating Data : Creating database & tables, Data types: retrieval of Data : SQL queries:, Retrieving information using select, Management of Database : Connecting databases, adding, deleting and updating tables. Report formation.distribution.

**Statistical package for social sciences (SPSS PC+)**

**Unit v :**

Defining data, data transformations, selecting, weighting and ordering cases, restructuring files.

**Unit vi :**

Statistical Analysis using the Software & interpretation of the results.

**Demography:**

**Unit vii : Introduction to Demography**



Sources of Demographic data: census, registration, survey, extent of under registration.

**Unit viii : Mortality, Fertility & Migration :**

Measurements, Crude and specific rates, Direct and Indirect methods of standardization, Determinant of Mortality., Life Table

Crude and specific rates, gross reproduction rates, net reproduction rates,

Measures of migration, Balancing equation, survival ration method.

**Unit ix : Population Growth and Estimation :**

Population pyramid, Age and Sex composition, Population projection and

estimation. India population: size, growth, trends and regional differentials

in growth. Demographic transition.

**IV Recommended text books :**

1. P.S.S. Sundar Rao, J. Richard (2004)- An introduction to Biostatistics – a manual for students in health sciences prentice – Hall of India private limited.
2. Tuckwell, Henry, C, (1988): Elementary Applications of Probability Theory, London: Chapman and Hall.
3. Ramakumar R. (1986), Technical Demography, Wiley Eastern Ltd. New Delhi.
4. SPSS manual version 13.

**V Suggested reference books:**

1. Altman , D.G. (1992) Practical Statistics for Medical Research, Cahpman and hall.
2. Bland, M. (1989): An introduction to medical statistics London : ELBS.
3. Kirkwood, B.R. (1988) : Essentials of Medical Statistics, London: Balckwell scientific publications.
4. World health organisation (who) (1992) : International statistical classification of diseases and related health problems (ICD-10), tenth revision, Vols 1-3, Geneva.
5. Donald H. Sanders, Computers Today, McGraw-Hill Book Company.
6. Stephen Wynkeep, Special Edition using Microsoft SQL Server.
7. Marija J. Norusis. Statistical Package for Social Sciences, SPSS Inc.,
8. Eric R. Christenson, William J. Ferguson, Amy F. Fulton, David Fulton FoxBASE + Relational database Management System.



SYLLABUS

PAPER 4 : Research Design & Biostatistical Inference

**I. Objective :**

The subject will provide basic knowledge and fundamental exposure to the design of experiments and statistical inference and solving problems applying to any biological science.

**II. Level of understanding :**

Application, analysis and interpretation of results to problems applying to the biological sciences.

**III. SYLLABUS :**

**A. Design of experiments :**

**Unit i :** Design, Replication, Randomization, Local Control Assignable Cause, Chance Causes.

**Unit ii :** Analysis of C.R.D. and calculation of missing values.

**Unit iii :** Analysis of R.B.D. and calculation of missing values.

**Unit iv :** Analysis of L.S.D. and calculation of missing values.

**Basis of statistical inference :**

**Unit v :** Sampling Distribution, Statistical inference, Critical region, level of significance, type I and II errors, power of the test.

**Estimation :**

**Unit vi :** Point & Interval estimation, Confidence interval for mean, variance of normal Distribution, proportions, correlation and regression coefficients. Confidence interval of mean and variance for small samples.

**Testing of hypothesis :**

**Unit vii :** Procedure, test on the mean of normal population difference between the populations.



**Unit viii :** Chi-squared test and goodness of fit test and test of independence in contingency tables, test of correlation and regression coefficient, test of proportion, trends of proportion.

**Unit ix :** Test based on t and F, Anova, Multiple comparison

**Unit x :** Non-parametric test.

#### **IV. Recommended Text Book :**

1. P.S.S. Sundar Rao, J. Richard (2004): An introduction to Biostatistics - a manual for students in health sciences - Prentice - Hall of India private limited.
2. Kapoor, V.K., and Gupta S.C., - Fundamentals of Mathematical Statistics-Sultan Chand and sons.
3. Altman, D.G. (1992) Practical statistics for medical research, Chapman and hall.
4. Das, M.N., and Giri, N.C. (1979) : Design and analysis of experiments, new Delhi: Wiley eastern.

#### **V. Suggested reference book :**

1. Altman, D.G. (1992) Practical statistics for medical research, Chapman and hall.
2. Bland, M. (1989) : An introduction to medical statistics, London: ELBS.
3. Kirkwood, B.R. (1988) : essentials of medical statistics. London : Blackwell scientific publications.
4. Fisher, R.A., and Yates, F. (1957) : Statistical tables for biological, agricultural and medical research, London: Oliver & Boyd.
5. Bradley, J.V. (1968): Distribution - free statistical tests, Englewood cliffs, new Jersey : prentice - hall.



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**Syllabus**

**Paper 5 Research Methods and Basic Epidemiology**

**I. Objective**

Techniques in research methods are of great utility to students of any discipline who need to complete project works as a part of the course. For a Biostatistics student this subject will provide a strong base to pursue the project work and to carry out independent research work elsewhere. Also this subject will provide fundamental exposure to basic Epidemiology

**II. Level of Understanding**

A good level of understanding and ability to use the research methods for the project work and understanding the basic principles of Epidemiology.

**A. Research Methods**

**Unit I - Scientific Research**

The scientific method and problem solving. characteristics of the scientific approach, purpose of scientific approach.

Research as decision-making process.

Research alternatives, major steps in the research process, major decision points.

Steps in the research process:

Literature review, theoretical contexts, the research problem, the research hypothesis.

**Unit II - Designs**

Experimental, Quasi - experimental and non-experimental research

Survey and evaluation research, Retrospective study, Prospective study, Case control study - cohort study - cross sectional study - clinical trials.

**Unit III - Design of clinical trials, Single and Double blind trials,**

Type of controls, Design of studies with Matched Controls.

**Unit IV - Measurement and data collection: primary and secondary:**

Self report, observational, physiological measures, projective techniques, records and available data.



Questionnaires and interview schedules, designing self report instruments, scales: response bias. Unstructured observational and structural observational methods, observational sampling, evaluation. Errors of measurement, reliability, validity and other criteria for assessing measures.

**Unit V** The context, style of research report: types of research documents, presentation of critique.

B. Basic Epidemiology:

**Unit VI** – Basic principles of Epidemiology & Epidemiologic methods.

**Unit VII** - Aims of Epidemiology, Epidemiological approach.

**Unit VIII** - Rates and ratios, measurement of mortality, measurement of morbidity

**Unit IX** - Epidemiologic methods, Descriptive Epidemiology, Analytical Epidemiology, Experimental Epidemiology.

**Unit X** - Association and causation, Uses of Epidemiology.

#### **IV Recommended Text Book**

1. P.S.S. Sundar Rao, J. Richard (2004): An introduction to Biostatistics - manual for students in health sciences - Prentice - Hall of India Private Limited.

2. K. Park : Text Book of Preventive and Social Medicine – 18<sup>th</sup> Edition, Banarasidas Bhanot, Jabhalpur, India.

3. Lilienfeld, A.M., and Lilienfeld, D.E., (1980): Foundations of Epidemiology, New York: Oxford University Press.

4. Pauline V. Young. Scientific Social Surveys and Research, Prentice-Hall, New. Delhi, 1968.

#### **V. Suggested Reference Book**

1. Kahn, Harold, A (1983): An introduction to Epidemiological methods, new York: Oxford University Press.

2. Kish, Leslie (1987): Statistical Design for Research. New York: John Wiley & Sons

3. Moser, C.A., and Kalton, Graham (1989): Survey Methods in Social Investigations. Hants (UK): Gower Publishing Group.



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