

University of Mumbai
POST GRADUATE DIPLOMA IN APPLIED STATISTICS WITH SOFTWARE

Introduction:

Statistics has become a vital tool of data analysis and valid inference in almost all fields in the present era. Statistical techniques are applied in Finance, Insurance, Marketing, Manufacturing, Social Sciences, Health Sciences and Software Designing etc. A huge volume of data is generated in these fields every day. Processing and Management of this data has become a vital need of the hour. This necessitates a pertinent exposure to various Statistical Techniques to all the users.

Processing and management of this voluminous data using computerized Statistical packages has become essential in the current era.

Over the next three years industry sources expect the number of statistician in Private Sector to double. Demand for statistician is likely to intensify as new entrants in clinical trials and pharma industry look at India.

Fees structure:

Rs. 40,000/- fee per year

Rs. 1,000/- Examination fee per student per term.

Rs. 800/- P. G. Registration Fee.

Scheme of Examination:

The evaluation of the performance of a student in each paper shall be based upon both internal and external examination. The external examination will be held only once at the conclusion of an academic term. The external examination will consist of SEVEN papers , each of THREE hours.

Subject	Title	Internal	External	Total
Paper I	Basic Statistics	40	60	100
Paper II	Marketing Research	40	60	100
Paper III	Regression and Linear Model	40	60	100
Paper IV	Decision Making and Forecasting	40	60	100

Paper V	Statistical Process Control	40	60	100
Paper VI	Medical Statistics	40	60	100
Paper VII	Multivariate Techniques	40	60	100
Paper VIII	Communication Skills and Project	100	---	100

First term will consist of first four papers & Second term will consist of next Four papers & Project work.

Detailed Syllabus for the Subject:

PAPER- I : BASIC STATISTICS

Sr. No.	Topics
1.	Exploratory Data Analysis.
2.	Concepts of Probability.
3	Concepts of Random Variable, Probability distribution, Distribution Function, Expected Value, Variance and Higher Moments.
4	Probability generating function, moment generating function, cumulate generating function and cumulant.
5	Basic discrete and continuous distributions.
6	Concepts of independence, jointly distributed random variables and conditional distributions, use of generating functions.
7	Central limit theorem and its application.
8	Concepts of random sampling, statistical inference and sampling distribution.
9	Methods of estimation and properties of estimators.
10	Confidence intervals for unknown parameters.
11	Testing of hypothesis.
12	Correlation and regression analysis.
13	Concepts of analysis of variance.
14	Concepts of conditional expectation and compound distribution.

Reference Books:

1. Rohatgi V. K. & A. K. MD. Ehsanes Saleh (2001): An Introduction to probability theory and Mathematical Statistics Second Edition.
2. Wackesly D.D, Mondonhall III, William and Scheffer R. L.(2002): Mathematical Statistics with application.
3. Anderson David R, Sweeny Dewis J and Williams Thomas A (2004) Statistics for business and economics.
4. Levin Richard I and Rubin David S (1994) Statistics for management.

PAPER – II : MARKETING RESEARCH

Sr. No.	Topics
1.	Definition of marketing research and market research, need for marketing research, requirement of good marketing research, manager researcher relationship, competitive and complex nature of Indian markets, role of research in new product development, packaging, branding, positioning, distribution and pricing, ethics in Business Research.
2.	Steps in marketing Research.
3	Techniques for identifying management problem and research problem.
4.	Meaning & types of research designs-exploratory, descriptive and causal.
5.	Exploratory research designs, Sampling & data collection methods.
6.	Causal research designs: Data collection methods
7.	Descriptive research design :Sampling methods, Types of scales , questionnaire design
8.	Preparations research proposal

9. Objectives and data needs for consumer research.
10. Objectives and data needs for product research.
11. Objectives and data needs for pricing research.
12. Objectives and data needs for advertising research.
13. Consumer segmentation techniques: Chi-square test of independence
Cluster analysis.
14. Customer discriminating technique :Discriminant analysis.
15. Product positioning techniques :Snake chart,Benefit structure
analysis, Multi-dimensional scaling technique Factor analysis.
16. New product development technique :Conjoint analysis.
17. Report writing.

Reference Books:

1. Kinnear Thomas C and Taylor James R (1995)
Marketing Research: An applied Approach.
2. Green Paul E , Tull Donalds, Albaum Gerald (1988)
Research for Marketing Decision.
3. Nargundkar Rajendra (2003), Marketing Research Text & Cases.
4. David A. Aaker (2004) Marketing Research.
5. Malhotra Naresh (2006) Marketing Research.
An applied Orientation and SPSS 14.0 student CD.
6. Burns C. Alvin & Bush Ronald (2006) : Marketing Research with SPSS
13.0
7. Boyd Harper W.Jr. Westfall Ralph, Stasch Stanley F. (1977)
Marketing Research: Text & Cases.
8. Harvard Business Review: Select Articles on Marketing Research.

PAPER – III : REGRESSION AND LINEAR MODEL

Sr. No.	Topics
1.	Simple linear regression.
2.	Multiple linear regression.
3.	Regression diagnostics.
4.	Transformation of variable.

5. Analysis of collinear data.
6. Logistic regression.
7. Stepwise regression.
8. ONE WAY ANOVA.
9. TWO WAY ANOVA.
10. Multiway ANOVA and Nested Analysis.
11. Comparison of individual means.
12. Analysis of covariance.
13. One Way Random effect model.
14. Two way Mixed Model.

Reference Books:

1. Chatterjee Samprit, Hadi Ali S., Price Betram (2000): Regression Analysis by Example Third Edition.
2. Draper Norman R., Smith Harry (2003): Applied Regression Analysis Third Edition.
3. Kshirsagar Anant M. (1983): A course in Linear Models.
4. Seber George A.F.(2003) Linear regression analysis
5. Dielman Terry E : (2004) Applied regression analysis :A second course in Business and Economic Statistics.
6. Chatterjee Samprit, Handcock Marks, Simonoff Jeffrey (1994) A Caselook for a list course in Statistics and data Analysis.

PAPER – IV : DECISION MAKING AND FORECASTING

Sr. No.	Topic
1	Basic Concepts of Forecasting and Decision Making.

- Qualitative Methods of Forecasting (Delphi, Subjective Probabilities, Market Research).
- 2 Quantitative Techniques of Forecasting and Regression Model.
 - 3 Quantitative Techniques of Forecasting and other Casual Models. (Econometric, Input-Output, Leading Indicator).
Quantitative Techniques of Forecasting Time Series Model. (Trend Projection).
 - 4 Quantitative Techniques of Forecasting Time Series Model. (Smoothing and Decomposition).
 - 5 Quantitative Techniques of Forecasting and Box Jenkins Model.
Selection of Right Forecasting Methods.
 - 6 Decision Making and Quantitative Tools.
Decision Making and Qualitative Tools.
 - 7 Steps in Decision Making .
 - 8 Inventory management and introduction, inventory control, costs in inventory problems, Techniques of Inv. Control and with selective control (ABC analysis, Usage rate and criticality).
 - 9 Techniques of inv. Control and with known demand and E.O.Q with uniform demand, prod. Runs of unequal length, with finite rate of replenishment, Problem of E.O.Q with shortage.
 - 10 Techniques inv. Control and with uncertain demand and buffer stock computation, stochastic problems and uniform demand.
 - 11 Techniques inv. Control and with price discounts.
 - 12 Financial Applications and Computation of net present value, future value and internal rate of return, converting effective interest rate to nominal rate, computing compound interest, accumulated value, discount, annuities etc.
 - 13 Break even analysis, Standard / Marginal Costing.

Reference Books:

1. Mayes Timothy R., and Shack Todd. M(2006): Financial Analysis with Microsoft Excel.
2. Martin Mindy C., Hansen Steven M., Klingher Beth,(1996): Mastering Excel 2000 Premium Edition.
3. Spyros G Makrindakis SteyanC. Wheelwright Rob J. Hyndman: Forecasting: Methods & Applications.
4. Hanke John E. , Reitsch Arthur G., Wichern Dean W. : Business Forecasting 7th Edition.

PAPER V: STATISTICAL PROCESS CONTROL.

Sr. No.	Topics
1	7 QC tools, 7 New QC tools
2	Control Charts for variables
3	Process and measurement system capability analysis.
4	Factorial and Fractional factorial experiments for process design and improvement .
5	Response surface methods and designs.
6	Taguchi techniques.
7	Six sigma.
8	Japanese System.
9	ISO 9000.

Reference Books:

1. Montgomery Douglas C. (2004): Introduction to statistical quality control Fourth Edition.
2. Phadke Madhav S. (1989): Quality Engineering Using Robust Design
3. Kaoru Ishikawa(1986): Guide To Quality Control Second Edition.
4. Genichi Taguchi (1991): Introduction to Quality Engineering: Designing Quality into Products and Processes Second Edition.
5. Brassard Michael & Diane Riffer (1994): The Memory Jogger II
6. Harry Mikel & Schroeder Richard (1999): Six Sigma The Breakthrough Management.

7. Pande Peter S., Neuman Robert P. & Cavanagh Rolana R.(2002): (Six Sigma Way Team) An Implementation Guide for Process Improvement.

PAPER – VI : MEDICAL STATISTICS

Sr. No.	Topic
1	Phase I, II and III Clinical Trials.
2	Randomization.
3	Blinding and Placebos.
4	Sample size calculation.
5	Comparing more than two treatments.
6	Causality, Non-compliance and Intent-to-treat.
7	Survival analysis in Phase III clinical trials.
8	Early stopping of clinical trials.
9	Multiplicity and interim analysis.
10	Parallel and Crossover designs.
11	Binary Response data, Categorical Data Analysis.
12	Comparing Methods of measurements.
13	Meta analysis.
14	Repeated measures analysis.

Reference Books:

1. Shoukri M. M., Pause C. A.(1999): Statistical Methods for Health Sciences Second Edition.

2. Davis Charles S.(2002): Statistical Methods for the Analysis of Repeated Measurements.
3. Finney D.J.(1964) : Statistical Method in Biological Assays.
4. Fleiss Joseph L.,Levin Bruce & Paik Myunghee Cho (2003): Statistical Methods for Rates and Proportions.
5. Dr. Fieller Nick(2007): Medical Statistics: Clinical Trials.
6. Zhang Daowen (2007): Statistical Principles of Clinical Trials (Lecture Notes).

PAPER – VII : MULTIVARIATE TECHNIQUES :

Sr. No.	Topic
1	The organization of Data.
2	Applications of Multivariate Techniques.
3	Data Display and Pictorial Representation.
4	Assessing the Assumption on Normality.
5	Detecting Outliers and Data Cleaning.
6	Transformations to Near Normality.
7	Hotelling's T^2 and Likelihood Ratio Tests.
8	Confidence Regions and simultaneous Comparisons of Component Means.
9	Large Sample Inferences about a Population Mean Vector.
10	The Classical Linear Regression Model.
11	Graphing the Principal Components.
12	Large Sample Inferences.
13	The Orthogonal Factor Model.

14	Methods of Estimation.
15	Factor Scores.
16	Factor Rotation.
17	Perspectives and a Strategy for Factor Analysis.
18	Canonical Variates and Canonical Correlations.
19	Discrimination and Classification.
20	Multi Dimensional Scaling.

Reference Books:

1. Johnson, Richard A. and Wichern, Dean W.(2007): Applied Multivariate Statistical Analysis
2. Seber, G.A.F. (1984): Multivariate observations.
3. Bishop Yvonne M.M., Fienberg S. E., Holland P. W.(1975): Discrete Multivariate Analysis Theory and Practice.

PAPER VIII Module I : COMMUNICATION SKILLS

Sr. No.	Topic
1	Spoken & Written communication.
2	Preparing and organizing a public speech: Topic selection, Research Methods, Overcoming anxiety, arranging main points, Constructing introductory and concluding remark; Development and delivering informative-style and persuasive-style, speeches; Debating: Fundamentals of debating, Premises and process of debate, Basic rules & language, Building & processing cases, Rebuttal arguments, Timing, Roles of the speakers, Judges & moderator; Debating style: Parliamentary, Academic, Cross- examination informal and impromptu speaking excercises.

- 3 Politics & governance, Business, Social, Morals & ethics, Culture & education, Law & order, Science & technology, Handling questions.
- 4 Personal communication, Business communication, Report Writing.
- 5 Fundamentals of Presentations: Effective presentation- understanding effective presentation, understanding different types of presentation; Planning presentations: Establishing objectives, Determining objectives, Making realistic objectives.
- 6 Analysing audience, Selecting supporting material, Understanding the types of supporting materials, Exploring retention & visual aids; Building presentation: Developing introduction, Capturing attention of audience, Organizing body of presentation, Creating conclusions, Closing presentation; Presentation mechanism: Power point, Visual aids, Speaker notes & footnotes, Reviewing presentations.

References:

1. Bahl Sushil (1996): Business Communication Today.
2. C. S. Rayadu: Media & Communication Management.
3. Thrill V. John, Bovee Courtland (2004): Excellence in Business Communication.
4. Nichols Ralph G., Leonard A. Stevens, Bartolome Fernando, Argyris Chris (1999) : Harvard Business Review on Effective Communication

Module II : PROJECT

Students should carry out the project on Statistical Application based on data

Note: The course will be taught using Statistic Software such as **SAS/SPSS/MINITAB**

Standard of Passing:

1. A candidate securing a minimum of 50% marks in each paper consisting of internal and external examination taken together will be declared to have passed in that paper and will be exempted from that paper.
2. A candidate will be declared to have passed the examination if he/she passes in all papers including project.
3. A candidate will be awarded the following Grades on the basis of percentage of total marks obtained by the candidate in one or more attempt(s).

Percentage	Grade
50 – below 60	C
60 – below 70	B
70 – below 80	A
80 – 100	A+

4. A registration of the candidate is valid only for three years for the course. After the three years he/she will have to register again.

*This syllabus likely to be implemented from June 2008.

Fees:

The fees prescribed for the One year Post-Graduate Diploma in Applied Statistics with Software and Post graduate Diploma in Actuarial Science is Rs. 40, 800 each.

In case a student wants to withdraw his/her admission, he/she has to apply at least one week before the commencement of the course. In such a case, administrative charges to the extent of 25% will be deducted as cancellation charges. After the commencement of the course no fees shall be refunded.

Mode of Payment:

Fees should be paid only by demand draft in favour of “THE FINANCE AND ACCOUNTS OFFICER, UNIVERSITY OF MUMBAI” payable at Mumbai.

HOW TO APPLY

Brochure and application forms can be collected from the office of the Department of Statistics, University of Mumbai, Vidyanagari Campus, Tilak Bhavan Building, 3rd floor Rs. 400 at the above address before the last date specified.

ENTRANCE TEST

Two separate entrance test will be held for two courses.

Question will be based on the following topics:

1. Limits
2. Derivatives
3. Integrals
4. Sequences and series
5. Simple and Compound Interest
6. Permutation and combination
7. Ratio and proportions
8. Quadratic equations
9. Matrices and determinant
10. Descriptive statistics
11. Standard Distributions
12. Probability

The question paper will contain objective question and short type question to be answered in 90 minutes.

IMPORTANT DATES TO REMEMBER

IMPORTANT DATES		
Sr.No	Event	Date
1	Last date of submission Test Form.	
2	Date of Entrance Test	
3	Announcements of Results	
4	Registration of candidates in Merit List-1	
5	Last Date for submission of Registration form for merit list- I candidates	
6	Registration of candidates in Merit –II (If seats are balance)	
7	Last date for submission of Registration form for merit list- II candidates (if any)	
8	Probable Date of commencement of Course	

You can also refer the websites for the above dates.