- Course code : (to be allotted by the system)
- Title of the course : Basics of SAS
- Department at which course will be conducted : Department of Statistics
- Duration: FOUR weeks
- Contact Sessions : Theory -10 hours and Practical :15 .hours
- Credits : One
- Course Coordinator/Instructor: Dr. D. T. Shirke
- Eligibility : A graduate student with good software skills. Students studying at M.Sc. in Mathematics, Statistics, Physics, Electronics, MBA, MCA.
- Intake : Min: 10 Max.: 20
- Course offered during : Even/Odd semester
- Course Fee: Rs 3000/-
- Course Contents:

Introduction to SAS, Common structure of SAS, Getting familier with interface with Base SAS System,

Accessing Data, Use FORMATTED, LIST and COLUMN input to read raw data files, Use of INFILE statement options to control processing when reading raw data files, Use various components of an INPUT statement to process raw data files including column and line pointer controls, and trailing @ controls, Combine SAS data sets using the DATA step

Creating Data Structures, Create temporary and permanent SAS data sets, Create and manipulate SAS date values, Use DATA Step statements to export data to standard and comma delimited raw data files, Control which observations and variables in a SAS data set are processed and output.

Managing Data : PROC step, Investigate SAS data libraries using base SAS utility procedures, Sort observations in a SAS data set, Conditionally execute SAS statements, Use assignment statements in the DATA step, Modify variable attributes using options and statements in the DATA step, Accumulate subtotals and totals using DATA step statements, Use SAS functions to manipulate character data, numeric data, and SAS date values, Use SAS functions to convert character data to numeric and vice versa, Process data using DO LOOPS, Process data using SAS arrays

Generating Reports : Generate list reports using the PRINT and REPORT procedures, Generate summary reports and frequency tables using base SAS procedures, Enhance reports through the use of labels, SAS formats, user-defined formats, titles, footnotes, and SAS System reporting options, Generate HTML reports using ODS statement. Error handling.

There shall be hands-on sessions Practice Sessions where students get familie with SAS with simple SAS programs.

Examination : (Method & Details)

There shall be Theory as well as Practical Examination each for 50 marks.

Structure for Theory paper : These shall be 50 MCQs each carrying one mark. All will be compulsory.

Practical Examination will be for three hours. There shall be 8 questions each carrying 10 marks. Students have to attempt any FIVE.

Passing head for Theory and Practical will be separate and Passing marks are 40% in each.

Text Books / Reference Books:

Recommended Texts:

Delwiche, Lora D. (2008), *The Little SAS Book: Primer*, Fourth Edition. Cary, NC: SAS Publishing. ISBN: 9781599947259

Cody, Ronald P. and Jeffrey K. Smith (2006), *Applied Statistics and the SAS Programming Language*, Fifth Edition, Upper Saddle River, NJ: Pearson Prentice Hall. ISBN 0-13-146532-5

SAS Institute Inc. (2009), *SAS Certification Prep Guide: Base Programming for SAS 9*, 2nd Edition, Cary, NC: SAS Institute, Inc. ISBN: 978-1-60764-045-5.

- Course code : (to be allotted by the system)
- Title of the course : An Introduction to R Software
- Department at which course will be conducted : Department of Statistics
- Duration: FOUR weeks
- Contact Sessions : Theory -10 hours and Practical :15 .hours
- Credits : One
- Course Coordinator/Instructor: Mr. D. M Sakate
- Eligibility : Any graduate with good knowledge of software.
- Intake : Min: 10 Max.: 20
- Course offered during : Even/Odd semester
- Course Type : Add on.
- Course Fee: Rs 3000/-
- Course Contents:

Getting Started with R: download and installation, introduction to components of R. **Working with data in R**: input from keyboard, import file-.xlx, .xlsx, .txt, .csv, etc. Creating vectors, performing arithmetic operations, adding elements to a vector, creating a matrix, matrix operations, extracting elements from a matrix, creating data frame, extracting elements from a data frame, Dealing with missing data. Programming in R: understanding the flow, operators-comparison and logical, looping, for loop, while loop, repeat loop, if loop.

Creating your own function in R and export data from R to another format like .xlx, .xlsx, .csv, .txt.

Statistical analysis in R: descriptive statistics, creating tables and graphs, correlation and regression, performing t-tests, anova

There shall be hands-on sessions where students get familiar with R programs.

Examination :(Method & Details)

Method: Theory - 50 Marks, Practical Examination- 50 Marks

Passing Rule: Separate for theory and Practical with at least 50 % marks.

Structure for Theory:

1)	06 Short answer	questions each for 5 marks	=30
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2) 10 Multiple Choice questions each for 2 marks =20

Total =50 marks

Structure for Practical Examination:

05 questions each for 10 marks	=50 marks
Theory + Practical	=100 marks

Note: All questions in Theory and Practical will be compulsory.

Text Books / Reference Books:

Recommended Texts:

- 1. Larry Pace (2012), Beginning R: An Introduction to Statistical Programming, Apress.
- S.R. Deshmukh and S. Purohit. (2007) Microarray Data: Statistical Data Analysis using R, Alpha Science International.

- Course code : (to be allotted by the system)
- Title of the course : An Introduction to Minitab
- Department at which course will be conducted : Department of Statistics
- Duration: FOUR weeks
- Contact Sessions : Theory -10 hours and Practical :15 .hours
- Credits : One
- Course Coordinator/Instructor: Dr. D. N. Kashid
- Eligibility : Any graduate with Knowledge of programming.
- Intake : Min: 10 Max.: 20
- Course offered during : Even/Odd semester
- Course Type : Add on.
- Course Fee: Rs 3000/-

Course Contents:

Getting started with Minitab: Menu bar, Worksheet, Minitab commands and sub commands, Data entry into worksheet, Importing data, Saving, Retrieving, Printing file.

Operators and functions: Arithmetical operations, Mathematical functions, Column and Row statistics, Comparisons and Logical operations, Coding, Computing ranks, Sorting data, Stacking and Unstacking columns.

Exploratory data analysis: Tallying data, Describing data, Histograms, Box plots, Bar charts Pie charts

Correlation and Regression: Correlation: Scatter plots, Karl Pearson correlation coefficient, Regression: Simple and Multiple regression.

Matrix operation and Macros: Creating matrices, Commands for matrix operations, Writing simple macros.

Examination: (Method & Details)

Method: Theory - 50 Marks, Practical Examination- 50 Marks

Passing Rule: Separate for theory and Practical with at least 40 % marks.

Structure for Theory Examination:

All questions will be compulsory.

3)	10 Short answer questions each for 3 marks	=30
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4) 10 Multiple Choice questions each for 2 marks =20

Total =50 marks

Structure for Practical Examination:

Practical examination will be for 3 hours. There shall be 8 questions each carrying 10 marks. Students have to attempt any 5 questions.

Theory + Practical =100 marks

Text Books / Reference Books:

- 1. David Moore, George McCabe: MINITAB Manual Introduction to the Practice of Statistics, Michael Evans University of Toronto.
- 2. Barbara F. Ryan, Brian L. Joiner, Jonathan D. Cryer: Minitab Handbook- Updated for Release 14, Cengage Learning, 2005.
- 3. Ruth K. Meyer, David D. Krueger: A Minitab Guide to Statistics, Prentice Hall, 1998.
- 4. Thomas Arthur Ryan, Brian L. Joiner, Barbara F. Ryan: Minitab student handbook, Duxbury Press, 1976.

DEPARTMENT OF STATISTICS SHIVAJI UNIVERSITY, KOLHAPUR COURSE OFFERED UNDER CBCS SCHEME

- Course code : (to be allotted by the system)
- Title of the course : An Introduction to SPSS
- Department at which course will be conducted : Department of Statistics
- Duration: FOUR weeks
- Contact Sessions : Theory -10 hours and Practical :15 .hours
- Credits : One
- Course Coordinator/Instructor: Dr. D. N. Kashid
- Eligibility : Any graduate with Knowledge of programming.
- Intake : Min: 10 Max.: 20
- Course offered during : Even/Odd semester
- Course Type : Add on.
- Course Fee: Rs 3000/-
- Course Contents:

Getting started with SPSS: Data editor, Output viewer, Syntax editor, Script window, Variable view.

Charts and Graphs: Line chart, Scatter Plots, Histogram, Bar chart, Box Plot, Pie chart. **Exploratory data analysis:** Sum, Mean, Standard deviation, Variance, Minimum value, Maximum value and Range.

Correlation and Regression: Correlation: Scatter plots, Karl Pearson correlation coefficient, Partial correlation, Spearman correlation, Regression: Simple and Multiple regression.

Testing of hypotheses: Chi square test for association, Chi square test goodness of fit, Independent sample t test, Paired sample t test, One sample t test, Report generation.

Examination: (Method & Details)

Method: Theory - 50 Marks, Practical Examination- 50 Marks

Passing Rule: Separate for theory and Practical with at least 40 % marks.

Structure for Theory Examination:

All questions will be compulsory.

- 5) 10 Short answer questions each for 3 marks =30
- 6) 10 Multiple Choice questions each for 2 marks =20

Total =50 marks

Structure for Practical Examination:

Practical examination will be for 3 hours. There shall be 8 questions each carrying 10 marks. Students have to attempt any 5 questions.

Theory + Practical =100 marks

Text Books / Reference Books:

- 1. William C. Rinaman: Workshop Statistics: SPSS Software Companion Manual, Key College Publishing, 2004.
- 2. Ton J. Cleophas, Ton J. M. Cleophas, Aeilko H. Zwinderman: Cookbook for Starters on SPSS, Springer.
- 3. Eelko Huizingh: Applied Statistics with SPSS, SAGE, 2007.

- Course code : (to be allotted by the system)
- Title of the course : **Basics of MATLAB**
- Department at which course will be conducted : Department of Statistics
- Duration: FOUR weeks
- Contact Sessions : Theory -10 hours and Practical :15 .hours
- Credits : One
- Course Coordinator/Instructor: Dr. H. V. Kulkarni.
- Eligibility : A graduate student with good software skills. Students studying at M.Sc. in Mathematics, Statistics, Physics, Electronics, MBA, MCA, B.Tech., M.Tech.
- Intake : Min: 10
- Max.: 20
- Course offered during : Even/Odd semester
- Course Fee: Rs 3000/-
- Course Contents:

UNIT-1:

- To Launch the Matlab application to get a command line prompt
- Import/export of data from/to external files
- Creating and manipulating new variables from the command line
- Using the built-in help documentation

UNIT-2

- simple linear algebra with matrices :transpose,products, powers,elment-by-element products, determinants, inverse,g-inverse
- Characteristic roots and related commands
- Sort, minimum, maximum,

UNIT-3

• Prepare simple macros in the form of M-files : if-else-end, :for-end, while –end and other statements

UNIT-4

- Using built-in functions and tool-boxes, creating new function files
- Numerical integration
- Roots of polynomials and solving complicated equations

UNIT-5

• 2-D and 3-D Mathematical and Statistical plots

UNIT-6

• Generating random numbers from different probability distributions

- Descriptive Statistics
- Hypothesis testing
- Linear regression analysis, ANOVA

UNIT-7

• Practice and revision

There shall be hands-on Practical/Practice Sessions on each Unit followed by every classroom session.

Examination :(Method & Details)

There shall be Theory as well as Practical Examination each for 50 marks.

Structure for Theory paper : These shall be 50 MCQs each carrying one mark. All will be compulsory.

Practical Examination will be for three hours. There shall be 8 questions each carrying 10 marks. Students have to attempt any FIVE.

Passing head for Theory and Practical will be separate and Passing marks are 40% in each.

Recommended Texts:

Enander, Eva Part (1996) Matlab handbook

Hanselman, D (1998) Mastering matlab 5 : Prentice Hall

Etter, Delores M (1997) Engineering problem solving with matlab : by Delores M Ettet : Prentice Hall

Kwon, Young W (1997) The Finite Element Method Using Matlab : CRC Pub.

Pratap, Rudha(2006) Getting started with matlab 7: A quick introduction for scientist and engineers Oxford Uni. Pr

Sigh, Y. Kiran (2007) Matlab programming: Prentice Hall

Elden, Lars (2006) Introduction to numerical computation: Analysis and MATLAB illustation Pearson Education

Mathews, J.H. (2007) Numerical methods using MATLAB : Pearson Education

Palm, William J. (2005) Introduction to MATLAB 7 for engineers : McGraw Hill

Driscoll, Tobin A. (2009) Learning Matlab -- Society for Industrial & Applied Mathematics

Siciliano, Antonio, (2008) Matlab R : Data analysis and visualization -- World Scientific