JAI HIND COLLEGE
BASANTSING INSTITUTE OF SCIENCE
&
J. T. LALVANI COLLEGE OF COMMERCE
(AUTONOMOUS)

"A" Road, Churchgate, Mumbai - 400 020, India.

Affiliated to
University of Mumbai

Program: M.Sc. Big Data Analytics

Course: Bridge Courses

Credit Based Semester and Grading System (CBSGS) with effect from the Academic year 2020-21

M.Sc. Bridge Courses Syllabus

Bridge Courses			
Course Code	Course Title	Lectures In Hours	Credits
SBBDA101	Fundamentals of Mathematics	15	1

M.Sc. Bridge Courses Syllabus

Course Code	Course Title	Number of Lectures	No. of Credits
SBBD101	FUNDAMENTALS OF MATHEMATICS	15	1
Unit I	Algebra of Matrices	7L	

Order of a matrix, square matrix, types of matrices: zero, diagonal, upper triangular, lower triangular, scalar, identity, symmetric, skew-symmetric, invertible. Operation on matrices: addition, scalar multiplication, transposition, multiplication and basic results.

Unit II	System of Linear Equations	8L

Introduction to system of homogenous and non-homogeneous linear equations. Parametric equations of lines and planes. Solutions of the system of m equations in n unknowns and their geometric interpretation. Matrix representation of system of homogenous and non-homogeneous linear equations. Elementary row operations. Row echelon form of a matrix. Gaussian elimination method to solve a system of homogenous linear equations.

References:

1. Lay David C (2000).: Linear Algebra and its Applications, Addison Wesley.

2. Schaum's Outlines(2006) : Linear Algebra, Tata McGraw-Hill Edition, 3rd Edition.
3. Artin M (1994).: Algebra. Prentice Hall of India.

Additional Reference:

1. Krishnamurthy V., Mainra V.P. and Arora J.L.: An Introduction to Linear Algebra

2. Biswas, S. (1997): A Textbook of Matrix Algebra, New Age International.
3. Gupta S.C.(2008): An Introduction to Matrices (Reprint). Sultan Chand & Sons.

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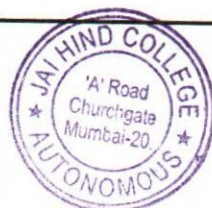# &
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M.Sc. Bridge Courses Syllabus

Bridge Courses			
Course Code	Course Title	Lectures In Hours	Credits
SBBDA102	Fundamentals of Statistics	15	1

M.Sc. Bridge Courses Syllabus

Course Code	Course Title	Number of Lectures	No. of Credits
SBBD102	FUNDAMENTALS OF STATISTICS	15	1
Unit I	Graphs,Diagrams and Bivariate Frequency Distribution	7L	

(a) Preliminary Concepts: Concepts of statistical population and sample. Different types of scales nominal, ordinal, interval and ratio. Types of Data from a population : Qualitative and quantitative data; Time series data; discrete and continuous data.

(b) Graphs,Diagrams and Bivariate frequency distribution: Diagrammatic representation using bar diagrams and pie chart. Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, frequency polygon, Stem and leaf diagram and Cumulative frequency polygon. Bivariate frequency distribution. Marginal and Conditional frequency distributions.

Unit II	Measure of Central Tendency and Dispersion	8L

(a) Measures of Central Tendency: Concept of central tendency of statistical data, Statistical averages, Arithmetic Mean: Definition; combined and weighted mean of a number of groups, Mode and Median: Definition; Empirical relation between mean, median and mode.

(b) Measures of Dispersion: Concept of dispersion,characteristics of good measure of dispersion, Mean deviation, minimality property (without proof), Variance and standard deviation, Combined variance for n groups(derivation for two groups), Mean squared deviation, minimality property of mean squared deviation.Measures of dispersion for comparison:Coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation.

References:

1. Medhi J. (2016) : Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
2. Agarwal B.L.(2013) : Basic Statistics, New Age International Ltd.
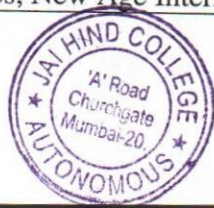
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Additional Reference:

1. Spiegel M.R.(2014) : Theory and Problems of Statistics, Schaum' s Publications series. Tata McGraw-Hill.

2. Goon A.M., Gupta M.K., Dasgupta B.(2003) : Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.
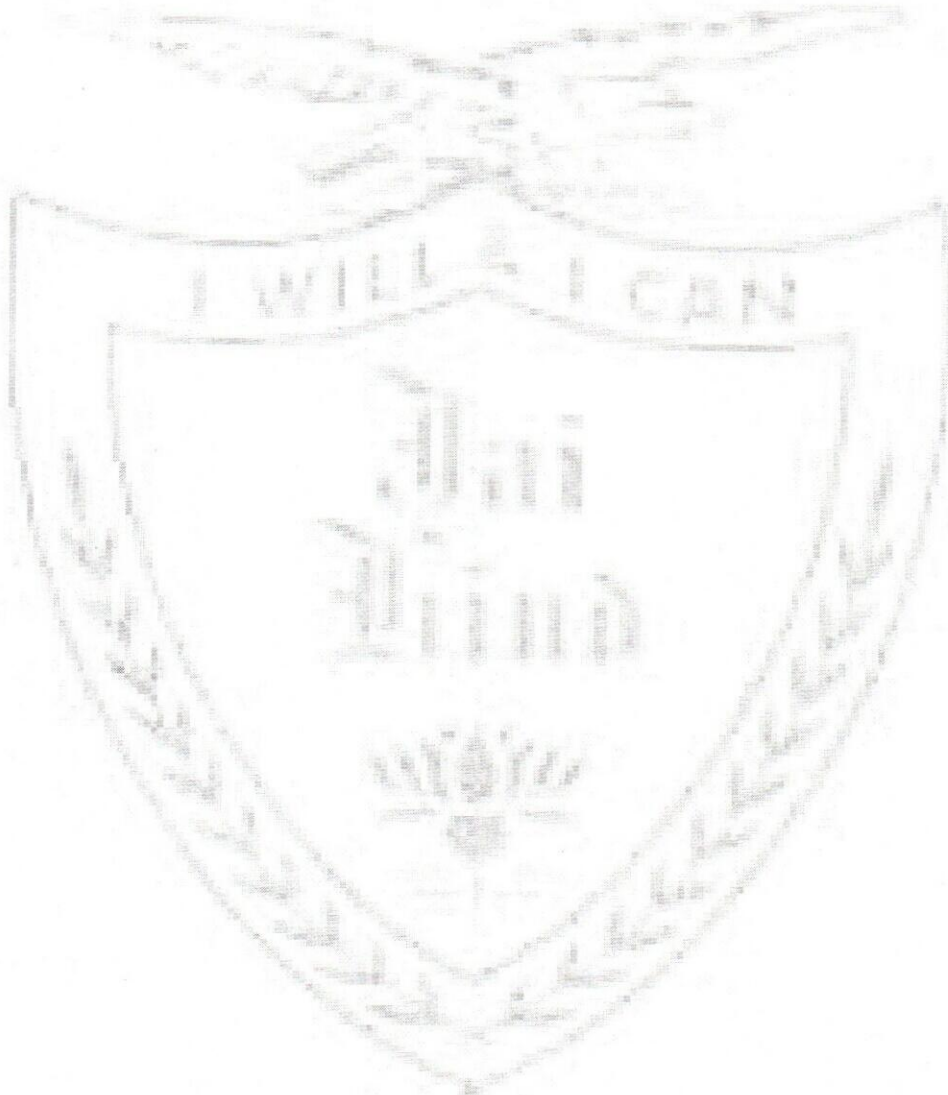
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M.Sc. Bridge Courses Syllabus

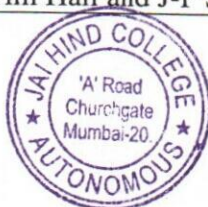| Bridge Courses			
Course Code	**Course Title**	**Lectures In Hours**	**Credits**
SBBDA103	Introduction to Python and Scala	15	1

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M.Sc. Bridge Courses Syllabus

Course Code	Course Title	Number of Lectures	No. of Credits
SBBDA103	**INTRODUCTION TO PYTHON AND SCALA**	15	1
Unit I	**Introduction to Programming and Python**		**8L**

(a) **Introduction to programming:** What is program, types of Programming languages, features, Simple program logic, program development cycle , Algorithms and Flow Charts, desirable program characteristics, , Comments, Errors, Data Types, Expressions, Variables, Keywords, Arrays, Operators andoperands, Type conversion.

(b) **Introduction to python:** Python history and features, Interactive mode and Scriptmode, Program execution, Python syntax.

(c) **Conditional Statements, Loops and control statements:** if, if-else, nested if –else, for loop, while loop, nested loops, Terminating loops, skipping specific conditions, infinite loops.

(d) **Functions:** Defining a function, global and local variables, calling a function, Advantages of functions, types of functions, function parameters, Formal parameters, Actual parameters, recursive function, anonymous functions, Function scope basics.

(e) **Regular Expressions:** Concept of regular expression, various types of regular expressions.

(f) **Modules and Packages**: Understanding Python Modules, Creating Your First Module, Using Your Module in Another Program, Understanding Packages, Python packages.

Unit II	**Introduction to OOP and Scala programming**	**7 L**

a) **Introduction to Scala:** History and purposes of Scala, platform and editors, Scala: scalable language, Scala for java programmers, variables, data types, conditional statements, loops, code blocks, functions.

b) **Object Oriented Scala:** Object Oriented principles, classes, objects , access and visibility, constructors, traits in scala, abstract class, packages and package objects, java interoperability, pattern matching, SBT and other build systems, Scala collections, exception handling.

References:

1) Programming logic and design by Joyce Farrell, Seventh edition.

2) Learning python by Mark Lutz, O'REILLY , 4th edition.

3) Python 3 for Absolute Beginners by Tim Hall and J-P Stacey, Apress.

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4) Fundamentals of python Programming by Richard L. Halterman

5) Scala and Spark for Big Data Analytics by Md. Rezaul Karim and Sridhar Alla, 2017.

6) Scala Programming for Big Data Analytics by Irfan Elahi.

INTRODUCTION TO PYTHON AND SCALA PRACTICAL

1) Programs containing Variable declaration and Arithmetic operations.
2) Programs on List, Tuples, Dictionary.
3) Programs based on Conditional statements.
4) Programs based on Loops.
5) Programs related to Functions & Modules.

6) Programs on Regular expression.
7) Programs on OOPS concepts with scala.
8) Programs based on constructors, traits and abstract classes.
9) Programs based on packages, collections and Exceptions.

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Program: M.Sc. Big Data Analytics

Course: Pre-Course Work

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Pre-course Work

1. <u>Microsoft Excel for Data Analysis</u>
    a. Excel Tables, Filters, Sorting
    b. Pivot Tables and Charts
    c. Formats, Formulas, Dates
    d. Functions – Mathematical, Statistical, Text, Date

   Reference:

   On-line courses/Tutorials:
    i. Microsoft Virtual Academy:
        a. Analyzing and Visualizing Data with Excel
           https://mva.microsoft.com/en-US/training-courses/analyzing-and-visualizing-data-with-excel-11157
        b. Data Analysis with Excel
           https://mva.microsoft.com/en-US/training-courses/data-analysis-with-excel-16654
    ii. Edx.Org:
    e. Introduction to Data Analysis using Excel
       https://www.edx.org/course/introduction-to-data-analysis-using-excel-0
    iii. Coursera.org:
    f. Introduction to Data Analysis Using Excel
       https://www.coursera.org/learn/excel-data-analysis

2. <u>Basic Unix Programming</u>
    a. Basic Unix Commands
    b. Handling files and folders
    c. Concatenation, find and replace, modify file & texts
    d. Basic summary commands

   Reference:

   On-line courses/Tutorials:
       Data Camp:
    e. Introduction to Shell for Data Science
       https://www.datacamp.com/courses/introduction-to-shell-for-data-science
       Linux.Org:
    f. Linux Beginner Tutorials https://www.linux.org/forums/linux-beginner-tutorials.123/
    g. Github - Organizing with Unix: https://rafaLabgithub.io/dsbook/organizing-with-unix.html

   Book:

    h. Data Science at the Command Line, Jeroen Janssens,
       https://www.datascienceatthecommandline.com/