Bridgecourse in Mathematics and Statistics
for
students of Data science and Business Analytics

Prepared by
Department of Statistics
K.C.College
HSNC University
Mumbai

For students who come from non mathematics back ground and who are aspiring to become data analysts or data scientists HSNC University offers a preparatory bridge course consisting of Data science fundamentals.

This program will prepare you to successfully study data science and business analytics at the graduation level by introducing basic concepts.

Course structure:

(Total 20 lectures of one hour duration each)

The program consists of the following courses:

Unit 1: Set Theory, Relations and functions: (03 lectures of one hour each)

Sets :

Sets and their representation, Different types of sets, Venn diagrams, Union and intersection of sets,Difference of sets and complement of a set. Practical problems on sets.

Relations and Functions:

Ordered pairs, Definition of Relation,Pictorial diagrams,Domain,Co-domain,Range of a relation

Function as a special kind of relation from one set to another.Pictorial representation of a function, domain, co-domain and range of a function

Real valued functions, domain and range of these functions:Constant,Identity,Polynomial, Rational,Modulus,Signum,Exponential,Logarithmic,Greatest integer functions (with their graphs)

Sum, difference, product and quotients of functions.

Simple problems based on Relations and functions.

References:

1. P.B. Bhattacharya, S,.K.Jain, S.R. Nagpaul, First Course in Linear Algebra, Wiley,1983
2. G. Hadley, Linear Algebra, Narosa Publishing, 1992.

3. J.P. Singh, Discrete Mathematics for Under graduates, Ane Books, 2014.
4. Mathematical analysis by S C Malik

Unit 2: Algebra (05 lectures of one hour each)

Linear and Quadratic equations,Linear inequalities, Permutation and combination.Simple problems based on Algebra.

Vectors

Definition of vectors. Concept of Dot product and Cross product. Simple problems based on these topics.

Matrices

Representation of the data in a Matrix form. Different types of matrices. Mathematical operations on matrices. Determinant and inverse of a matrix.

Problems based on Matrices will be solved during the lecture.

References:

1. J.P. Singh, Discrete Mathematics for Under graduates, Ane Books, 2014.
2. P.B. Bhattacharya, S,.K.Jain, S.R. Nagpaul, First Course in Linear Algebra,wiley 1983
3. G. Hadley, Linear Algebra, Narosa Publishing, 1992.
4. An Introduction to linear algebra A R Vasistha
5. Mathematical analysis by S C Malik

Unit 3: Calculus (05 lectures of one hour each)

Chapter 1: Limits and Derivatives

Understanding and calculating limits, continuity and derivatives as rates of change. Differentiation rules including, derivatives of polynomials, exponentials. Product, quotient and chain rule of differentiation. Maximum and Minimum problems. L'Hospitals rule. Simple problems based on limits and derivatives.

Chapter 2: Integration

Concept of integration. Indefinite and Definite integration. Concept of area under the curve. Simple problems based on all the topics.

References:

• G.B. Thomas, M.D. Weir, J.R. Hass, Thomas' Calculus, Pearson Publication.
• R.G. Bartle, D.R. Sherbert, Introduction to Real Analysis, Wiley Publication.

Unit 4: Statistics

Chapter 1: Descriptive statistics: (02 lectures of one hour each)

Data, Different types of data, Organization of data using classification. Graphical representation of data.

Probability: (03 lectures of one hour each)

Basic definitions of Theory of probability. Addition theorm of probability, Conditional probability, Multiplication theorem of probability. Simple problems based on probability.

Random variables (02 lectures of one hour each)

Discrete Random variables:

Definition, probability mass function, cumulative density function. Simple problems based on discrete random variables. Expectation and variance. Simple problems based on Expectation and variance.

Continuous random variables:

Definition, probability mass function, cumulative density function.Expectation and variance. Simple problems based on Continuous random variables.

Expectation and variance. Simple problems based on Expectation and variance.

References:

1. Mathematical statistics by J N Kapur and H C Saxena.
2. Descriptive statistics by Milan Gholba, Sudha Phatak
3. Statistical Methods by Milan Gholba,Sudha Phatak
4. Probability and Statistics by Schaums's outlines, M R Speigel, J J Schiller,R A Srinivasan

Assessment:

1. Students will be given assignments on all units as soon as the unit is completed. Students should complete all assignments within 2 days of completion of the unit.
   (Marks:20)
2. Viva voce for 10 marks.
3. One test of 20 marks will be conducted. Minimum passing percentage is 50%.

****