Combinatorics, Statistics and Basic Probability

Programme(s) in which it is offered: B.Sc.B.Ed. Mathematics

Course Category: Core	**Schedule of Offering**: Odd
Course Credit Structure: 4	**Course Code:** EG412
Total Number of Hours: 5	**Contact Hours Per Week:** 5
Lecture: 3, 3	**Tutorial:** 1, 2
Practical: 0, 0	**Medium of Instruction:** English
Date of Revision:	**Skill Focus:** Others
Short Name of the Course: Combinatorics, Statistics & Probability	**Course Stream**
Grading Method: Regular	**Repeatable:** Credit
Course Level: Beginner	

Course Description

This course is offered as a Core Course for B.Sc. B. Ed Mathematics students. The students will learn about certain mathematical and statistical tools that are used in a business environment

Course Introduction

To enable the students to understand the basic concepts of combinatorics, statistics and probability, to obtain the skills and apply them in problem-solving and teaching (as part of assessment of learners).

Course Objective

The objectives of the course are:

1. To familiarize the students with the concepts and techniques of combinatorics

2. To sensitize the students regarding the application of statistics in solving real life problems.

3. To make the students aware about the business statistical methods

4. To develop the student's ability to deal with numerical and quantitative issues in business
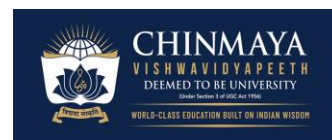
Course Outcome

At the end of the course students will be able to

1. Analyse different types of Lattices and their properties
2. Apply the counting principles such as permutation and combination, pigeonhole principle, principle of inclusion and exclusion to solve real life problems
3. Analyse data using different types of charts and graphs
4. Apply the concept of Probability and random variable in various problem situations
5. Compute the probability and value of a random variable

PO-CO Mapping

<This should explain how the Course Outcomes (CO) are mapped with the Programme Outcomes (PO). All programmes to have two generic POs which can map to all minors/proficiency courses and foundation/self-immersion courses. Please tick the respective cells only; leave the other cells blank.>

PO-CO Mapping Matrix

CO/PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6
CO1						
CO2						
CO3						
CO4						
CO5						

Prerequisites and other constraints

This course is offered to all students of B.Sc.B.Ed. Mathematics. There is no prerequisite course.
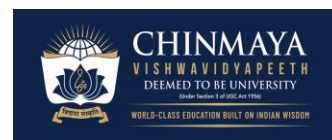
Pedagogy

The teaching-learning of the course is organized through lectures, problem-solving sessions and student presentations.

Suggested Reading:

1. C. L. Liu (1986), Elements of Discrete Mathematics, McGraw-Hill Education.
2. Kenneth H. Rosen (2002), Discrete Mathematics and its Applications, McGraw-Hill Education.

3. Alexander M. Mood and Others (1988), Introduction to the Theory of Statistics, McGraw Hill Education.
4. Charles M. Grinstead and Laurie Snell J. (1991), Introduction to Probability, Rhode Island, American Mathematical Society.
5. Gupta S.C and Kapur (2011), Fundamentals of Mathematical Statistics, Sultan Chand and Co, New Delhi.
6. Richard Serfozo (2003), Basic Probability Problems, London, Springer.
7. Robert V. Hogg and Allen T. Craig (1978), Introduction to Mathematical Statistics, McMillan Publishing Co.

Evaluation Pattern

Evaluation Matrix

	Component Type	Weightage Percentage	Total Marks	Tentative Dates	Course Outcome Mapping
Continuous Internal Assessment (CIA) Components*	Mid-semester exam	50% of CIA	30	Around 9th week	1, 2, 3
	Assignment	25% of CIA	15	End of each module	1, 2, 3, 4, 5
	Quizzes	25% of CIA	15	Every two weeks	1, 2, 3, 4
	CIA Marks	**100% of CIA**	60		
ESE		40%	80	End of the semester	1, 2, 3, 4, 5

Module Sessions

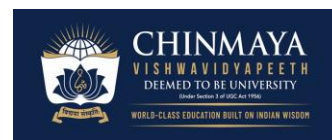## Module I: Lattices and Boolean algebra   (15 Hours)

Partially ordered sets, Lattices, Complete lattices, Distributive lattices, Complements, Boolean algebra, Boolean expressions, Application to switching circuits.

Readings:

1. Liu. 1986.

2. Rosen. 2002.

Activities:
   a) Quiz
   b) Assignment

Module II: Permutations and Combinations   (10 Hours)

Permutations and Combinations, Pigeon-hole principle, Principle of inclusion and exclusion. Solving real life problems based on them.

Reading:
   a) Rosen. 2002.
   b) Hogg. 1978.

Activities:
   a) Quiz
   b) Assignment

Module III: Introduction to Statistics   (25 Hours)

Introduction to statistics- Mean, Mode and Median of grouped and un-grouped data, Graphical representations - Pie Charts, Line Graphs, Bar Graphs, Histograms, frequency polygon. Measures of dispersion - Range, Mean deviation, Variance and Standard deviation. Analysis of frequency distribution.
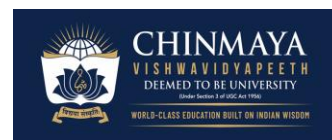
Reading:
   a) Grinstead. 1991.
   b) Gupta. 2011.

Activities:
   a) Quiz

b) Assignment

Module IV: Basics of Probability   (25 Hours)

Random experiment, Concept of probability, Sample space, Events- different kinds
Probability definitions – Mathematical or Classical or Statistical, Conditional probability,
Independent events, Bayes' theorem.
Random variable, Discrete and continuous random variables, Probability function,
Probability density function, Distribution function. Mean Variance and standard deviation
of a random variable.

Reading:
1. Grinstead.

2. Gupta

3. Serfozo

Activity:
a) Quiz
b) Assignment