GIRIJANANDA CHOWDHURY UNIVERSITY

Hathkhowapara, Azara, Guwahati-781017, Assam

CORE COURSES OFFERED BY DEPT. OF MATHEMATICS

BMA23201T	DIFFERENTIAL EQUATIONS	L	T	P	C
		3	1	0	4

Pre-requisite: Knowledge of Mathematics at Class XI & XII

Course Objectives:

- To introduce the students to the exciting world of ordinary differential equations, mathematical modeling and their applications.

Course Outcome:

After successful completion of the course, the students will be able to

CO 1: describe basics of first order ordinary differential equations and their solutions.

CO2: explain the concept of Wronskian for solving ordinary differential equations.

CO3: demonstrate linear and nonlinear homogeneous differential equations of second order using standard methods.

Module 1: First Order Ordinary Differential Equations — **30 Hours**

Linear equations and Bernoulli equations, Exact equations, Orthogonal trajectories and oblique trajectories; Basic theory of higher order linear differential equations, Wronskian, and its properties; Solving differential equation by reducing its order.

Module 2: Second Order Linear Differential Equations — **30 Hours**

Linear homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous differential equations

Total Lecture hours — **60 hours**

Text Book(s)

1. Simmons G. F., Differential Equations with applications 3rd Edition, CRC Press, Chapman and Hall Book (2017)
2. Sneddon, I. N. Elements of Partial Differential Equations, Dover Publications. Indian Reprint (2006)

Reference Books

1. Raisinghania M. D., Advanced Differential Equations, S. Chand & Company Pvt. Ltd (2014)
1. Ahsan, Z. Differential Equations and their Applications, 2nd Ed., PHI, Pvt. Ltd., New Delhi (2004).

BMA23105T	BASIC STATISTICS	L	T	P	C
		3	1	0	4

Pre-requisite: Knowledge of Mathematics at Class XI & XII

Course Objectives:

- To make the students familiar with the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness.
- To render the students to several examples and exercises that blend their everyday experiences with their scientific interests.

Course Outcome:

After successful completion of the course, the students will be able to

CO 1: understand probability and moment generating functions.

CO 2: understand various distributions such as Binomial, Poisson and Normal distributions.

CO 3: apply the measure the scale of association between two variables, and to establish a formulation helping to predict one variable in terms of the other, i.e., correlation and linear regression.

Module 1: Introduction to Probability — **15 Hours**

Random experiment, Sample space, Events, Definition of probability and examples, Addition law of probability, Conditional probability, Baye's Theorem

Module 2: Random Variable — **15 Hours**

Random Variable, Probability distribution: Discrete and Continuous, Mean and Variance of probability distribution, Binomial distribution, Poisson's and Normal distribution

Module 3: Introduction to Statistics — **15 Hours**

Measures of central Tendency, Measures of dispersion, Moments and moment generating function, Skewness and Kurtosis

Module 4: Bivariate Data — **15 Hours**

Bivariate data: Definition, Scatter diagram, Simple and multiple correlation, Rank correlation, Simple linear Regression, Lines of regression, Principle of least squares and fitting of straight lines.

Total Lecture hours — **60 hours**

Text Book(s)

1. Hogg R. V., McKean J.W., & Craig A. T., Introduction to Mathematical Statistics (7th ed.). Pearson Education, Inc., (2013).
2. Miller I. & Miller M., John E. F., Mathematical Statistics with Applications (8th ed.), Pearson. Dorling Kindersley (India), (2014).
3. Ross S. M. Introduction to Probability Models (11th ed.). Elsevier Inc., (2014).

Reference Books

1. Mood, A. M., Graybill, F. A. & Boes, D. C., Introduction to the Theory of Statistics (3rd ed.). McGraw-Hill Education Pvt. Ltd. Indian Edition (2017)

MULTIDISCIPLINARY COURSES (MDC) OFFERED BY DEPT. OF MATHEMATICS

BMA23143T	Introduction to Programming with MATLAB	L	T	P	C
		1	0	4	3

Pre-requisite: Basic idea of mathematics

Course Objectives:

- To impart the knowledge to the students with MATLAB software.
- To enhance programming knowledge in Research and Development.

Course Outcome:

After successful completion of the course, the students will be able to
CO1:Understand the implementation of basic arithmetic operations in MatLab.
CO2: Apply built in functions to plot graphs of functions, polynomials.
CO3: Apply MATLAB's built-in functions in 2D and 3D plots.

Module 1: Introduction to MATLAB	**15 Hours**

Getting help with commands in MATLAB, Vector and matrix generation, Subscripting and the colon notation, matrix and array operations and their manipulations, introduction to some inbuilt functions related to array operations. m-files: scripts and functions, editing, saving m-files, and interaction between them.

Module 2: Simple graphics in MATLAB	**15 Hours**

Plotting of graphs of function, Plotting the graphs of polynomial of degree 4 and 5, Sketching parametric curves

Module 3:Two & three-dimensional graphics	**15 Hours**

Basic plots, change in axes and annotation in a figure, multiple plots in a figure, saving and printing figures, mesh plots, surface plots and their variants e.g., contour plots, sphere, and animations.

Total Lecture Hours	**45 hours**

Text Book(s)

1. Gilat A., MATLAB: An Introduction with Applications, 4th edition, Wiley; Fourth edition, (2012)

Reference Book(s)

1. Pratap R.,Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, Oxford, (2010)