



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-3(B. Tech.)

Subject: Mathematics-II (BETXX10209)

Type of course: Multidisciplinary

Prerequisite: Algebra, calculus, basic probability theory etc.

Rationale: The basic concepts of Mean, Mode, Standard Deviation, Skewness, and Bayes' rule, Bernoulli trials, Random variables.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
4	0	0	4	60	30	10	-	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. no.	Course content	Hrs	% Weightage
1	<p>Chapter-1: Probability Definition of probability, Exhaustive events, Pair wise independent events, Multiplicative law of probability, Conditional probability, Baye's theorem.</p> <p>Chapter-2: Descriptive Statistics Introduction of Central Tendency, Arithmetic Mean, Harmonic Mean, Median, Mode, Quartile, Deciles and Percentile, Introduction of Dispersion, Range(R), Quartile Deviation, Standard Deviation.</p>	15	25%
2	<p>Chapter-3: Probability Distributions Moments, Expectation, dispersion, skewness, kurtosis, expected value of two dimensional random variable, Linear Correlation, correlation coefficient, ranks correlation coefficient.</p> <p>Chapter-4: Curve fitting Curve fitting by method of least squares, Fitting of straight lines, Fitting of Second degree parabola, curve fitting of the type $y = ax^b$, curve fitting of the type $y = ab^x$, curve fitting of the type $y = ae^{bx}$.</p>	15	25%



3	Chapter-5: Root Finding and Optimization False position Methods, Newton – Raphson Methods, Secant Methods and Successive Approximation Methods Solution of system of linear equations using Numerical Techniques Gauss Elimination, Gauss – Seidel iterative methods.	15	25%
4	Chapter-6: Interpolation, Numerical Integration and Solution of ODE Interpolation: Netwon’s forward Interpolation, Newton’s backward Interpolation, Lagrange’s interpolation methods, Cubic spline interpolation, Inverse interpolation, Numerical Integration: Trapezoidal rule, Simpson’s 1/3rd and 3/8th rule, Solution of ODE: Taylor series method, Euler method, Runge - Kutta method of 4 th order.	15	25%

Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1	An interactive math tool: Solve mathematical problems from the syllabus chapters with graphical visualization using any open-source interactive math tool and submit the solutions to the GMIU web portal.	10
2	Preparation of Mind-Map: The students have to prepare the mind map for probability and statistics using an A3 sheet and upload the same to the GMIU web portal.	10
3	Real-world application: In your engineering field, list the five real-world uses for statistics and numerical techniques. Then, explain how each challenge was solved.	10
4	Vedic Mathematics Students have to prepare a chart of short tricks utilizing Vedic mathematics for any three chapters, which will be submitted to the GMIU web portal.	10
5	Preparation of Formulae List Students have to list formulas with examples used in a given chapters and upload it to the GMIU web portal.	10
Total		50

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom’s Taxonomy)						
Level	Remembrance(R)	Understanding(U)	Application(A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	10%	15%	20%	20%	35%	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



Course Outcome:

After learning the course, the students should be able to:	
CO1	Compute and interpret descriptive statistics using numerical and graphical techniques and understand the basic concepts of probability, random variables, probability distribution.
CO2	Apply the concept of the correlation and correlation coefficient on various real world problems and understand the fitting of various curves by method of least square.
CO3	Grasp the fundamental concepts of numerical analysis, including error analysis, convergence criteria, and the importance of stability in numerical algorithms.
CO4	Find an approximate solution of Ordinary Differential Equations using appropriate iterative method.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- [1] E. Kreyszig, Advanced Engineering Mathematics (8th Edition), John Wiley (1999)
- [2] S. D. Conte and Carl de Boor, Elementary Numerical Analysis-An Algorithmic Approach (3rd Edition), McGraw-Hill, 1980.
- [3] C.E. Froberg, Introduction to Numerical Analysis (2nd Edition), Addison-Wesley, 1981.
- [4] Gerald C. F. and Wheatley P.O., Applied Numerical Analysis (5th Edition), Addison-Wesley, Singapore, 1998.
- [5] Johnson Richard A., Miller and Freund's - Probability and Statistics (8th Edition), PHI.
- [6] S.C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics (11th Edition), Sultan Chand & Sons.

