National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology**		Year of Regulation	**2024-25**
Department	**Mathematics**		Semester	**I**

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
MA101	**Engineering Mathematics-I**	**---**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes	CO's	Statement	Bloom's Taxonomy
Course Objectives	To enable the students to have a good understanding of fundamental concepts of single and multivariable calculus.	Course Outcomes	MA101.1	Able to acquire **knowledge** of limit, continuity and differentiation for functions of single and multi-variables and the consequences of different mean value theorems.	**Understand, Analyze**
	To provide the basic and important concepts of linear algebra.		MA101.2	Able to **apply** Taylor's series to approximate differentiable functions of single and multi-variables and **estimate** the error.	**Apply, Evaluate**
	To prepare the students to apply the mathematical principles of calculus and linear algebra to solve engineering problems.		MA101.3	Able to **apply** definite integrals to **evaluate** length of plane curves, volume and surface area of solids of rotation.	**Apply, Evaluate**
			MA101.4	Able to **understand** the basic concepts of vector spaces and to solve systems of linear equations.	**Understand, Evaluate**
	To enable the students to have a good understanding of essential methods of statistical inference.		MA101.5	Able to **demonstrate** and **apply** estimation of parameters, confidence interval, and testing hypotheses for normal distribution.	**Understand, Apply**
			MA101.6	Able to **formulate** relationships among random variables using regression and correlation.	**Create**

COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MA101.1	2														
MA101.2	3														
MA101.3	3														
MA101.4	3														
MA101.5	2														
MA101.6	3														
MA101	**2.67**														

SYLLABUS

No.	Content	Hours	COs
I	**Differential Calculus:** Real valued functions of single variable: Limit; continuity; differentiation, Taylor & Maclaurin series, indeterminate forms, L'Hospital's rule. Real valued functions of two/three variables: Limit, continuity, partial differentiation; Taylor and Maclaurin series for function of two variables; Extreme values of functions of two variables.	14	**MA101.1 MA101.2**
II	**Integral Calculus:** Definite integral: length of a plane curve, surface area of revolution, volume of solids of revolution; Differentiation under sign of integral: Leibnitz rule; Improper integrals, convergence tests, beta and gamma functions; Multiple Integrals: double and triple integrals, volume and surface integrals.	16	**MA101.3**
III	**Linear Algebra:** Vector space over R, subspaces, bases and dimension; Echelon form, rank of a matrix, system of linear equations-direct & iterative methods; eigenvalues and eigenvectors; Symmetric, skew-symmetric, Hermitian, skew-Hermitian, orthogonal, and unitary matrices.	14	**MA101.4**
IV	**Statistics:** Random variables, Probability distributions, Point estimation of parameters, Confidence Intervals, Testing Hypotheses, goodness of fit: Chi-square test, Regression: fitting straight lines, correlation.	12	**MA101.5 MA101.6**
	Total Hours (4 Modules)	56	

Essential Readings

1. J. Stewart, D. K. Clegg and S. Watson, "Calculus", Cengage Learning India Pvt. Limited, 9th edition, 2023.

2. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th edition 2023.

Supplementary Readings

1. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa Publishing House, 5th edition, 2019.

2. N. Piskunov, "Differential Calculus and Integral Calculus – I", CBS, 1996.

3. N. Piskunov, "Differential Calculus and Integral Calculus – II", CBS, 1996.

4. D. C. Montgomery and G. C. Runger, "Applied Statistics and Probability for Engineers", John Wiley & Sons, 7th edition, 2018.