

Syllabus Template (First year of 25-26 entry Batch and second year of 24-25 entry Batch)

Course Code :		1BMAM201C	MULTIVARIABLE CALCULUS AND NUMERICAL METHODS FOR ME STREAM	Semester :	II
L:T:P :		3 : 1 : 0		Course Type :	BSC
Hours/Sem.	Teaching :	42+28Hrs		CIE Marks :	50
	Learning (TW+SL) :	44Hrs		SEE Marks :	50
	Exam :	6Hrs		Total Marks :	100
	Total Hrs. :	120Hrs		Credits :	04

Professional Competency:

Apply calculus and numerical methods to solve complex engineering problems.

Course Outcomes

After the completion of the course student will be able to

CO1: Apply foundational concepts of calculus for geometric curves

CO2: Employ vector calculus concepts to solenoidal and irrotational vector fields and extremum problems of functionals.

CO3: Apply the concept of numerical methods to obtain approximate solutions for mathematical problems.

CO4: Apply the concept of numerical methods to solve ordinary differential equations of first order and first degree

UNIT-I

11 Hrs.

Integral Calculus

Multiple Integrals: Definition, Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

UNIT-II

10Hrs.

Vector Calculus

Scalar and vector fields. Gradient, directional derivative, divergence and curl-physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential.

Vector Integration: Line integrals, Surface integral, work done by a force and flux. Statement of Green's theorem and Stoke's theorem and problems without verifications.

UNIT-III

11 Hrs.

Numerical Methods – 1

Solution of algebraic and transcendental equations: Regular falsi and Newton-Raphson methods. Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae, Lagrange's interpolation formula.

Numerical integration: Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule.

UNIT-IV

10 Hrs.

Numerical Methods- 2

Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor – corrector formula.

Text Books

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2021.

2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2018.
3. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4th Ed., 2022.

Reference Books

1. B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Ed., 2022.
4. H.K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.
5. David Clay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018.

Web Links and Video Lectures:

<https://drive.google.com/file/d/1KtCtZmnJnOvV1S68wXS9FZPXUFvRktBQ/view?usp=sharing>

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO2	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO3	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO4	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		

Sri B.V.V.S.
Basaveshwar Engineering College, Bagalkote
Scheme (from 2025-26)

Sl. N o.	Cour se Code	Course Title	Teaching-Learning Scheme				Examina tion Duration (Hrs/Sem .)		Tot al Hou rs	Examination Scheme and Evaluation			Cre dits (C)= Tot al Hou rs /30
			L Hrs/ Wee k (Hrs /Se m.)	T Hrs/ Week (Hrs/Se m.)	P Hrs/ Week (Hrs/Se m.)	Term Work (TW) and Self Learn ing (SL) (TW+S L) Hrs/ Sem				CIE Mar ks	SEE Mar ks	Tota l Mar ks	
							CIE	SEE					
1	1BM AM2 01C	Multivar iable calculus and Numeric al methods for ME stream	3(42)	28	0	44	3	3	120	50	50	100	4= 120 /30