Course Description Form
Monsoon 2025

Section A:								
Course Code	MAT1002							
Course Title	Engineering Mathematics 2							
Course Credits	4	**No. of Contact Hours/week**	**L:**	3	**T:**	1	**P:**	0
School	School Of Natural Sciences							
Offered By	Mathematics							
Method of Instruction:	In Person	**Offered in:**	Spring Semester	Full Semster				
Check each box, when applicable, if the course covers one or more of the below listed attributes								
☐	**REALS**	☐	**VELS**	☐	**DISE**			
Prerequisites	None							
None								
Fill this, if applicable: A Similar Course Was Offered With Code MAT104 In Year 2025.								

NOTE:

Section B:This course is offered as (use checkbox) for which Programs			
☒	Major Core for:	All B.Tech. branches	Not required
☐	Major Elective for:	Enter The Name Of the Program(S) For Which This Is a Major Elective	Instructor's Approval
☐	UWE for:	Enter The Name Of the Program(S) For Which This Can Be A UWE	Instructor's Approval
☐	Project /UG Thesis / Internship	Any Other Information	Instructor's Approval
☐	CCC for:	Choose a Category	Instructor's Approval
☐	Specialization (If applicable)	Mention The Specialization	Instructor's Approval
☐	Minor (If applicable)	Mention The Minor(S)	Instructor's Approval
Estimated No. of Seats:	540	Estimated Number of Sections	18

Section C: State the Program Learning Goals of the Major Degree Program mapped to the Core Course (Applicable to Major Core courses only)
PLG
PLG
PLG

Section D: State the Course Objectives / Aim (Specific details of what the course intends to achieve in terms of student knowledge and ability. Items should begin with phrases such as "To provide students with …", "To enable students to …", "To develop students' skills in …" and so on.)

- Provide a strong foundation in differential equations and linear algebra, essential for engineering applications.
- Introduce basic concepts and solution techniques for partial differential equations.
- Foster critical thinking and problem-solving abilities through mathematical modeling and analytical reasoning.

Section E: State the Learning Outcomes (A list of what students will know or be able to do as a result of successfully completing the course. Should be expressed as knowledge, skills, or attitudes.)

On successful completion of the course, students will be able to:

1. Derive And Solve Mathematical Models Of Physical Systems, If Necessary With The Aid Of Mathematical Software.
2. Understand And Apply Matrix Operations, Determinants, Eigenvalues, Eigenvectors, And Diagonalization.
3. Solve First- And Second-Order Linear Odes Using Various Methods.
4. Learn The Concept And Applications Of Laplace Transform To Solve Differential Equations.

Section F: State if course contributes to any skill development

Click Here To List Course Contribution To Skill Development

Section G: Module-wise Curriculum Content (Syllabus, Lab work, Project, Term paper, Group work, etc.)
1. First Order ODE: direction fields, separable ODE, exact ODE and integrating factors, linear ODE (5 hours) 2. Second Order ODE: linear ODE, linear ODE with constant coefficients, undetermined coefficients, variation of parameters, higher order linear ODE, power series method. (10 hours) 3. Laplace Transform: Laplace transform, inverse transform, shift and scaling, transform of derivative and integral, step function, delta function, partial fractions, convolution, differentiation and integration of transforms. (7 hours) 4. Matrices and Vectors: matrix operations, linear systems, Gauss elimination, vector subspaces of R^n, span and linear independence, basis, rank, solution space of linear systems, determinant and inverse, orthogonality and orthonormal basis. (9 hours) 5. Eigenvalues and Eigenvectors: characteristic equation, diagonalisation, unitary and symmetric matrices. (4 hours) 6. Systems of ODE: constant coefficient systems, phase plane, critical points, stability. (4 hours) Add additional sheet(s), if required

Section H: Text Book(s), Reference book(s) and any other study material

Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, 10th edition.
2. Alan Jeffrey, Essentials of Engineering Mathematics, Chapman and Hall, 2nd edition.
3. David C. Lay, Linear Algebra and its Applications, Pearson, 5th edition.
4. Gilbert Strang, Linear Algebra and its Applications, Cengage, 4th edition

Lecture Videos:

1. Gilbert Strang, Linear Algebra, MIT Online: https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/
2. Haynes Miller and Arthur Mattuck, Differential Equations, MIT Online: https://ocw.mit.edu/courses/18-03-differential-equations-spring-2010/

Section I: Please fill in all the rows for the applicable rows. For evaluation component not included in the list, use the last two rows and mention the evaluation component in the corresponding last column. Please see the NOTE below this box for the prorate policy.

	Component	Weightage %	Missed Graded Component Policy	Use of Gen AI policy	Any Other Information
☒	Mid Sem Exam	30.00	Retake of Graded Component	Prohibited: No Gen AI	other info
☒	End Sem Exam	40.00	I grade awarded on approval from De	Prohibited: No Gen AI	other info
☒	Quiz(s)	30.00	Choose the best n from m componer	Prohibited: No Gen AI	other info
☐	Assignment(s)	0.00	Please Select	Please Select	other info
☐	Lab	0.00	Please Select	Please Select	other info
☐	Project	0.00	Please Select	Please Select	other info
☐	Case Studies	0.00	Please Select	Please Select	other info
☐	Group Discussion	0.00	Please Select	Please Select	other info
☐	Any Other Component	0.00	Please Select	Please Select	other info
☐	Any Other Component	0.00	Please Select	Please Select	other info
	Total **Weightage** (%)	100.00			

Note:
a) While you may mark multiple evaluation components for pro-rate. However, if a particular student misses multiple evaluations, *not more than 20% of the evaluation can be prorated for that student.*
b) The best n out of m: Please make sure that n < m.
c) Award of 'I' grade is applicable only in the case of the End-term Exam. Additionally, end-term exams or final assessments cannot be prorated or waived.
d) Individual faculty can decide the prorate policy for each component.
e) 'None' as an option can only be used in exceptional cases, for example lab evaluated by an external expert

Section J: Grading Policy (*Tick the one You intend to follow)*				
☒	**Relative** Grading	90% Will Guarantee An A And 40% Will Guarantee A D. Cutoffs May Be Lowered From These Based On Difficulty Level Of Assessment.		Total Marks Will Be Rounded Up.
☐	Absolute Grading	**Grade**	**Range** *(replace M's appropriately)*	Please Mention The Rounding Off Policy And Any Other Information
		A	M1 <= marks <= M2	
		A-	M1 <= marks <= M2	
		B	M1 <= marks <= M2	
		B-	M1 <= marks <= M2	
		C	M1 <= marks <= M2	
		C-	M1 <= marks <= M2	
		D	M1 <= marks <= M2	
		E	M1 <= marks <= M2	
		F	M1 <= marks <= M2	

Section K: Details about instructors teaching this course. For multiple instructors in a course, mention each name once after the other					
Name of the Instructor(s):	Amber Habib Charu Sharma Sneh Lata Prof XYZ Prof ABC			**Section(s)**	List Sections L1, L2, L3
Office Location	A111-B A111-D A111-C K 120 L 325	**Tel. Extension***	999	**Email:**	amber.habib@snu.edu.in charu.sharma@snu.edu.in sneh.lata@snu.edu.in abc@snu.edu.in xyz@snu.edu.in
About the Instructor(s): Click Here To Enter About 250 Words about each instructor teaching the course`					

***** - Optional

Section L: Office Hours
Please let the students know the day(s) and time slot(s) for any consultation. You may update this at the start of the semester.

Section M: Any other information
This course replaces the earlier MAT103 Mathematical Methods I. Students with backlog in MAT103 should clear MAT1001 in its place.