Section A:								
Course Code	MAT280							
Course Title	Numerical Methods							
Course Credits	4	**No. of Contact Hours/week**	**L:**	3	**T:**	0	**P:**	2
School	School Of Natural Sciences							
Offered By	Department Of 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	Mat101							
List The Courses Which May Be Like This Course. So, If A Student Has Already Done A Course From This List, They Should Not Register For This Course, I.E. It's A Negative List								
Fill this, if applicable: A Similar Course Was Offered With Code ....Mat280. In Year ...Spring 2025								

NOTE:

Section B:This course is offered as (use checkbox) for which Programs			
☒	Major Core for:	Enter The Name Of the Program(S) For Which This Is a Major Core	Not required
☐	Major Elective for:	Enter The Name Of the Program(S) For Which This Is a Major Elective	Not required
☒	UWE for:	Enter The Name Of the Program(S) For Which This Can Be A UWE	Not required
☐	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)	Not required
Estimated No. of Seats:	40	Estimated Number of Sections	1

Section C: State the Program Learning Goals of the Major Degree Program mapped to the Core Course (Applicable to Major Core courses only)
PLG1
PLG3
PLG4, PLG5

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.)
This course is an introduction to the different numerical techniques for solving linear system of equations, root finding, interpolation, integration. Eigenvalue decomposition, SVD factorizations, stability and accuracy of numerical algorithms, the IEEE floating point standard, sparce and structured matrices, least square approximations. Problem sets will involve use of python. The aim of this course for students to get familiar with different numerical techniques and at the same time strengthen their understanding of developing fundamentals as how to write pseudo-code, i.e. writing an algorithm for a popular numerical methods and the implementation.

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:
O Understanding Of Different Numerical Methods And Techniques. O Error Estimation And Rate Of Convergence Of Different Numerical Methods. O Understanding The Concepts And Importance Of Stability Of Systems. O Developing Skills As How To Write An Algorithm For A Given Method O Developing Skills That Once An Algorithm Is There Then How To Implement It Using Python.

Section F: State if course contributes to any skill development
This Course Develops Skills For Writing An Algorithm And It's Implementation Using Python

Section G: Module-wise Curriculum Content (Syllabus, Lab work, Project, Term paper, Group work, etc.)

Python: Basics as how to write a code in python. [3 Hours]
Conditioning and Stability: Introduction to conditioning and condition numbers, stability of systems, floating point arithmetic and IEEE floating point standard. [6 Hours]

Linear System of Equations: Gauss elimination, LU decomposition, pivoting, operation counts, basic iterative techniques. [6 Hours]

Root Finding: Bisection method, Newton's method, secant method and order of convergence. [6 Hours]

Interpolation: Polynomial interpolation (Vendermonde polynomial, Lagrange polynomial and Newton's polynomial), piecewise linear interpolation. [6 Hours]

Integration: Elementary formulas like midpoint rule, trapezoidal rule, Simpson's rule, composite rules, local versus global error. [6 Hourse]

Factorization: Eigenvalue problems, eigenvalue decomposition, overview of eigenvalue algorithms, computing SVD and least square approximation, conditioning of least squares problems and stability of least square algorithms. [6 Hours]

Add additional sheet(s), if required

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

1. R. W. Hamming, Numerical methods for scientist and engineers.
2. Burden and Fairs, Numerical Analysis, 9th Edition
3. R. W. Hamming, An introduction to applied numerical analysis, (Dover Books on Mathematics)
4. Trefethen, Lloyd N. and David Bau III. Numerical Linear Algebra. SIAM: Society for Industrial and Applied Mathematics, 1997. ISBN: 9780898713619.
5. https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/
6. John Guttag, Introduction to computation and programming using python: With application to understanding data science MIT Press 2016

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	retake only if approved from deans office
☒	End Sem Exam	40.00	I grade awarded on approval from De	Prohibited: No Gen AI	other info
☐	Quiz(s)	0.00	Please Select	Please Select	other info
☒	Assignment(s)	20.00	Choose the best n from m componen	Prohibited: No Gen AI	other info
☒	Lab	10.00	Choose the best n from m componen	Prohibited: No Gen AI	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 And Above Is A Grade, 35 And Below Is F Grade. In Between Gardes, Depending Upon Class Preformance.		Round Up
☐	Absolute Grading	**Grade**	**Range** *(replace M's appropriately)*	
		A	M1 <= marks <= M2	Please Mention The Rounding Off Policy And Any Other Information
		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):	Dr. Santosh Singh Prof XYZ Prof ABC			**Section(s)**	L1 L1, L2, L3
Office Location	A 111 I K 120 L 325	**Tel. Extension***	999	**Email:**	santosh.singh@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
Any other information you would like to specify in relation to the above course