Indian Institute of Technology Kanpur
Proposal for a New Course

1. Course No: CHE6XX
2. Course Title: Elementary Engineering Mathematics
3. Per Week Lectures: 3 (L), Tutorial: 0 (T), Laboratory: 0 (P), Additional Hours[0-2]: 0 (A), Credits (3-0-0-0): 6 Duration of Course: Modular
4. Proposing Department: Department of Chemical Engineering

   Other Departments/IDPs which may be interested in the proposed course: NA

   Other faculty members interested in teaching the proposed course: Indranil Saha Dalal, Dipin S. Pillai, Akash Chaudhary, Sanjeev Garg, Nishith Verma
5. Proposing Instructor(s): Naveen Tiwari (naveent@iitk.ac.in) and V. Shankar (vshankar@iitk.ac.in)
6. Course Description:
   A) Objectives:
   The course will expose fresh PhD students to basic engineering mathematics to aid them in learning advanced courses in Chemical Engineering.
   B) Contents (preferably in the form of 5 to 10 broad titles):

   Lecture-wise break-up (considering the duration of each lecture is 50 minutes)

S. No.	Broad Title	Topics	No. of Lectures
1.	Introduction to Multivariable Calculus	Functions of one or more variables, limits, chain rule of differentiation, change of variables, maxima/minima of function of two or more variables	3
2.	Elementary algebra of complex numbers	Complex numbers, Polar form, Powers and Roots, Logarithms	3
3.	Linear Algebra	Matrices, vectors, determinants, solution of linear system of equations, eigenvalue problems	5
4.	Ordinary Differential Equations	First order ODEs, second order linear ODEs	2
5.	Fourier Analysis and PDEs	Fourier series, Fourier Transform, Laplace Transform, Classification of PDEs; PDE solution by separation of variables	7
		Total	20

   C) Recommended pre-requisites, if any (examples: a- PSO201A, or b- PSO201A or equivalent): None
   D) Short summary for including in the Courses of Study Booklet:
   Introduction to Multivariable Calculus, Elementary algebra of complex numbers, Linear Algebra, Ordinary Differential Equations, Fourier Analysis and PDEs

7. Recommended text/reference books:
    A) Erwin Kreyszig, Advanced Engineering Mathematics, Wiley
    B) Mary L. Boas, Mathematical Methods in the Physical Sciences, Wiley
8. Any other remarks: None

Dated: 08/02/25 Proposer: NT, VS

Dated: DPGC Convener:

The course is approved / not approved

Chairman, SUGC

Dated: