(Proposed from A.Y 2019-2020)

NIRMA UNIVERSITY
Institute of Technology
Bachelor of Technology – Chemical Engineering

Semester III

L	T	P	C
2	1	0	3

Course Code	**2MA301**
Course Title	**Applied Mathematics for Chemical Engineering**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to-

1. comprehend and apply probability distribution in engineering problems
2. apply the basic concepts of modern numerical techniques to solve chemical engineering problems
3. use Laplace transform to solve differential equations

Syllabus: Teaching hours:

Unit I **6**

Laplace Transforms: Definition, Linearity property, Laplace transforms of elementary functions, Shifting theorem, Inverse Laplace transforms, Laplace of differentiation and integration, Convolution theorem, application of Laplace transforms in solving ordinary differential equations, Laplace transforms of periodic, Unit step and impulse functions

Unit II **3**

Solution of Transcendental and Algebraic equations: Solution of algebraic and transcendental equations by Bisection, Regula-Falsi, Newton-Raphson iteration methods

Unit III **5**

Finite Differences and Interpolation: Finite differences, Interpolation, Finite difference operators (forward, backward and central differences), Interpolation formulae: Newton's forward, Newton's backward, Lagrange's and Sterling's formula

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Unit IV

Numerical Differentiation and Integration: Numerical differentiation, Numerical integration: Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule

Unit V **6**

Numerical Solutions of Differential Equations: Solution of first order differential equations: Taylor series method, Euler's method, 4th order Runge–Kutta method, Finite difference method to solve partial differential equations

Unit VI **2**

Solution of System of Linear Equations: Iterative methods: Gauss-Seidel and Gauss-Jacobi methods

Unit VII **5**

Statistics: Introduction to probability and conditional probability, Mean, median, mode and standard deviation, Random variables, Poisson, Normal and Binomial distributions, Linear regression analysis

Tutorials:

This shall consists of at least 8 tutorials based on the syllabus.

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from the self-study contents.

Suggested Readings^:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications.
2. S. C. Chapra and R. P. Canale, Numerical Methods for Engineers with Programming and Software Applications, McGraw-Hill Publications.
3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Publications.
4. M. K. Jain and S R K Iyengar Numerical Methods for Scientific & Engineering Computation, New age International Publication.
5. S C Gupta and V. K .Kapoor, Fundamentals of Mathematical Statistics: S Chand
6. Jay I. Devore, Probability and Statistics for Engineers and Scientists; Pearson

L = Lecture, T = Tutorial, P = Practical, C = Credit
^ this is not an exhaustive list