



**CHEMISTRY &
BIOCHEMISTRY**

Advanced Mathematical Methods for Chemistry

Type of Course	: New
Course Snapshot	: Core / UG, PG
Pre-requisites	: Basics of vectors and matrices, elementary solution, Basics of Physical Chemistry
Course Duration	: 30 hours / 12weeks
Industry Support	: Companies involved in molecular modeling may be interested in this as a precursor to advanced courses on molecular modeling.

COURSE OUTLINE:

This course will introduce the students to fairly advanced mathematical methods for chemists. The style of teaching will be through applications and students will be expected to learn a lot of material by reading the books suggested. Students in 3rd year B Sc or 1st and 2nd year M Sc are encouraged to take this course. All problem sets and exams will be online multiple choice type.

INSTRUCTOR:

Prof. Madhav Ranganathan
Department of Chemistry
IIT Kanpur



ABOUT INSTRUCTOR:

Prof. Madhav Ranganathan has been a faculty in the Department of Chemistry, IIT Kanpur since 2007. His research interests are statistical mechanics of crystal growth and theoretical biophysics. His main teaching interests are in Physical Chemistry, especially more theoretically inclined courses. He has taught several courses at IIT Kanpur at undergraduate, masters and doctorate levels.

COURSE PLAN:

- Week 1 : Vectors and vector operations
- Week 2 : Matrices
- Week 3 : Special Functions
- Week 4 : 1st order ODEs
- Week 5 : 2nd order ODEs
- Week 6 : Optimization of functions
- Week 7 : Nonlinear differential equations
- Week 8 : Orthogonal basis functions
- Week 9 : Integral Transforms
- Week 10 : Partial Differential Equations
- Week 11 : Errors and Statistics
- Week 12 : Complex variables