



MATHEMATICS

Instructor Name : MADHAV RANGANATHAN (IIT Kanpur - Department of Chemistry)

COURSE DURATION : Jan-Mar 2017 **CORE / ELECTIVE :** Elective **UG / PG:** Both

PRE-REQUISITES : Basic knowledge of integration, differentiation, real and complex numbers, vectors and scalars. 2 years of undergraduate chemistry courses so students are familiar with kinetics, basic quantum mechanics and Boltzmann statistics.

INTENDED AUDIENCE : M Sc 1st year, B Sc 3rd year

INDUSTRIES APPLICABLE TO : 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 various basic mathematical methods for chemists. The methods involve error analysis, probability and statistics, linear algebra, vectors and matrices, first and second order differential equations and their solution. Students in 3rd year B.Sc or 1st year M.Sc are encouraged to take this course. The problem will be mathematical and hence the format of assignments and exams will be subjective problem solving which will be graded offline.

ABOUT INSTRUCTOR : 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. He has taught Mathematics for Chemistry at IIT Kanpur several times and this has influenced the material for this course. On his website, <http://home.iitk.ac.in/~madhavr>, it is possible to find details of several courses taught by him.

COURSE PLAN

Week 1:Errors and Statistics.

Week 2:Vectors and Vector spaces.

Week 3:Matrices and Determinants.

Week 4:Matrix operations.

Week 5:First order ordinary differential equations.

Week 6:Solution of First order ODEs, system of ODEs.

Week 7:2nd order ODEs.

Week 8:Power Series method.