



## Symmetry and Group Theory in Chemistry

Chemistry and Biochemistry

**Instructor Name:** Anindya Datta

**Institute:** IIT Bombay

**Department:** Others

**Course Intro:** : This course provides a quantitative treatment of symmetry in chemistry, using group theory. We start with determination of point group, discuss transformation matrices, abstract group theory, unitary transformations, derivation of Great Orthogonality Theorem and its consequences leading to character tables. Then, various applications in Chemistry are discussed. It is equivalent to CH 801 of IIT Bombay. The lectures are already recorded by CDEEP, IIT Bombay.

**Pre Requisites:** : None

**Core/Elective:** : Core

**UG/PG:** : Both

**Industry Support** : None

**Reference** : Group theory and Chemistry by D M Bishop, Symmetry in Chemistry by F A Cotton

**About Instructor:** Since 2002, I have taught courses on Chemical thermodynamics, kinetics, spectroscopy and group theory to undergraduate as well as graduate students in IIT Bombay. This year, I have received an excellence in teaching award. I have also taught in IIT Goa and in several workshops and refresher courses across the country, for students as well as teachers. My area of research is ultrafast processes in Chemistry.



### COURSE PLAN

SL.NO	Week	Module Name
1	1	Symmetry elements and operations
2	1	
3	2	Transformation matrices
4	3	Know thy matrices
5	4	Matrix representations
6	5	Juggling with representations
7	6	Derivation of Great Orthogonality Theorem
8	7	Character tables for cyclic groups
9	8	Projection operators
10	9	From SALCs to molecular orbitals
11	10	Naphthalene: a case study
12	11	Ferrocene: a case study
13	12	Electronic spectrum of benzene