Theory of groups for physics applications
Physics

Instructor Name: Urjit A. Yajnik
Institute: IIT Bombay
Department: Physics

Course Intro: : Group Theory is the mathematics of symmetry. It is used extensively in quantum theory. There are applications to molecular structure, spectroscopy, crystal structure and to Elementary Particle physics

Pre Requisites: : Multivariate calculus, Linear Algebra, Introductory Quantum Mechanics, Special Theory of Relativity
Core/Elective: : Elective
UG/PG: : UG
Industry Support : materials technologies.

Reference : M S Dresselhaus, G Dresselhaus and A Jorio Applications of group theory to the physics of condensed matter (2008), Brian C Hall, Lie groups lie algebras and representations (2015),Morton Hammermesh Group theory and its applications to physical problems(1962)

About Instructor: Faculty at IIT Bombay since 1989. Primary research interest in Elementary Particle Physics and Cosmology. Primary teaching interest mathematical and theoretical physics. I like to design instructional material so that the essentials of the advanced material become accessible to interested undergraduates

COURSE PLAN

SL.NO	Week	Module Name
1	1	Introduction and Algebraic Preliminaries
2	1	
3	2	Lagranges Theorem and Cayleys Theorem
4	3	Cycle Structures and Molecular Notation
5	4	Point Group Notation and Factor Group
6	5	Representation Theory 2
7	6	Orthogonality for Characters
8	7	Preliminaries about the continuum
9	8	Classical Groups Topology
10	9	Generators, discussion of Lies theorems
11	10	SO3, SU2 Representations
12	11	Lorentz Boosts SO3,1 Algebra
13	12	SU(3) and Lies classification