UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO INTERUNIVERSITARIO DI FISICA

General information	
Academic subject	Physics Applications of Group Theory
Degree course	Physics
Academic Year	1
European Credit Transfer and Accumulation System (ECTS)	3
Language	English
Academic calendar (starting and ending date)	First week of October - Third week of December
Attendance	Preferred, Not compulsory

Professor/ Lecturer	
Name and Surname	Antonio Marrone
E-mail	antonio.marrone@uniba.it
Telephone	+39 080 5443463
Department and address	Campus Universitario via Amendola 173 - 70125 Bari
Virtual headquarters (Microsoft Teams code)	
Tutoring (time and day)	On request

Syllabus	
Learning Objectives	Understanding the concept of symmetry in physics
Course prerequisites	Basic Pysics and Mathematics knowledge
Contents	Introduction to Symmetry in Physics; Groups and Representations Definitions and examples Group of Permutations Sn General properties of groups Conjugation classes Subgroups. Normal subgroups. Homomorphisms. Group representations Schur Lemmas. Orthogonality theorem. Characters. Character table. Direct product and decomposition Symmetric group Sn and its representations. Young tableaux. Irreps of SU(N) and Sn. Tensorial method. Lie groups. SO(2),SO(3) and SU(2). SU(N) Young tableaux. Lie Algebras Simple Lie Algebras. Killing form. Root quantization. Dynkin diagrams. Weights and representations.
Books and bibliography	H.F. Jones, *Groups, Representations and Physics*, Taylor & Francis; 2 edition H. Georgi, *Lie Algebras In Particle Physics: from Isospin To Unified Theories* (Frontiers in Physics),Westview Press; 2 edition (October 22, 1999) F. Stancu, *Group Theory in Subnuclear Physics*, Oxford Studies in Nuclear Physics
Additional materials	Sone notes from the teacher

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
		31	62
ECTS			
		3	

Teaching strategy	
	Lessons on the blackboard

Expected learning outcomes	
Knowledge and understanding on:	Understanding the concept of symmetry in physics
Applying knowledge and understanding on:	Implementation of a symmetry in physical models
Soft skills	• *Making informed judgments and choices* Ability to proceed autonomously in the study of physical symmetries • *Communicating knowledge and understanding* Ability to express the acquired knowledge properly • *Capacities to continue learning* Ability to study independently from texts and scientific literature

Assessment and feedback	
Methods of assessment	Oral test (100%)
Evaluation criteria	Adequate comprehension and global knowledge of concepts and arguments described throughout the course.
Criteria for assessment and attribution of the final mark	
Additional information	