



# UNIVERSITÀ DI PISA

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## QUANTUM FIELDS AND TOPOLOGY

**ENORE GUADAGNINI**

Anno accademico 2022/23  
CdS FISICA  
Codice 328BB  
CFU 6

Moduli	Settore/i	Tipo	Ore	Docente/i
QUANTUM FIELDS AND TOPOLOGY	FIS/02	LEZIONI	36	ENORE GUADAGNINI

### Obiettivi di apprendimento

#### *Conoscenze*

By the end of the course, the students will have acquired knowledge on general methods of quantization of gauge theories and of the so-called topological field theories, Chern-Simons and BF theories; basic notions of low dimensional topology: manifolds, knots and links, homotopy equivalence, ambient isotopy equivalence; polynomial invariants of links, framed links, use of the skein relation, Alexander-Conway, Jones and HOMFLY polynomials, linking number and related Gauss integral, fundamental group of a manifold and of the complement of a link, Seifert surface, surgery on three manifolds and the Lickorish fundamental theorem; solution of the abelian Chern-Simons theory in a generic 3-manifold.

#### *Modalità di verifica delle conoscenze*

Presentation of a specific argument by the student, final oral examination

#### *Capacità*

perturbative computations in field theory, determination of the link polynomials, computations of the fundamental group

#### *Modalità di verifica delle capacità*

the student provides a presentation of a specific argument discussed in the course

#### *Prerequisiti (conoscenze iniziali)*

basic notions of quantum field theory

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