

General information	
Academic subject	Quantum Field Theory
Degree course	Physics
Academic Year	2022-2023
European Credit Transfer and Accumulation System (ECTS)	6
Language	English
Academic calendar (starting and ending date)	September-December
Attendance	Not compulsory

Professor/ Lecturer	
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Department and address	<i>Physics Department, via Amendola 173, Bari</i>
Virtual headquarters (Microsoft Teams code)	
Tutoring (time and day)	Upon request

Syllabus	
Learning Objectives	
Course prerequisites	<i>Meccanica Quantistica, Metodi Matematici della Fisica</i>
Contents	<i>Many-Body Systems and Classical Field Theory Classical and Quantum Mechanics of Particle Systems Classical Field Theory Canonical Quantization Nonrelativistic Quantum Field Theory Spin-0 Fields: The Klein-Gordon Equation Spin-1/2 Fields: The Dirac Equation Spin-1 Fields: The Maxwell and Proca Equations Quantization of the Photon Field</i>
Books and bibliography	<i>Walter Greiner &amp; Joachim Reinhardt, Field quantization (Springer Verlag, 1997) S. Weinberg, The Quantum Theory of Fields 1: Foundations (Cambridge Univ. Press, 2005).</i>
Additional materials	<i>Selected chapters + course lecture notes</i>

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b>Hours</b>			
160	24	45	91
<b>ECTS</b>			
6	3	3	

Teaching strategy	
	Lectures, exercises, comments on methodology

Expected learning outcomes	
Knowledge and understanding on:	<ul style="list-style-type: none"> <li>○ Acquire critical thinking, creativity, analytical ability.</li> <li>○ Understand physical phenomena and focus on their precise formulation.</li> <li>○ Understand the meaning of the mathematical (most concise) description of the physical world.</li> </ul>
Applying knowledge and understanding on:	<ul style="list-style-type: none"> <li>○ Define objectives, benchmarks, learning targets and standards.</li> <li>○ Apply the powerful methods of theoretical physics to other fields and disciplines.</li> <li>○ Acquire the ability to judge correctness.</li> <li>○ Become aware of methods and tools of investigation.</li> </ul>



	<ul style="list-style-type: none"> <li>○ Stimulate and direct collaborative learning and individual understanding.</li> </ul>
Soft skills	<ul style="list-style-type: none"> <li>● <b>Making informed judgments and choices</b> <ul style="list-style-type: none"> <li>○ Judge the value of acquired knowledge and methods.</li> <li>○ Establish evaluation criteria and standards, both quantitative and qualitative.</li> <li>○ Compare, contrast, distinguish, describe and finally identify physical phenomena.</li> </ul> </li> <li>● <b>Communicating knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ Grasp communication accurately, become able to adopt different and alternative forms of presentation.</li> <li>○ Master physics and science communication.</li> <li>○ Make examples that are not misleading and hinder scientific understanding.</li> </ul> </li> <li>● <b>Capacities to continue learning</b> <ul style="list-style-type: none"> <li>○ Reorganize material in summary, with central meaning and crucial points.</li> <li>○ Translate, interpret, extrapolate and view relationships.</li> <li>○ Continuously update scientific knowledge.</li> <li>○ Ask the right questions.</li> </ul> </li> </ul>

<b>Assessment and feedback</b>	
Methods of assessment	Oral examination
Evaluation criteria	<ul style="list-style-type: none"> <li>● <b>Knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ Demonstrate knowledge and understanding of content and concepts through developed and accurate descriptions, explanations and examples.</li> </ul> </li> <li>● <b>Applying knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ Apply concepts in practically relevant situations.</li> </ul> </li> <li>● <b>Autonomy of judgment</b> <ul style="list-style-type: none"> <li>○ Consistently identify and analyze sources and data and consistently identify different views and their implications.</li> </ul> </li> <li>● <b>Communicating knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ Organize information and ideas effectively and communicate information and ideas in a way that is completely clear.</li> </ul> </li> <li>● <b>Communication skills</b> <ul style="list-style-type: none"> <li>○ Communicate information and ideas in a way that is completely appropriate to the audience and purpose.</li> </ul> </li> <li>● <b>Capacities to continue learning</b> <ul style="list-style-type: none"> <li>○ Development of effective continuous assessment instruments and methods, and selection of appropriate continuous assessment instruments and methods.</li> </ul> </li> </ul>
Criteria for assessment and attribution of the final mark	Knowledge of the principles and patterns of quantum field theory and comprehension of the facts and methods of quantum physics.
<b>Additional information</b>	