

General information		
Academic subject	COMPLEMENTI DI DINAMICA CLASSICA E RELATIVISTICA (modulo di RELATIVITA' RISTRETTA)	
Degree course	Physics (Triennale)	
Academic Year	SECOND	
European Credit Transfer and Accumulation System (ECTS)	3	
Language	ITALIAN	
Academic calendar (starting and ending date)	First week of March 2022 -- First week of June 2022	
Attendance	NO COMPULSORY	

Professor/ Lecturer	
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Virtual headquarters	<a href="http://www.ba.infn.it/~gasperin/academic.html">http://www.ba.infn.it/~gasperin/academic.html</a>
Tutoring (time and day)	tuesday and wednesday , 15-17

Syllabus	
Learning Objectives	Introduction to special relativity and to its main applications to classical physics.
Course prerequisites	Newtonian dynamics, notions of analytic mechanics, electromagnetic theory, vector calculus.
Contents	Lorentz transformations, Lorentz group. Tensor calculus in the Minkowski space-time. Relativistic kinematics: time dilatation, length contraction, velocity composition, hyperbolic motion, Rindler space-time. Covariant form of the Maxwell equations. Lorentz transformations of the electric and magnetic field. Relativistic dynamics: covariant Lagrangian formalism and equations of motion. Example: charged relativistic particles interacting with an external electric and magnetic field. Relativistic kinematics of simple scattering and decay processes: center of mass, invariant mass, scattering angles.
Books and bibliography	M. Gasperini, <i>Manuale di Relatività Ristretta per la Laurea Triennale in Fisica</i> (Sprinter-Verlag, Milano, 2010).
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
75	31		44
ECTS			
	3		

<b>Teaching strategy</b>	Class lectures/exercises using blackboard.
<b>Expected learning outcomes</b>	
<b>Knowledge and understanding on:</b>	Knowledge of special relativistic kinematics and dynamics.
<b>Applying knowledge and understanding on:</b>	Ability to solve simple exercises and to perform covariant calculations in the context of the Minkowski space-time. ○
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>• <i>Making informed judgments and choices</i></li> </ul> Ability to compare relativistic hypothesis with experimental tests. <ul style="list-style-type: none"> <li>• <i>Communicating knowledge and understanding</i></li> </ul> Communication skills in Italian, ability to present and to discuss a relativistic effect in a complete way and with an appropriate scientific language. <ul style="list-style-type: none"> <li>• <i>Capacities to continue learning</i></li> </ul> Ability to approach the specialistic literature and to independently choose the method of solving a relativistic problem.

<b>Assessment and feedback</b>	
Methods of assessment	Oral colloquium including exercises and calculation tests to be performed on the blackboard.
Evaluation criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i></li> </ul> knowledge and understanding of the basic aspects of the theory of special relativity and its applications to mechanics and electromagnetism; <ul style="list-style-type: none"> <li>• <i>Applying knowledge and understanding</i></li> </ul> ability to solve simple relativistic exercises; <ul style="list-style-type: none"> <li>• <i>Autonomy of judgment</i></li> </ul> ability to discuss the main physical differences between relativistic and non-relativistic models <ul style="list-style-type: none"> <li>• <i>Communicating knowledge and understanding</i></li> </ul> ability to present and to discuss the main relativistic dynamical effects; <ul style="list-style-type: none"> <li>• <i>Communication skills</i></li> </ul> ability to access the specialistic literature on this subject; <ul style="list-style-type: none"> <li>• <i>Capacities to continue learning</i></li> </ul> ability to apply the relativistic laws to different sectors of physics.
Criteria for assessment and attribution of the final mark	Numerical rating from 0 to 30 attributed on the ground of the evaluation criteria listed above.
<b>Additional information</b>	