



### TEACHING TOOLS AND METHODS

Enrollment year	2021/2022
Academic year	2021/2022
Regulations	DM270
Academic discipline	FIS/08 (DIDACTICS AND HISTORY OF PHYSICS)
Department	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
Course	MATHEMATICS
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (29/09/2021 - 14/01/2022)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian or English upon request (English friendly course - <a href="http://fisica.unipv.it/dida/English-friendly-programme.pdf">http://fisica.unipv.it/dida/English-friendly-programme.pdf</a> )
Activity type	ORAL TEST
Teacher	FALOMO BERNARDUZZI LIDIA (titolare) - 3 ECTS MALGIERI MASSIMILIANO - 3 ECTS
Prerequisites	Basic knowledge of mechanics, thermodynamics and electromagnetism, as provided by the courses of the Bachelor's degree in Physics and Mathematics.
Learning outcomes	The course aims to introduce students to the use of the laboratory for the teaching/learning of physics by providing examples of innovative approaches, methods and tools.
Course contents	Based on the results of Physics Education research, students are guided to design and develop lab experiences for high-school students. Students acquire familiarity with both traditional and new teaching tools, such as Microcomputer Based Laboratory (MBL), video analysis tools (such as Tracker), simulation programs (i.e. Algodoo) and programs for multimedia and concept map construction. The course includes the

	<p>presentation of a sequence of experiments, realizable with simple materials, which can complement an educational path on the greenhouse effect, with the objective of improving students' environmental awareness (goal #13 of the 2030 Agenda). Students will be introduced to works and proposals from science education and history of physics research teams, all the while also considering the results of studies on spontaneous mental representations and conceptual change. Experiments are performed on different topics: mechanics, thermodynamics, and electromagnetism. Significant historical experiments are reconstructed and analyzed.</p>
<b>Teaching methods</b>	<p>Laboratory work carried out by the students in groups of two or three. Students use worksheets, tutorials and concept maps. Design and implementation of experiments and simulations by means of low cost materials and common tools such as smartphones.</p>
<b>Reccomended or required readings</b>	<p>Arnold B. Arons, Guida all'insegnamento della fisica, Zanichelli, 1992. Olivier Darrigol, Electrodynamics from Ampere to Einstein, Oxford University Press, 2002.</p>
<b>Assessment methods</b>	<p>Oral exam. Discussion of reports and concept maps produced by the student during the course activities. The discussion is aimed at testing the disciplinary knowledge acquired by the student and her/his skill in designing and carrying out experiments suitable for high school students.</p>
<b>Further information</b>	<p>= Agenda 2030, goal #13 - Sustainable development, climate change</p>
<b>Sustainable development goals - Agenda 2030</b>	<p><a href="#">\$lbl legenda sviluppo sostenibile</a></p>