

Syllabus

Course Description

Course Title	Laboratory of Didactics of Physics (lab.)
Course Code	82048
Course Title Additional	
Scientific-Disciplinary Sector	PHYS-06/B
Language	Italian
Degree Course	University course for initial training of secondary school teachers in the Italian language - 60CP
Other Degree Courses (Loaned)	Training course 30 CP - Italian section
Lecturers	Prof. a contratto dr. Leonardo Colletti, Leonardo.Colletti@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/3425
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	2
Teaching Hours	0
Lab Hours	16
Individual Study Hours	34
Planned Office Hours	0
Contents Summary	Main types of laboratory experiences and examples of designing physics laboratory activities.
Course Topics	The course is aimed at developing planning and operational competencies for teaching physics in academic-track high schools. Particular attention is devoted to the design of teaching and learning units (UDAs), calibrated to the different high school tracks (scientific, classical, linguistic, human sciences, etc.) and to the varying levels of students.

	<p>The topics covered include:</p> <p>Analysis of the fundamental core concepts of classical physics (mechanics, thermodynamics, electromagnetism, optics) and modern physics (relativity, quantum mechanics, twentieth-century physics), with attention to their didactic transposition.</p> <p>Identification and discussion of the main student misconceptions in physics.</p> <p>Design of laboratory activities, both experimental and based on digital simulations.</p> <p>Strategies for motivating the study of physics and for actively engaging students.</p> <p>Interdisciplinary approaches and connections with mathematics, philosophy, history of science, and other disciplines.</p> <p>Methods and tools for the assessment of learning.</p>
Keywords	didactic transposition; culture of physics; didactic choice; didactic methodology; design of teaching and learning units
Recommended Prerequisites	---
Propaedeutic Courses	
Teaching Format	<p>The course is conducted in a laboratory-based and participatory mode. It includes:</p> <p>Interactive lectures with guided discussion.</p> <p>Design activities in small groups.</p> <p>Analysis of case studies and teaching materials.</p> <p>Lesson simulations and micro-teaching.</p> <p>Presentation and collective review of the designed teaching units.</p> <p>Students will be actively involved in the construction of teaching pathways, with opportunities for discussion and feedback both among peers and with the instructor.</p>
Mandatory Attendance	In accordance with the regulation
Specific Educational Objectives and Learning Outcomes	<p>The course is part of the characterising area in the specific subject area of A027.</p> <p>The aim is for students to acquire classroom modes of action for teaching physics, through the use of conceptual and operational tools.</p>

	<p>Knowledge Know the main types of laboratory experiences in physics. Understand the theoretical foundations of physical measurements, experimental uncertainty, data processing. Know inquiry-based teaching (IBSE) models applicable to the laboratory.</p> <p>Skills Design and implement educationally meaningful laboratory experiences. Conduct and have conducted experiments that develop scientific skills (measuring, predicting, verifying, interpreting, modelling). Use digital and measuring instruments (e.g. sensors, data acquisition software). Develop teaching sheets and experimental protocols.</p> <p>Competencies Knowing how to integrate the laboratory into the curricular programme, consistent with the learning objectives. To be able to guide students in linking theory and experimental observation, promoting active learning. To know how to manage a laboratory in terms of logistics, safety, time and resources. Promote a scientific attitude in students: curiosity, rigour, collaboration and critical spirit. To authentically assess the experimental skills acquired by the students.</p>
<p>Specific Educational Objectives and Learning Outcomes (additional info.)</p>	<p>At the end of the course, students will be able to:</p> <p>Design teaching and learning units consistent with the curricular objectives of academic-track high schools. Adapt content and teaching methodologies to different school contexts and high school tracks. Recognize and address the main student difficulties and misconceptions in physics. Effectively integrate theoretical and laboratory activities. Use a variety of teaching strategies to foster motivation and active learning. Apply assessment criteria and tools consistent with the intended</p>

	<p>learning outcomes.</p> <p>Develop an interdisciplinary perspective on the teaching of physics.</p>
Assessment	<p>The examination consists of:</p> <p>The design and submission of a teaching and learning unit (individual or group-based).</p> <p>An oral presentation of the unit, including the simulation of selected teaching activities.</p> <p>A critical discussion of the methodological choices, content, and assessment tools adopted.</p>
Evaluation Criteria	<p>The assessment will take into account:</p> <p>Coherence and clarity of the instructional design.</p> <p>Appropriateness of the scientific content.</p> <p>Ability to adapt to the selected high school context.</p> <p>Integration of laboratory activities and active teaching strategies.</p> <p>Attention to misconceptions and learning difficulties.</p> <p>Quality of the oral presentation and ability to argue effectively.</p> <p>Originality and critical reflection.</p>
Required Readings	<p>Reference texts on physics education and pedagogy.</p> <p>National and international research articles in the field of science education (including studies on misconceptions and concept inventories).</p> <p>Selected contributions on the epistemology and history of physics.</p> <p>Institutional documents (National Guidelines for upper secondary schools).</p> <p>Materials provided by the instructor during the course.</p>
Supplementary Readings	-
Further Information	-
Sustainable Development Goals (SDGs)	Quality education