Syllabus

Descrizione corso

Titolo insegnamento	Fisica
Codice insegnamento	42605
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	FIS/03
Lingua	Tedesco
Corso di Studio	Corso di laurea professionalizzante in Tecnologie del Legno
Altri Corsi di Studio (mutuati)	
Docenti	prof. dr. Niko Stephan Münzenrieder, Niko.Muenzenrieder@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/42095
Assistente	
Semestre	Secondo semestre
Anno/i di corso	1
CFU	5
Ore didattica frontale	50
Ore di laboratorio	0
Ore di studio individuale	75
Ore di ricevimento previste	15
Sintesi contenuti	• Basics e.g.: physical quantities; units; dimensions of physical quantities; vectors. • Mechanics e.g.: Newtonian mechanics; mechanical forces; energy; power, momentum; conservation of energy. • Thermodynamics e.g.: phases of matter; thermal properties of matter; ideal gases; first and second law of thermodynamics. • Electrostatics e.g.: electric charges, Coulomb force; potentials, and fields; capacitors. • Electric current: DC/AC currents; Ohm's law; Joule's law. • Magnetism: permanent magnets; electromagnets magnetic

	forces and induction.
Argomenti dell'insegnamento	1. Fundamentals Introduction to physical quantities and their measurement: SI units, unit conversions, and the role of dimensions. Use of dimensional analysis to check the plausibility and consistency of equations. Basics of vector algebra for describing position, velocity, forces, and field quantities (vector decomposition, magnitude/direction, vector addition). 2, Mechanics Presentation of Newtonian mechanics, with Newton's laws as the basis for analyzing motion and forces. Treatment of typical mechanical forces (e.g., gravitational force/weight, normal force, friction, spring force) and their application to simple systems. Introduction to work, energy, and power, as well as the concept of momentum. Analysis of collisions and motion processes with particular emphasis on energy conservation and related conservation laws. 3. Thermodynamics Description of states of matter and phase transitions, as well as key thermal material properties (e.g., heat capacity, thermal expansion). Introduction to the ideal gas model and equations of state; basic processes (isothermal, isobaric, isochoric, adiabatic) are examined qualitatively and quantitatively. Application of the first law (energy conservation in thermal systems) and the second law (direction of thermal processes, entropy, efficiencies). 4. Electrostatics Fundamentals of electric charge and the interaction of stationary charges. Discussion of Coulomb's force and the concepts of electric field, field lines, electric voltage, and electric potential. Calculation and interpretation of simple field and potential distributions. Introduction to capacitors, capacitance, stored electrical energy, and typical applications. 5. Electric Current Basic concepts of electric current and simple circuits, including direct current and alternating current (fundamental ideas and characteristic quantities). Application of Ohm's law to analyze

	resistor networks in basic configurations. Relationship between electrical work/power and resistive heating based on Joule's law; simple power and energy analyses in circuits. 6. Magnetism Introduction to magnetic phenomena: permanent magnets and magnetic fields. Principles of electromagnets and the magnetic effects of current-carrying conductors. Treatment of magnetic forces (e.g., on conductors or on moving charged particles) and basic induction phenomena. Qualitative and simple quantitative discussion of electromagnetic induction and its technological significance.
Parole chiave	SI units, dimensions, vectors Newtonian mechanics, conservation laws Thermodynamics, ideal gases, 1st/2nd laws Electrostatics, fields, potential, capacitors Electric circuits, magnetism, induction
Prerequisiti	Mathematics
Insegnamenti propedeutici	
Modalità di insegnamento	Frontal lectures and occasional exercises in class.
Obbligo di frequenza	Recommended.
Obiettivi formativi specifici e risultati di apprendimento attesi	This is a basic course on the fundamental of physics. The course aims to give the attendants a basic scientific understanding on mechanics, thermodynamics, electricity and magnetism. The lecture is linked to the associated course: 42606 Laboratory of Physics applied to Mechanics Knowledge and understanding 1. Knowledge and understanding of physical laws of: - Mechanics - Thermodynamics -Electricity and Magnetism Applying knowledge and understanding

	2. Ability to analyse and solve simple problems on mechanics, thermodynamics, electricity and magnetism. Making judgements 3. Students are expected to develop the ability to judge the plausibility of results. Communication skills 4. Further development of a quantitative, technical, and scientific terminology to express ideas and opinions about physical phenomena. Ability to learn 5. Development of an analytic attitude enabling the student to divide a problem into sub-tasks which can be solved using previously acquired knowledge.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	Formative assessment: Form: In-class exercises Length/duration: Continuously as part of course-accompanying exercises ILOs assessed: 1-5 Summative assessment: Form: oral Length/duration: 20 minutes ILOs assessed: 1-5
Criteri di valutazione	The oral examination consists of 3 topics per person: 1. Explanation of a topic from the lecture (correct answer is sufficient to pass). 2. Application of a known principle from the lecture to a new problem (correct answer improves the mark). 3. Discussion of an unknown problem related to the lecture (correct answer/convincing discussion is necessary to achieve a "cum Laude" distinction). All answers/discussion will be oral but may be supported by sketches and written formulae on paper. The following will be assessed: • The correctness of the approaches and steps to the solution,

	and the correct use of physical quantities and units • The correctness of the answers and arguments presented, and the terminology used. To pass the exam the final score must be greater or equal to 18. If the final score is greater than 30, a "with honors" is awarded.
Bibliografia obbligatoria	Blackboard.
Bibliografia facoltativa	Various textbooks can be used as a reference, for example: • Physik für Bachelors, Johannes Rybach, Carl Hanser Verlag, 3. Auflage, 2007 (only in German). • Mechanics and Thermodynamics, Wolfgang Demtröder, Springer International Publishing, 2017. • Electrodynamics and Optics, Wolfgang Demtröder, Springer International Publishing, 2013. • Physics for Scientists and Engineers with Modern Physics, Douglas C. Giancoli, Pearson, 4th edition, 2008.
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Innovazione e infrastrutture, Istruzione di qualità