Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Physics I
Course code	42403
Scientific sector	FIS/01
Degree	Electronics and Cyber-Physical Systems Engineering
Semester	1st
Year	I
Academic year	2022/23
Credits	6
Modular	No

Total lecturing hours	36
Total exercise hours	24 (16 exercises +8 laboratories)
Attendance	Recommended
Prerequisites	Mathematics
Course page	
Lecturers	Dott. Giuseppe Cantarella, prof. Franco Cacialli

Specific educational objectives	The course aims to give to the attendants a scientific basis in statics, mechanics, fluids and thermodynamics, as well as practical methods and the ability to solve problems related to the same topics. More specifically, the following topics will be covered: 1. measurement and vectors: units of measurement, dimensions of physical quantities, mathematical operations with vectors. 2. kinematics: mean and instantaneous velocity and acceleration, uniformly accelerated motion. 3. dynamics: Newton's three axioms, work, energy, law of conservation of energy, linear momentum. 4. Rotation: angular displacement, mean and instantaneous angular velocity and acceleration, torque, moment of inertia, angular momentum 5. Fluids: Ideal fluids, Pascal's and Archimedes' principles, Bernoulli's equation. 6. thermodynamics: thermal expansion, kinetic theory of gases, heat, ideal gases, first and second law, circular processes, entropy.

Learning outcomes	Knowledge and understanding

	Knowledge and understanding of physical laws of: 1. Basics of Physics 2. Kinematics 3. Dynamics 4. Fluids 5. Thermodynamics <u>Applying knowledge and understanding</u> 4. Ability to analyze and solve problems on mechanics, thermodynamics and electrodynamics. <u>Making judgements</u> 5. Students are expected to develop the ability to judge the plausibility of results. <u>Communication skills</u> 6. Further development of a quantitative, technical, and scientific terminology to express ideas and opinions about physical phenomena. <u>Ability to learn</u> 7. Development of an analytic attitude enabling the student to divide a problem into sub-tasks which can be solved using previously-acquired knowledge.

Assessment	**Formative assessment** **Form** / **Details** / **ILOs assessed** In-class exercises / Continuously as part of course-accompanying exercises / 1-7 **Summative assessment** **Form** / **Details** / **ILOs assessed** Written / Closed book exam / 1-7
Assessment language	English
Evaluation criteria and criteria for awarding marks	The written exam consists in two parts: a first part (problem 1) with a series of qualitive questions based on the understanding of the covered topics, as well as a second part (problems 2-6) consisting of several numerical problems to be solved, which cover aspects of the various topics covered. Judged will be: - the correctness of the approach and the mathematical steps of the solution, the calculation

	of numerical results and the correct use of physical quantities and units; - the correctness of the provided answers and of the presented, as well as the terminology used. Every problem has the same maximum score of 5. The final score is the sum of the scores associated to each exercise. 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. The student can have access to the exam with pen, pencil and a portable calculator. A short list of constants is provided to the students along with the text of the exam. After specific requirement from the student, a voluntarily-based oral exam can be performed. It consists of two questions, covering both qualitative questions and numerical exercises. The mark can range from 0 to +3 and it is summed up to the score of the written exam.

Required readings	Blackboard / lecture slides
Supplementary readings	• *Physics for Scientists and Engineers with Modern Physics*, Douglas C. Giancoli, Pearson, 4th edition, 2008. • *Physics for Scientists and Engineers*, Paul A. Tippler, Macmillan, 6th edition, 2007