Valid from 2024.HS

Module description: Physics 2

Module Code	t.BA.XXP6.PHY2.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	ICP
Module Coordinator	Mojca Jazbinsek
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	The Physics 2 module covers the basic physics and methods in the fields of electrostatics, magnetism, electromagnetism, optics and radioactivity. Using selected examples, students learn about and employ the physics way of thinking and working as part of the engineer's modern technical thinking.
Module Content	• Electrostatics: charge, Coulomb's law, electric field, potential and potential energy, analogy to gravity • Magnetism: magnetic field, Lorentz force, motion of charged particles in a magnetic field, sources of the magnetic field, magnetic materials, magnetic flux, induction, Lenz's law • Waves: a) mechanical waves: types of waves, mathematical description of a wave, the speed of a wave, reflection, transmission, interference, standing waves; b) electromagnetic waves and sources, thermal radiation, wave-particle duality • Optics: light as a wave, reflection, refraction, dispersion, interference, diffraction, ray optics as an example of a model reduction: mirrors and lenses • Radioactivity: structure and properties of the nucleus, radioactive decay, decay rate, radioactive activity and examples, alpha-, beta-, gamma-decay, interaction with matter, dose quantities, nuclear reactions and nuclear energy
Prerequisite Knowledge	Physics of the technical BMS; Physics and Mathematics from the first semester

Module description: Physics 2

Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Overview: General physics education and the knowledge of the methods in physics are prerequisites for interdisciplinary thinking and performing of a future engineer. Based on selected examples from nature and technology, the students learn about and employ the physics way of thinking and working as part of the engineer's modern technical thinking. The students know the definitions of basic quantities and concepts in the areas listed below and understand how these are motivated. They can distinguish between definitions and fundamental physical relationships (natural laws).	F	K1, K2
	The students understand and recognize the relations between the concepts developed in 1) in different forms and can identify them. The forms include dynamic relationships, conservation laws, and geometric concepts.	F	K1, K2
	The students understand the concept of analogy in physics and can exemplify it. They know the structures of conservation laws and can identify these structures in concrete physics examples.	M	K2, K3
	The students can apply the knowledge and skills from 1) to 3) qualitatively and quantitatively to natural and technical phenomena. The students are able to decide, based on the particular problem statement, which methods are suitable for the analysis. (e.g. they can distinguish dynamic problems from the analysis of states).	M	K3, K4
	The students understand the significance of an experiment and can evaluate it. They recognize possible disturbing effects and are able to reduce them or to consider them. They can handle data-acquisition and data-analysis tools and are able to document their activities and to interpret the results. They are able to organize themselves in a team, to communicate and to take responsibility.	SE, SO, F, M	K2, K4, K5
	The students understand the importance of modeling and are able to identify the application range of a model. They are able to set up their own models with analytical procedures and simulations and to implement them in suitable simulation tools.	M, F	K4
	The students know methods for evaluating the model results and can apply these to their models. These include limit-case considerations, plausibility assessments, back-of-the-envelope calculations and the comparison with experience from technology and everyday life.	SE, M	K6

Module description: Physics 2

Performance Assessment	see tables below

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	60	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	20	acc. to module agreement
Graded assignments during the semester *laboratory reports; optionally: Moodle-tests, presentations*	Grade		20	acc. to module agreement

Classroom Attendance Requirement	None Mandatory attendance: group laboratory assignments, mid-term exam
Learning material	• Exercises and solutions • Laboratory instructions • Lecture notes
Comments	