**Valid from** 2024.HS

# Module description: Physics 1

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| **Module Code** | t.BA.XXP5.PHY1.19HS |
| **ECTS Credits** | 4 |
| **Language of Instruction/Examination** | German |
| **Organizational Unit** | IAMP |
| **Module Coordinator** | Julien Rey |
| **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<br><br>2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class |
| **Module Description** | The students acquire the physical and technical basics in the fields of kinematics, translation dynamics, momentum- energy- and charge-conservation. Using selected examples from these areas, the students learn about and apply the physical way of thinking and working as part of the modern technical thinking of engineers. |
| **Module Content** | **Kinematics:**<br><br>• Description of motions in 1-,2- and 3-dimensions,<br>• Velocity and acceleration (vector) in form of rate of change (differential and integral forms).<br><br>**Translation dynamics:**<br><br>• Reference frame, inertia, inertial systems,<br>• Newton's laws,<br>• Relationship between kinematics and physics.<br>• Applications to dynamics / kinematics, oscillations:<br>• Forces, interactions (including gravitation, Hooke's law, friction und Coulomb),<br>• Force equilibrium, statics,<br>• Description of motion for point particles.<br><br>**Momentum-, energy- and charge-conservations, potential, E-Field:**<br><br>• Dynamical and energy aspects for mechanical and electrical systems,<br>• Analogies between electrostatics und gravity,<br>• Conservation of momentum: elastic, inelastic and part elastic collisions,<br>• Impulse.<br><br>**Testing, modelling and simulation of dynamical systems; laboratory with error analysis, data acquisition & analysis.**<br><br>• Model building and simulation,<br>• Practical experiments with data aquisition, evalution and error estimation. |
| **Prerequisite Knowledge** | |

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**Learning Objectives (Competences)**

| Students... | Competencies | Taxonomies |
|---|---|---|
| They are able to gain new insights through physical experimentation and computer simulation by observing, recognising (retrieving) physical relationships, acquiring data and their numerical evaluation and interpretation. | F, M | K2, K3 |
| The students get to know the inductively determined physical thinking and working method as part of the modern thinking and working method of the engineer and are able to apply it. This includes such important methods as experimentation, modelling, idealisation and analogy. In principle, they are able to check the correctness of results from experiments and models by means of rough calculations, limit case considerations and evaluation of their plausibility by comparison with empirical values from technology or everyday life. | F, M | K2, K3 |
| The students have understood the fundamental relations of physics in the form of basic laws, conservation laws and physical concepts and can apply them to concrete situations. | M, F | K2, K3 |
| They can grasp physical situations, model physical systems, recognize performance and validity limits of the model, develop and refine models and obtain qualitative and quantitative results from the models. | F, M | K2, K3 |

**Performance Assessment**

| End-of-module exam | Assessment | Length (min.) | Weighting | Form |
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| written exam | Grade | 90 | 70 | acc. to module agreement |

| Performance assessment during the semester | Assessment | Length (min.) | Weighting | Form |
|---|---|---|---|---|
| report | Grade | | 10 | acc. to module agreement |
| written exam | Grade | 60 | 20 | acc. to module agreement |

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| **Classroom Attendance Requirement** | None |
| **Learning material** | |
| **Comments** | |