

Course Manual PH2

Physics 2

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– General information

Long name	Physics 2
Approving CModule	PH2_BaET
Responsible	Prof. Dr. Karl Kohlhof Professor Fakultät IME
Valid from	winter semester 2021/22
Level	Bachelor
Semester in the year	winter semester
Duration	Semester
Hours in self-study	60
ECTS	5
Professors	Prof. Dr. Karl Kohlhof Professor Fakultät IME

Literature

Tippler, Mosca; Physik (Springer Spektrum)

Giancoli; Physik Lehr- und Übungsbuch (Pearson)

Halliday, Resnick, Walker; Halliday Physik (Wiley-VCH)

Final exam

Requirements

Functions (sin, cos, exp, ln)
Equations and systems of equations (linear, quadratic)
Analysis (differential and integral calculus)
Linear algebra (2-/3-dim vector calculation)
Differential equations
Complex numbers
Basic physical terms
Kinematics, dynamics
Forces, Newton's axioms
Work, energy, energy conservation
Momentum, momentum conservation
Torque, angular momentum
Oscillations of mass-spring systems (free/forced, undamped/damped)

Language

German

Separate final exam

Yes

Details

Written examination, oral examination only in individual cases, with the following elements:

- Multiple choice and assignment questions to query fundamental concepts, relationships and analogies
- Free-text answers to query further knowledge and the basic understanding of physical relationships
- Preparation of sketches to test further understanding
- Application-oriented text tasks, whose solutions make it necessary to analyze and reduce the physical problems, select a suitable model and apply it mathematically.

Minimum standard

50 % of the questions and tasks correctly solved

Exam Type

EN Klausur

– Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	<p>Mechanics</p> <ul style="list-style-type: none"> - Superposition of oscillations (beat) - Waves, wave propagation (longitudinal, transversal) - Superposition of waves (interference), standing waves <p>Optics</p> <ul style="list-style-type: none"> - Huygens Fresnel Principle - Reflection, total reflection, refraction, diffraction - Doppler effect (classic) - Geometric optics <p>Thermodynamics</p> <ul style="list-style-type: none"> - Kinetic gas theory, ideal gases - thermal expansion, absolute temperature - Fundamentall laws of thermodynamics - Thermodynamic processes (isothermal, isobaric, isochoric, adiabatic)
Skills	<p>Recognize and apply analogies, e.g. mechanical / electrical oscillations</p> <p>Derive and apply equations of motion from balances of forces or energies</p> <p>Describe and explain wave propagation processes</p> <p>Derive superposition of harmonic waves and calculate standing waves</p> <p>Apply Bernoulli equation and determine state variables of the fluid</p> <p>Derive thermomechanical state variables (pressure, volume, temperature) from the fundamental laws</p> <p>Analyze physical problems, apply physical models and calculate with them</p>

Special requirements

none

Accompanying material

Presentation slides for the lecture
 Collection of exercise tasks with solutions
 Questionnaire to prepare the exam
 Links to Internet resources with basic information

Separate exam

No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
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Lecture	2
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Exercises (whole course)	2
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Exercises (shared course)	0
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Tutorial (voluntary)	0
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– Practical training

Learning goals

Goal type	Description
Knowledge	<p>Error analysis</p> <ul style="list-style-type: none"> - Systematic and random measurement deviations - Absolute and relative measurement deviations - Graphical determination of the measurement deviations - Calculated determination of the measurement deviations - Error statistics (distribution, mean, standard deviation) - Error propagation <p>Demonstration experiment</p> <ul style="list-style-type: none"> - Mathematical pendulum <p>Lab exercises</p> <ul style="list-style-type: none"> - Fall acceleration - Temperature dependence of resistors - Damped torsional oscillation <p>Online lab exercises</p> <ul style="list-style-type: none"> - Forced torsional oscillation
Skills	<p>Analyze, modify and verify experimental setup</p> <p>Record measurement data and create a simple log</p> <p>Perform an error calculation and evaluate the measurement deviation</p> <p>Evaluate, assess and compare measured data with expectation or known values</p> <p>Create a structured report</p>

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0

Special requirements

none

Accompanying material

Documents to introduce the lab exercises incl. script for error calculation
Background information and task description of lab exercises
Questionnaire to prepare the lab exercises

Separate exam

Yes

Separate exam

Exam Type

EN Projektaufgabe im Team bearbeiten (z.B. im Praktikum)

Details

Online entrance test to control student preparation
Evaluation of the test report

Minimum standard

70% of online tests correct
80% of the measurement results correct
80% of the evaluation performed correctly
Discussion of evaluation available