

## Module Handbook

TUK MODHB Homepage

# Module MAT-PHY-EX-M-4

Experimental Physics I/II (for Mathematicians) (M, 18.0 LP)

## Module Identification

Module Number	Module Name	CP (Effort)
MAT-PHY-EX-M-4	<i>Experimental Physics I/II (for Mathematicians)</i>	18.0 CP (540 h)

## Basedata

CP, Effort	18.0 CP = 540 h
Position of the semester	2 Sem. from WiSe
Level	[4] Bachelor (Specialization)
Language	[DE] German
Module Manager	Lossen, Christoph, Dr. habil. (WMA   DEPT: MAT)
Lecturers	
Area of study	[MAT-NF] Special Offers for Subsidiary Topics in Math Programmes
Reference course of study	[MAT-82.105-SG] B.Sc. Mathematics
Lifecycle-State	[NORM] Active

### Notice

In addition, the module contains the accompanying lecture with exercise classes and tutorials [PHY-PFEP-021-K-2] "*Mathematical fundamentals of physics*", in which advanced mathematical contents and skills are imparted at an early stage (with regard to the requirements of experimental physics). Due to the overlap with the mathematics modules in the B.Sc. Mathematics, the workload associated with this course is only considered proportionally (in the form of 60 hours of self-study).

## Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
4V+2U	PHY-PFEP-020-K-2	P	-	PL1	8.0	WiSe/SuSe
4V+2U	PHY-PFEP-023-K-2	P	-	PL1	8.0	SuSe

- About [PHY-PFEP-020-K-2]: Title: "Mechanics and heat"; Presence-Time: 84 h; Self-Study: 156 h
- About [PHY-PFEP-023-K-2]: Title: "Electromagnetism and optics"; Presence-Time: 84 h; Self-Study: 156 h

## Examination achievement PL1

- Form of examination: **oral examination (30-45 Min.)**
- Examination Frequency: each semester
- Examination number: 85611 ("Experimental Physics I/II (for Mathematicians)")

## Evaluation of grades

The grade of the module examination is also the module grade.

### Contents

#### From [PHY-PFEP-020-K-2] Mechanics and heat:

- Einführung und Überblick zur Mechanik eines Massenpunktes
- bewegte Bezugssysteme und spezielle Relativitätstheorie
- Systeme von Massenpunkten
- Stöße
- Dynamik starrer Körper
- reale, feste und flüssige Körper
- Gase
- strömende Flüssigkeiten und Gase
- mechanische Schwingungen und Wellen
- Wärmelehre

#### From [PHY-PFEP-023-K-2] Electromagnetism and optics:

- Elektrostatik
- elektrischer Strom
- Magnetostatik
- zeitlich veränderliche Felder
- Maxwell-Gleichungen
- elektrotechnische Anwendungen
- elektromagnetische Schwingungen
- elektromagnetische Wellen im Vakuum
- elektromagnetische Wellen in Materie
- geometrische Optik
- Interferenz und Beugung
- Streuung
- optische Instrumente
- neue Techniken der Optik

### Competencies / intended learning achievements

Upon successful completion of this module, the students know and understand the fundamental terms, concepts and

phenomena

- of classical mechanics and hydrodynamics, of vibrations and waves in mechanical systems, and of thermodynamics, as well as
- of electrodynamics and optics.

This also includes basic knowledge in theoretical modelling of problems in classical mechanics and electrostatics.

Then have acquired appropriate mathematical skills and are able to work independently on problems in the field mentioned above.

## Literature

From [PHY-PFEP-020-K-2] **Mechanics and heat:**

- Demtröder: Experimentalphysik 1, Springer
- Meschede: Gerthsen Physik, Springer

From [PHY-PFEP-023-K-2] **Electromagnetism and optics:**

- Demtröder: Experimentalphysik 2, Springer
- Meschede: Gerthsen Physik, Springer

## Materials

Current information and materials accompanying the course will be announced in the lecture or on the website of the course.

## Registration

Registration for the exercises is required. Details will be announced during the first lecture.

## Requirements for attendance of the module (informal)

None

- Notice: Some Courses have informal requirements for attendance:
  - #A: [PHY-PFEP-020-K-2] Mechanics and heat (4V+2U, 8.0 LP) (P: Obligatory)
  - #A: [PHY-PFEP-023-K-2] Electromagnetism and optics (4V+2U, 8.0 LP) (P: Obligatory)

## Requirements for attendance of the module (formal)

None

- Notice: Some Courses have formal requirements for attendance:
  - #A: [PHY-PFEP-020-K-2] Mechanics and heat (4V+2U, 8.0 LP) (P: Obligatory)

## References to Module / Module Number [MAT-PHY-EX-M-4]

Course of Study	Section	Choice/Obligation
[MAT-82.105-SG] B.Sc. Mathematics	[Subsidiary Topic] Subsidiary Subject (Minor)	[P] Compulsory