

## Module Handbook

TUK MODHB Homepage

### Notes on the module handbook of the department Mechanical and Process Engineering

Die hier dargestellten veröffentlichten Studiengang-, Modul- und Kursdaten des Fachbereichs Maschinenbau und Verfahrenstechnik ersetzen die Modulbeschreibungen im KIS und wurden mit Ausnahme folgender Studiengänge am 28.10.2020, bzw. am 13.01.2021 verabschiedet.

Ausnahmen:

- BEd. Lehramt Metalltechnik (Stand WS 19/20): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MHB\\_Bachelor\\_Lehramt\\_Metalltechnik.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Bachelor_Lehramt_Metalltechnik.pdf)
- MEd. Lehramt Metalltechnik Werkstoffe und Fertigung (Stand WS 19/20): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MHB\\_Master\\_Lehramt\\_Metalltechnik\\_-\\_Werkstoffe\\_und\\_Fertigung.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Werkstoffe_und_Fertigung.pdf)
- MEd. Lehramt Metalltechnik Maschinen- und Fahrzeugtechnik (Stand WS 19/20): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MHB\\_Master\\_Lehramt\\_Metalltechnik\\_-\\_Fahrzeugtechnik.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Fahrzeugtechnik.pdf)
- MEd. Lehramt Metalltechnik Verfahrenstechnik (Stand WS 19/20): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MHB\\_Master\\_Lehramt\\_Metalltechnik\\_-\\_Verfahrenstechnik.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MHB_Master_Lehramt_Metalltechnik_-_Verfahrenstechnik.pdf)

## Module MV-LTD-M207-M-7

Laboratory for magnetic resonance in natural sciences and engineering (M, 3.0 LP)

### Module Identification

Module Number	Module Name	CP (Effort)
MV-LTD-M207-M-7	<i>Laboratory for magnetic resonance in natural sciences and engineering</i>	3.0 CP (90 h)

### Basedata

CP, Effort	3.0 CP = 90 h
Position of the semester	1 Sem. in WiSe
Level	[7] Master (Advanced)
Language	[DE] German
Module Manager	Münnemann, Kerstin, Dr. (WMA   DEPT: MV)
Lecturers	Münnemann, Kerstin, Dr. (WMA   DEPT: MV)
Area of study	[MV-LTD] Engineering Thermodynamics
Reference course of study	[MV-88.B10-SG] M.Sc. Energy and Process Engineering
Lifecycle-State	[NORM] Active

### Notice

Can also be taken by students from the Master Chemistry, Master TechnoPhysics, Master BCI, Master Physics, Master Biophysics.

## Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2L	MV-LTD-86083-K-7	P	LABOR	no	3.0	WiSe

- About [MV-LTD-86083-K-7]: Title: "Laboratory for magnetic resonance in natural sciences and engineering"; Presence-Time: 28 h; Self-Study: 62 h
- About [MV-LTD-86083-K-7]: The study achievement "[LABOR] practical laboratory / experimental work" must be obtained.

### Examination achievement PL1

- Form of examination: **practical laboratory exam**
- Examination Frequency: Examination only within the course
- Examination number: 10284 ("Laboratory for magnetic resonance in natural sciences and engineering")

Tests and protocols for the individual experiments as well as a main test.

## Evaluation of grades

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

The grade is calculated primarily from the grade of the main test. More details will be announced in the course.

### Contents

From [MV-LTD-86083-K-7] Laboratory for magnetic resonance in natural sciences and engineering:

- Technical principles of Magnetic Resonance (NMR and ESR).
- Set-up, execution, evaluation and analysis of NMR and ESR experiments
- One- and multidimensional spectroscopy

- Relaxation
- Imaging
- Diffusion measurements
- Dynamic nuclear polarization for sensitivity enhancement of NMR

## Competencies / intended learning achievements

From [MV-LTD-86083-K-7] Laboratory for magnetic resonance in natural sciences and engineering:

The students are able

- to explain the setup and operation of a magnetic resonance spectrometer
- to set up and perform NMR experiments themselves (spectroscopy, relaxation, imaging, diffusion measurements, hyperpolarization experiments)
- to perform a dedicated post-processing of the obtained data and to evaluate them
- to select specific measurement sequences for dedicated questions and analyze the measurement results

## Literature

From [MV-LTD-86083-K-7] Laboratory for magnetic resonance in natural sciences and engineering:

- Eiichi Fukushima, Stephen B.W. Roeder: Experimental Pulse NMR, Addison-Wesley Publishing Company, Inc. ISBN 0-201-10403-2
- Daniella Goldfarb, Stefan Stoll: EPR Spectroscopy, Fundamentals and Methods, Wiley ISBN 978-1-119-16299-5
- Horst Friebolin: Ein- und zweidimensionale NMR-Spektroskopie, Wiley-VCH ISBN 3-527-29514-3
- Paul T. Callaghan: Principles of Nuclear Magnetic Resonance Microscopy, Clarendon Press, Oxford, ISBN 978-0-19-853997-1

## Requirements for attendance of the module (informal)

Simultaneous attendance of the lecture "Applications of magnetic resonance in natural sciences and engineering" is recommended.

## Requirements for attendance of the module (formal)

None

## References to Module / Module Number [MV-LTD-M207-M-7]

Module-Pool	Name
[MV-ALLG-2022-MPOOL-6]	Wahlpflichtmodule Master allgemein 2022
[MV-ALL-MPOOL-6]	Wahlpflichtmodule allgemein
[MV-BioVT-MPOOL-6]	Wahlpflichtmodule Bioverfahrenstechnik
[MV-EVT-2022-MPOOL-6]	Wahlpflichtmodule M.Sc. EVT 2022
[MV-EVT-MPOOL-6]	Wahlpflichtmodule Energie- und Verfahrenstechnik