

## Module Handbook (<https://modhb.uni-kl.de/>)

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### 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 verabschiedet.

Ausnahmen:

- BSc. Bio- und Chemieingenieurwissenschaften (Stand WS 20/21): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MH\\_BSc\\_BCI.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_BSc_BCI.pdf) ([https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MH\\_BSc\\_BCI.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_BSc_BCI.pdf))
- 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) ([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))
- MSc. Bio- und Chemieingenieurwissenschaften (Stand WS 20/21): [https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MH\\_Msc\\_BCI.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_Msc_BCI.pdf) ([https://www.mv.uni-kl.de/fileadmin/mv/Studium\\_Lehre/Modulhandbuecher/MH\\_Msc\\_BCI.pdf](https://www.mv.uni-kl.de/fileadmin/mv/Studium_Lehre/Modulhandbuecher/MH_Msc_BCI.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) ([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) ([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) ([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-TM-100-M-4

Selected Topics of Mechanics (M, 3.0 LP)

### Module Identification

Module Number	Module Name	CP (Effort)
MV-TM-100-M-4	<i>Selected Topics of Mechanics</i>	3.0 CP (90 h)

### Basedata

CP, Effort	3.0 CP = 90 h
Position of the semester	1 Sem. in SuSe
Level	[4] Bachelor (Specialization)
Language	[DE] German
Module Manager	Müller, Ralf, Prof. Dr.-Ing. (PROF   DEPT: MV) (/staff/83/) Sator, Christian, Dr.-Ing. (WMA   DEPT: MV) (/staff/84/)
Lecturers	Müller, Ralf, Prof. Dr.-Ing. (PROF   DEPT: MV) (/staff/83/)
Area of study	[MV-LTM] Applied Mechanics
Lifecycle-State	[NORM] Active

## Notice

In each summer semester, one of the courses is offered in consultation with the lecturer.

## Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V	<a href="/mhb/courses/MV-TM-86016-K-4/">MV-TM-86016-K-4</a>	WP	-	PL1	3.0	irreg. SuSe
2V	<a href="/mhb/courses/MV-TM-86017-K-4/">MV-TM-86017-K-4</a>	WP	-	PL1	3.0	irreg. SuSe
2V	<a href="/mhb/courses/MV-TM-86018-K-4/">MV-TM-86018-K-4</a>	WP	-	PL1	3.0	irreg. SuSe

- About **[MV-TM-86016-K-4]**: Title: "Introduction to Tensor Calculus and Shell Theory"; Presence-Time: 28 h; Self-Study: 62 h
- About **[MV-TM-86017-K-4]**: Title: "Micromechanics"; Presence-Time: 28 h; Self-Study: 62 h
- About **[MV-TM-86018-K-4]**: Title: "Theory of Plasticity"; Presence-Time: 28 h; Self-Study: 62 h

## Examination achievement PL1

- Form of examination: **oral examination (30-45 Min.)**
- Examination Frequency: each semester
- Examination number: 10010 ("Selected Topics of Mechanics")

## Evaluation of grades

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

## Contents

From **[MV-TM-86016-K-4] Introduction to Tensor Calculus and Shell Theory** (/mhb/courses/MV-TM-86016-K-4/):

- Euclidean vector space
- covariant and contravariant coordinates
- vector and tensor algebra in curvilinear coordinates
- covariant derivatives, vector and tensor analysis
- membrane and bending theory for shells

From **[MV-TM-86017-K-4] Micromechanics** (/mhb/courses/MV-TM-86017-K-4/):

- defects in materials
- Eshelby solution for inclusions and inhomogeneities
- analytical homogenization
- numerical homogenization

From [MV-TM-86018-K-4] Theory of Plasticity (/mhb/courses/MV-TM-86018-K-4/):

- fundamentals of plastic deformation
- von Mises, Tresca, and Mohr yield surfaces
- associated and not associated flow rules
- rate dependent and rate independent plasticity

## Competencies / intended learning achievements

From [MV-TM-86016-K-4] Introduction to Tensor Calculus and Shell Theory (/mhb/courses/MV-TM-86016-K-4/):

Students are able to

- state fundamental principles of tensor calculus
- apply tensor calculus to curvilinear coordinates
- formulate and solve problems in differential geometry
- analyze shell problems via membrane and bending theory

From [MV-TM-86017-K-4] Micromechanics (/mhb/courses/MV-TM-86017-K-4/):

Students are able to

- model defect in materials
- state the properties of the Eshelby solution
- apply the Eshelby solution to inclusions and inhomogeneities
- compare and apply analytical homogenization methods
- state and apply numerical homogenization methods

From [MV-TM-86018-K-4] Theory of Plasticity (/mhb/courses/MV-TM-86018-K-4/):

Students are able to

- state fundamentals of plastic deformation
- state, discuss, and apply the von Mises, Tresca, and Mohr yield surfaces
- describe and apply associated and not associated flow rules
- formulate, apply, and numerically implement rate dependent and rate independent plasticity models

## Literature

From [MV-TM-86016-K-4] Introduction to Tensor Calculus and Shell Theory (/mhb/courses/MV-TM-86016-K-4/):

- E. Klingbeil: Tensorrechnung für Ingenieure, B.I.-Hochschultaschenbuch

From [MV-TM-86017-K-4] Micromechanics (/mhb/courses/MV-TM-86017-K-4/):

- D. Gross, Th. Seelig: Bruchmechanik - Mit einer Einführung in die Mikromechanik, Springer

From [MV-TM-86018-K-4] Theory of Plasticity (/mhb/courses/MV-TM-86018-K-4/):

Will be announced in the lecture.

## Requirements for attendance (informal)

Basic knowledge in applied mechanics and higher mathematics

## Requirements for attendance (formal)

None

References to Module / Module Number [MV-TM-100-M-4]

<b>Module-Pool</b>	<b>Name</b>
[MV-ALL-MPOOL-6 (/mhb/modulepools/MV-ALL-MPOOL-6/)]	Wahlpflichtmodule allgemein
[MV-BioVT-MPOOL-6 (/mhb/modulepools/MV-BioVT-MPOOL-6/)]	Wahlpflichtmodule Bioverfahrenstechnik
[MV-CE-MPOOL-6 (/mhb/modulepools/MV-CE-MPOOL-6/)]	Wahlpflichtmodule Computational Engineering