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 wuden 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)
- 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)
- 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)
- 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)

Course MV-TM-86020-K-4

Elements of Applied Mechanics I (3V+1U, 6.0 LP)

Course Type

SWS	Type	Course Form	CP (Effort)	Presence-Time / Self-Study	
-	K	Lecture with exercise classes (V/U)	6.0 CP		124 h
3	V	Lecture		42 h	
1	U	Lecture hall exercise class		14 h	
(3V+1U)			6.0 CP	56 h	124 h

Basedata

SWS	3V+1U
CP, Effort	6.0 CP = 180 h
Position of the semester	1 Sem. in WiSe
Level	[4] Bachelor (Specialization)
Language	[DE] German
Lecturers	Sator, Christian, Dr.-Ing. (WMA | DEPT: MV) (/staff/84/)
Area of study	[MV-LTM] Applied Mechanics
Additional informations	Informations about the course (https://www.mv.uni-kl.de/ltm/lehre/)
Livecycle-State	[NORM] Active

Notice

In addition to lectures and exercises, the Chair of Applied Mechanics offers tutorials and student consultation hours. (Dates: see OLAT)

Contents

- fundamental concepts regarding the statics of rigid bodies (force, classification of forces)
- forces with common point of origin (equilibrium on a plane)
- general systems of forces (force groups on a plane)
- centroid of loads, bodies, volumes, surfaces and lines
- bearing and joint reactions (static and kinematic determinacy)
- trusses (zero force bars, method of joints and sections)
- beams, frames, arches (forces on cuts)
- fundamental concepts of elastostatics
- tension compression in bars (stress, strain, material law, bar systems)
- concept of work for bar systems (principle of work and energy, strain energy, principle of virtual forces)
- stress state (transformation relations, principal stresses, Mohr's circle)
- strain state (strain and shear)
- law of elasticity and strength hypothesis
- beam bending (moment of inertia of area, ordinary bending)

Competencies / intended learning achievements

1. Lecture

Students are able to

- describe fundamental concepts regarding statics (force and torque)
- classify structural elements regarding their load-bearing behavior
- compute resultants of load systems and distributed volume, area, and line forces
- label forces on cuts of structures
- compute the deformation behavior of bars and bar systems
- compute the deformation of elastic bars and bar systems via energy methods and the principle of virtual forces
- explain the terms stress and strain for one and also higher dimensions
- describe the elastic material law for one and also higher dimensions

- analyze the deformation behavior and stress distribution in a beam

2. Tutorial

Students are able to

- analyze systems by cuts and equilibrium conditions
- compute bearing and joint reactions
- compute the centroid of loads and bodies
- compute forces on cuts of structures
- compute the deformation of bar systems via displacement diagrams
- compute the deformation of bar systems via energy methods and the principle of virtual forces
- analyze homogeneous plane and three-dimensional stress states
- compute moments of inertia of area
- analyze structures of bars and beams with respect to deformation and stress distribution
- present and discuss their results among themselves

Literature

Gross, Hauger, Schröder, Wall: Technische Mechanik, Band 1 und Band 2, Springer Verlag;

Gross, Ehlers, Wriggers, Müller: Formeln und Aufgaben zur Technischen Mechanik 1 - Statik, Springer Verlag;

Gross, Ehlers, Wriggers, Schröder, Müller: Formeln und Aufgaben zur Technischen Mechanik 2 – Elastostatik, Hydrostatik, Springer;

Hagedorn: Technische Mechanik, Band 1 und Band 2, Verlag Harry Deutsch;

Materials

Blackboard/overhead, projector, slides. For further information and course materials please consider the corresponding OLAT-course.

Requirements for attendance (informal)

None

Requirements for attendance (formal)

None

References to Course [MV-TM-86020-K-4]

Module	Name	Context	
[MV-BEMT-7-M-4 (/mhb/modules/MV-BEMT-7-M-4/)]	Applied Mechanics	P: Obligatory	3V+1U, 5.0 LP
[MV-TM-54-M-4 (/mhb/modules/MV-TM-54-M-4/)]	Elements of Applied Mechanics I	P: Obligatory	3V+1U, 6.0 LP