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)

Module MV-MEMT-3-M-6

Metallic Materials (M, 6.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MV-MEMT-3-M-6	*Metallic Materials*	6.0 CP (180 h)

Basedata

CP, Effort	6.0 CP = 180 h
Position of the semester	2 Sem. from WiSe
Level	[6] Master (General)
Language	[DE] German
Module Manager	Beck, Tilmann, Prof. Dr.-Ing. (PROF | DEPT: MV) (/staff/303/)
Lecturers	Smaga, Marek, Dr.-Ing. (WMA | DEPT: MV) (/staff/277/)
Area of study	[MV-WKK] Materials Science and Engineering
Reference course of study	[MV-66.108-SG] M.Ed. LaBBS Metals Technology (/mhb/FB-MV/cos-632/)
Livecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V	**MV-WKK-86153-K-4** (/mhb/courses/MV-WKK-86153-K-4/)	P	-	PL1	3.0	WiSe
2V+1U	**MV-WKK-86154-K-7** (/mhb/courses/MV-WKK-86154-K-7/)	P	-	PL1	3.0	SuSe

- About **[MV-WKK-86153-K-4]**: Title: "Construction Materials I"; Presence-Time: 28 h; Self-Study: 62 h
- About **[MV-WKK-86154-K-7]**: Title: "Construction Materials II"; Presence-Time: 42 h; Self-Study: 48 h

Examination achievement PL1

- Form of examination: **written exam (Klausur) (180 Min.)**
- Examination Frequency: each semester
- Examination number: 18300 ("Metallic Materials")

Evaluation of grades

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

Contents

From [MV-WKK-86153-K-4] Construction Materials I (/mhb/courses/MV-WKK-86153-K-4/):

- Selection criteria for construction materials
- Classification of steels
- Thermodynamic aspects of phase transformation
- Transformation of steels from the austenite area
- Time-temperature transformation diagrams
- Selected heat treatments (thermal, thermo-mechanical, chemical-thermal processes)
- Additive manufacturing

From [MV-WKK-86154-K-7] Construction Materials II (/mhb/courses/MV-WKK-86154-K-7/):

- TRansformation Induced Plasticity / TWining Induced Plasticity (TRIP/TWIP) steels
- Aluminum and its alloys
- Magnesium and its alloys

- Titanium and its alloys
- Nickel and its alloys
- Ceramic materials

Competencies / intended learning achievements

Die Studierenden verstehen die wesentlichen Grundlagen der Konstruktionswerkstoffe und deren Anwendung in der Technik, insbesondere in den für berufsbildende Schulen wichtigen Gebieten, und beherrschen deren grundlegende Methodik.

From [MV-WKK-86153-K-4] Construction Materials I (/mhb/courses/MV-WKK-86153-K-4/):

The students are able to
- name essential criteria for the selection of a material
- classify steels according to the DIN standard
- explain the transformation from the austenite area of hypoeutectoid and hypereutectoid steels
- determine heating and cooling parameters based on time-temperature transformation diagrams
- explain the physical processes occurring during the hardening of steels as well as specific hardening processes
- discuss the origin and effects of residual stresses
- present the most important thermal, thermo-mechanical and chemical-thermal heat treatment processes
- describe the main additive manufacturing processes and discuss their advantages over conventional manufacturing

From [MV-WKK-86154-K-7] Construction Materials II (/mhb/courses/MV-WKK-86154-K-7/):

The students are able to
- name the main groups of construction materials as well as their specific applications and to describe the behavior of these materials under mechanical loading
- explain the different strengthening mechanisms
- name the different classes of high-temperature materials, to describe the material behavior at high temperatures, in particular the various aspects of creep, as well as to explain the effectiveness of strengthening mechanisms at high temperatures
- apply the knowledge concerning material, microstructure and resulting properties to the selection of materials for construction components

Literature

From [MV-WKK-86153-K-4] Construction Materials I (/mhb/courses/MV-WKK-86153-K-4/):

- Verein Deutscher Eisenhüttenleute: Werkstoffkunde Stahl Band 1 u. 2, Springer Verlag und Verlag Stahleisen GmbH;
- W. Schatt: Werkstoffe des Maschinen-, Anlagen- und Apparatebaus, Deutscher Verlag für Grundstoffindustrie;
- W. Bergmann: Werkstofftechnik Teil 1: Grund- lagen, Teil 2 Anwendungen, Carl Hanser Verlag.

From [MV-WKK-86154-K-7] Construction Materials II (/mhb/courses/MV-WKK-86154-K-7/):

- Verein Deutscher Eisenhüttenleute: Werkstoffkunde Stahl Band 1 u. 2, Springer Verlag und Verlag Stahleisen GmbH;
- W. Schatt: Werkstoffe des Maschinen-, Anlagen- und Apparatebaus, Deutscher Verlag für Grundstoffindustrie;
- W. Bergmann: Werkstofftechnik Teil 1: Grundlagen, Teil 2 Anwendungen, Carl Hanser Verlag.

Requirements for attendance (informal)

Modules:

- [MV-WKK-B100-M-4] Materials Science (M, 11.0 LP) (/mhb/modules/MV-WKK-B100-M-4/)

Requirements for attendance (formal)

None

References to Module / Module Number [MV-MEMT-3-M-6]

Course of Study	Section	Choice/Obligation
[MV-66.108-SG] M.Ed. LaBBS Metals Technology (/mhb/FB-MV/cos-632/)	Werkstoffe und Fertigung	[P] Compulsory