

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)
- 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-13-M-6

Thermal Process Engineering (M, 8.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MV-MEMT-13-M-6	<i>Thermal Process Engineering</i>	8.0 CP (240 h)

Basedata

CP, Effort	8.0 CP = 240 h
Position of the semester	1 Sem. in WiSe
Level	[6] Master (General)
Language	[DE] German
Module Manager	von Harbou, Erik, Prof. Dr.-Ing. (PROF DEPT: MV) (/staff/684/)
Lecturers	
Area of study	[MV-TVT] Separation Science and Technology
Reference course of study	[MV-66.108-SG] M.Ed. LaBBS Metals Technology (/mhb/FB-MV/cos-632/)
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
3V+1U	MV-TVT-86400-K-4 (/mhb/courses/MV-TVT-86400-K-4/)	P	-	PL1	6.0	WiSe
2L	MV-TVT-86418-K-4 (/mhb/courses/MV-TVT-86418-K-4/)	P	LABOR	no	3.0	WiSe

- About **[MV-TVT-86400-K-4]**: Title: "Thermal Separation Processes I"; Presence-Time: 56 h; Self-Study: 124 h
- About **[MV-TVT-86418-K-4]**: Title: "Thermal Separation Processes Laboratory I"; Presence-Time: 28 h; Self-Study: 62 h
- About **[MV-TVT-86418-K-4]**: The study achievement **[LABOR] practical laboratory / experimental work** must be obtained.

Examination achievement PL1

- Form of examination: **written exam (Klausur) (240 Min.)**
- Examination Frequency: each semester
- Examination number: 10400 ("Thermal Separation Processes I")

Evaluation of grades

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

Contents

From **[MV-TVT-86400-K-4] Thermal Separation Processes I** (/mhb/courses/MV-TVT-86400-K-4/):

1. Introduction
2. Basics
3. Equilibrium stage model for separation processes
4. Rate based model for separation processes
5. Evaporation and Condensation
6. Distillation
7. Absorption and Desorption

From [MV-TVT-86418-K-4] Thermal Separation Processes Laboratory I (/mhb/courses/MV-TVT-86418-K-4/):

Laboratory tests

- Properties of mixtures (phase equilibrium): LLE,VLE
- Rektifikation (continous / batch.)
- Extraction (Mixer-Settler)
- Long tube evaporator
- Drying

Competencies / intended learning achievements

Students understand the essentials of thermal process engineering and its application in technology, especially in areas important for vocational schools, and master its basic methodology.

From [MV-TVT-86400-K-4] Thermal Separation Processes I (/mhb/courses/MV-TVT-86400-K-4/):

1. Lecture

The students are able to

- reproduce and describe the basic concepts and procedures of thermal process engineering.
- solve and analyze fluid process separation tasks.
- relate separation technology to economic issues
- draw up balance sheets
- Application of the different modeling approaches (equilibrium step model and mass transfer model) to describe thermal separation processes..
- Basic understanding of the variables influencing the separation processes
- Basic evaluation of the separation processes with regard to energy demand and equipment design
- reproduce and analyze the evaporation, crystallization, absorption, extraction, distillation, rectification (hydrodynamics), drying and adsorption

2. Exercise

The students are able to

- set up balances and calculate phase equilibria of ideal and non-ideal mixtures
- calculate basic separation processes of thermal process engineering: evaporation, crystallization, adsorption, extraction (single-stage and multi-stage), distillation and rectification, hydrodynamics of columns, drying, adsorption.

From [MV-TVT-86418-K-4] Thermal Separation Processes Laboratory I (/mhb/courses/MV-TVT-86418-K-4/):

The students are able to

- describe and explain thermal separation processes
- plan and carry out experimental investigations on selected thermal separation processes
- evaluate and discuss the results in a professional manner
- present their findings to the practice group and consult with each other as a team effort

Literature

From [MV-TVT-86400-K-4] Thermal Separation Processes I (/mhb/courses/MV-TVT-86400-K-4/):

- Sattler: Thermische Trennverfahren
- Seader, Henry: Separation Process Principles
- Grassmann: Einführung in die thermische Verfahrenstechnik
- Perry, Chilton: Chemical Engineers Handbook
- Mersmann: Thermische Verfahrenstechnik
- Thurner: Verdampfung, Kristallisation, Trocknung
- Onken, Leschonski: Grundzüge der Verfahrenstechnik und Reaktionskinetik
- Walas: Chem. Process Equipment.

From [MV-TVT-86418-K-4] Thermal Separation Processes Laboratory I (/mhb/courses/MV-TVT-86418-K-4/):

Written laboratory instructions

Requirements for attendance (informal)

Courses

- [MV-TD-86050-K-4] Thermodynamics I (2V+2U, 5.0 LP) (/mhb/courses/MV-TD-86050-K-4/)

Requirements for attendance (formal)

None

References to Module / Module Number [MV-MEMT-13-M-6]

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