

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
- 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
- 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
- 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

Module MV-TD-264-M-4

Thermodynamics of Transport Processes (M, 3.0 LP)

Module Identification

| Module Number | Module Name | CP (Effort) |
|---------------|--|---------------|
| MV-TD-264-M-4 | <i>Thermodynamics of Transport Processes</i> | 3.0 CP (90 h) |

Basedata

| | |
|---------------------------|---|
| CP, Effort | 3.0 CP = 90 h |
| Position of the semester | 1 Sem. in WiSe |
| Level | [4] Bachelor (Specialization) |
| Language | [DE] German |
| Module Manager | Hasse, Hans, Prof. Dr.-Ing. (PROF DEPT: MV) |
| Lecturers | Hasse, Hans, Prof. Dr.-Ing. (PROF 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 |

Courses

| Type/SWS | Course Number | Choice in Module-Part | SL | PL | CP | Sem. |
|----------|-----------------|-----------------------|----|-----|-----|------|
| 2V | MV-TD-86061-K-4 | P | - | PL1 | 3.0 | WiSe |

- About [MV-TD-86061-K-4]: Title: "Thermodynamics of Transport Processes"; Presence-Time: 28 h; Self-Study: 62 h

Examination achievement PL1

- Form of examination: **oral examination (15-30 Min.)**
- Examination Frequency: each semester
- Examination number: 10261 ("Thermodynamics of Transport Processes")

Evaluation of grades

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

Contents

From [MV-TD-86061-K-4] Thermodynamics of Transport Processes:

- Relations, similarities and differences between heat transport, momentum transport, and mass transport
- Driving potentials
- Cross effects (Dufour, Soret, etc.)
- Irreversible thermodynamics
- Coupling of transport equations with balance equations
- Transport properties (heat conductivity, viscosity, diffusion coefficient)
- Fickian diffusion (binary, multi-component)
- Maxwell-Stefan diffusion (binary, multi-component)
- Relations between Fickian and Maxwell-Stefan diffusion
- Diffusion coefficients
- Mass transfer
- Film theory

- Penetration theory

Competencies / intended learning achievements

From [MV-TD-86061-K-4] Thermodynamics of Transport Processes:

1. Lectures

The students are able to describe and discuss

- the role and nature of transport processes
- the basic approach for modeling transport processes
- how to combine models of transport processes with balance equations
- the Fickian approach and the Maxwell-Stefan approach to model diffusion and the relations between these approaches
- how to get numbers for diffusion coefficients

2. Exercises

The students are able to apply the learning outcomes of the lecture to solve practical problems related to transport processes.

Literature

From [MV-TD-86061-K-4] Thermodynamics of Transport Processes:

- B. E. Poling, J.M. Prausnitz, J. P. O'Connell: The Properties of Gases and Liquids, McGraw Hill Professional New York (2000)
- R. Taylor, R. Krishna: Multicomponent Mass Transfer, Wiley New York (1993)
- R. B. Bird, W. E. Steward, E.N. Lightfoot: Transport Phenomena, Wiley New York (2007)

Requirements for attendance of the module (informal)

Modules:

- [MV-TD-56-M-4] Thermodynamics of Mixtures (M, 5.0 LP)

Requirements for attendance of the module (formal)

None

References to Module / Module Number [MV-TD-264-M-4]

| Course of Study | Section | Choice/Obligation |
|--|--|--------------------------|
| [MV-88.A29-SG] M.Sc. Biological and Chemical Engineering | [Compulsory Modules] Studienschwerpunkt II | [WP] Compulsory Elective |
| 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-CE-2022-MPOOL-6] | Wahlpflichtmodule M.Sc. Computational Engineering 2022 | |
| [MV-CE-MPOOL-6] | Wahlpflichtmodule Computational Engineering | |
| [MV-EVT-2022-MPOOL-4] | Wahlpflichtmodule B.Sc. EVT 2022 | |
| [MV-EVT-2022-MPOOL-6] | Wahlpflichtmodule M.Sc. EVT 2022 | |
| [MV-EVT-MPOOL-6] | Wahlpflichtmodule Energie- und Verfahrenstechnik | |