

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-TVT-300-M-7

Process and Plant Safety (M, 4.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MV-TVT-300-M-7	<i>Process and Plant Safety</i>	4.0 CP (120 h)

Basedata

CP, Effort	4.0 CP = 120 h
Position of the semester	1 Sem. in WiSe/SuSe
Level	[7] Master (Advanced)
Language	[DE] German
Module Manager	Schmidt, Jürgen, Prof. Dr.-Ing. (EXT DEPT: MV) von Harbou, Erik, Prof. Dr.-Ing. (PROF DEPT: MV)
Lecturers	Schmidt, Jürgen, Prof. Dr.-Ing. (EXT DEPT: MV)
Area of study	[MV-LRF] Separation Science and Technology
Reference course of study	[MV-88.B78-SG] M.Sc. Production Engineering in Mechanical Engineering
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V+1L	MV-TVT-86405-K-7	P	L-Schein	PL1	4.0	WiSe/SuSe

- About [MV-TVT-86405-K-7]: Title: "Process and Plant Safety"; Presence-Time: 42 h; Self-Study: 78 h
- About [MV-TVT-86405-K-7]: The study achievement "[L-Schein] proof of successful participation in the practical course / lab" must be obtained.
 - It is a [prerequisite for the examination](#) for PL1.
- About [MV-TVT-86405-K-7]:

Compulsory internship (short internship report on a topic from the lecture under the guidance of doctoral students of the CSE Institute).

Examination achievement PL1

- Form of examination: **written or oral examination**
- Examination Frequency: each semester
- Examination number: 10300 ("Process and Plant Safety")

Written (90-120 minutes) or oral (15-30 minutes) examination

Evaluation of grades

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

Contents

From [MV-TVT-86405-K-7] Process and Plant Safety:

Detailed information about the lecture: <https://www.cse-institut.de/lehre>

The lecture is held in 5 modules with the following topics:

- Introduction

- Risk management
- Hazardous substances and dangerous chemical reactions
- Modern protection concepts (model-based protective devices and end-of-pipe technology)
- Retention systems for emergency relief from reactors
- Dispersion of hazardous substances
- Explosion protection and electrostatics

Are technical systems really safe? Chemical reactors, tank farms, petrochemical plants, high-pressure gas lines, etc. harbor risks - these are systematically examined in industry in order to establish several barriers to safety measures. The number and quality of such measures is determined by the possible effects in the event of an incident. How do you make such systems really safe? That is the content of the lecture!

At the end of the lecture there will be an excursion to a BASF facility.

Competencies / intended learning achievements

From [MV-TVT-86405-K-7] Process and Plant Safety:

Expertise:

- Learn about asset risk management
- Identify and evaluate hazards from substances, processes and systems (Hazard and Operability Study)
- Design safety equipment and define the necessary safety measures

Methodological competence:

- Analyze the risks of chemical plants or plant components
- Apply safety-related design methods to any processes and systems
- Propose suitable measures to reduce risks
- Develop modern security concepts for plants

Social competence:

- Develop a critical reflection on the subject of plant safety
- Communicatively enforce safety-related measures against economic requirements

Personal competence:

- Develop a safety mind set (typical way of thinking of the experienced safety engineer)
- Personally accept and live safety-related principles

Learning outcomes of the individual lecture units (2 lecture units are read per block, lecture unit 01 is only an introduction to the topic:

Learning objectives for lecture unit 02:

You can ...

- classify hazards with a technical risk analysis
- define and assess risks qualitatively and quantitatively
- use the risk graph to determine the requirements for protective devices
- create and evaluate a plant safety concept
- carry out a safety analysis for a plant

Learning objectives for lecture unit 03:

You can ...

- describe the effects / absorption routes of toxic substances
- carry out GHS and REACH classifications
- define safety parameters
- apply the basics of occupational safety

Learning objectives for lecture unit 04:

You can ...

- recognize the causes of runaway reactions
- interpret reaction calorimetric data (DTA / DWStau)
- assess the heat balances of reactors

Learning objectives for lecture unit 05:

You should ...

- know the types and areas of application of safety devices
- being able to describe the function and characteristics of safety valves
- being able to show the way in which safety devices are designed

Learning objectives for lecture unit 06:

You should be able to ...

- show the types and areas of application of retention systems
- evaluate retention systems for chemical plants in terms of safety
- propose emergency cooling and stopping systems as an alternative to relief systems

Learning objectives for lecture unit 07:

You should be able to ...

- decide whether substances may be discharged into the atmosphere in the event of emergency discharges from reactors
- describe the factors influencing the spread of pollutants
- name and explain accident assessment values
- give recommendations for the companies on what to look out for when relieving hazardous substances

Learning objectives for lecture unit 08:

You should ...

- being able to classify PLC equipment
- be able to name the requirements for a PLC protective equipment
- be able to reproduce the procedure for the design of PLC protective devices
- be able to evaluate the use of existing PLC protective devices

Learning objectives for lecture unit 09:

You should be able to ...

- name the prerequisites for the occurrence of explosions
- define safety-related key figures and the explosion parameters and describe the associated concepts
- propose protective measures to avoid explosions
- evaluate existing protective measures on systems

Learning objectives for lecture unit 10:

You should be able to ...

- describe the different forms of electrostatic charge and discharge on objects and equipment
- evaluate existing protective measures and to give recommendations for the correct implementation of new systems

Literature

From [MV-TVT-86405-K-7] Process and Plant Safety:

Will be announced during the event

Requirements for attendance of the module (informal)

none

The basics for the lecture contents are taught in the lecture. This makes the lecture suitable for mechanical engineers, process engineers, chemists, industrial engineers, etc.

Requirements for attendance of the module (formal)

None

References to Module / Module Number [MV-TVT-300-M-7]

Module-Pool	Name
[MV-ALLG-2022-MPOOL-6]	Wahlpflichtmodule Master allgemein 2022
[MV-ALL-MPOOL-6]	Wahlpflichtmodule allgemein
[MV-BCI-BSc-MV-MPOOL-4]	Wahlpflichtmodule MV für Bachelor BCI
[MV-BioVT-MPOOL-6]	Wahlpflichtmodule Bioverfahrenstechnik
[MV-EVT-2022-MPOOL-6]	Wahlpflichtmodule M.Sc. EVT 2022
[MV-EVT-MPOOL-6]	Wahlpflichtmodule Energie- und Verfahrenstechnik
[MV-PE-2022-MPOOL-6]	Wahlpflichtmodule M.Sc. Produktentwicklung 2022
[MV-PE-MPOOL-6]	Wahlpflichtmodule Produktentwicklung im Maschinenbau