

Module Handbook (<https://modhb.uni-kl.de/>)

TUK (<https://www.uni-kl.de>) MODHB (<https://modhb.uni-kl.de/>) 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 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-TM-145-M-7

Introduction to the Boundary Element Method (M, 3.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MV-TM-145-M-7	<i>Introduction to the Boundary Element Method</i>	3.0 CP (90 h)

Basedata

CP, Effort	3.0 CP = 90 h
Position of the semester	1 Sem. in SuSe
Level	[7] Master (Advanced)
Language	[DE/EN] German or English as required
Module Manager	Andrä, Heiko, Dr. habil. (EXT DEPT: MV) (/staff/248/)
Lecturers	Andrä, Heiko, Dr. habil. (EXT DEPT: MV) (/staff/248/)
Area of study	[MV-LTM] Applied Mechanics
Reference course of study	[MV-88.808-SG] M.Sc. Computational Engineering (/mhb/FB-MV/cos-559/)
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
2V	MV-TM-86025-K-7	P	-	PL1	3.0	SuSe

- About **[MV-TM-86025-K-7]**: Title: "Introduction to the Boundary Element Method"; Presence-Time: 28 h; Self-Study: 62 h

Examination achievement PL1

- Form of examination: **oral examination (30-45 Min.)**
- Examination Frequency: each semester
- Examination number: 10025 ("Introduction to Boundary Elements")

Evaluation of grades

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

Contents

From **[MV-TM-86025-K-7] Introduction to the Boundary Element Method** (/mhb/courses/MV-TM-86025-K-7/):

- Variational principles of elasticity
- Singular and hypersingular boundary integral equations for elasticity and thermal conduction problems
- Collocation and Galerkin discretization
- Numerical solution of integral equations
- Solution of elastoplastic notch and crack problems with boundary element method (BEM)
- Implementation of BEM algorithms
- Coupling of finite element method (FEM) and BEM

Competencies / intended learning achievements

From **[MV-TM-86025-K-7] Introduction to the Boundary Element Method** (/mhb/courses/MV-TM-86025-K-7/):

- The students will be able to
- derive and explain representation formulas
 - compute fundamental solutions

- derive and explain boundary integral equations for elasticity problems
- describe and compare solution algorithms (especially collocation and Galerkin methods) for boundary integral equations
- apply the BEM to crack and notch problems

Literature

From [MV-TM-86025-K-7] Introduction to the Boundary Element Method (/mhb/courses/MV-TM-86025-K-7/):

- J.H. Kane: Boundary Element Analysis in Engineering Continuum Mechanics, Prentice Hall, New Jersey, 1994
- H. Andrä: Einführung in moderne Galerkin-Randelementmethoden mit einer Anwendung aus dem Maschinenbau, Forschung im Ing.-Wesen 65, 1999, 58-90

Requirements for attendance (informal)

basic lectures in mechanics, continuummechanics

Requirements for attendance (formal)

None

References to Module / Module Number [MV-TM-145-M-7]

Module-Pool	Name
[MV-ALL-MPOOL-6 (/mhb/modulepools/MV-ALL-MPOOL-6/)]	Wahlpflichtmodule allgemein
[MV-CE-MPOOL-6 (/mhb/modulepools/MV-CE-MPOOL-6/)]	Wahlpflichtmodule Computational Engineering