

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-SAM-276-M-4

Numerical Fluid Mechanics with Open Source Tools (M, 5.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MV-SAM-276-M-4	<i>Numerical Fluid Mechanics with Open Source Tools</i>	5.0 CP (150 h)

Basedata

CP, Effort	5.0 CP = 150 h
Position of the semester	1 Sem. in WiSe
Level	[4] Bachelor (Specialization)
Language	[DE] German
Module Manager	Reviol, Thomas, Dr.-Ing. (WMA DEPT: MV) (/staff/266/)
Lecturers	Reviol, Thomas, Dr.-Ing. (WMA DEPT: MV) (/staff/266/)
Area of study	[MV-SAM] Fluid Mechanics and Turbomachinery
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.
4V	MV-SAM-86365-K-4 (/mhb/courses/MV-SAM-86365-K-4/)	P	-	PL1	5.0	WiSe

- About **[MV-SAM-86365-K-4]**: Title: "Numerical Fluid Mechanics with Open Source Tools"; Presence-Time: 56 h; Self-Study: 94 h

Examination achievement PL1

- Form of examination: **oral examination (30 Min.)**
- Examination Frequency: each semester
- Examination number: 10365 ("Computational Fluid Dynamics with Open Source Tools")

Evaluation of grades

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

Contents

From **[MV-SAM-86365-K-4] Numerical Fluid Mechanics with Open Source Tools** (/mhb/courses/MV-SAM-86365-K-4/):

- Basic knowledge about CFD.
- Introduction to the structure and use of the software package OpenFOAM.
- Mathematical and physical modelling of examples for numerical flow calculation. Examples are taken from the field of fluid mechanics and process engineering.
- Calculation of different examples with incompressible and Newtonian fluids
- Application of different turbulence models
- Various simplifications such as periodicities

Competencies / intended learning achievements

From **[MV-SAM-86365-K-4] Numerical Fluid Mechanics with Open Source Tools** (/mhb/courses/MV-SAM-86365-K-4/):

- Students are able to use the open source package OpenFOAM independently.
- They learn to analyse a given problem and to select a suitable case for the solution of a concrete problem in a Linux environment based on ready-made solution examples.
- They learn to analyse the given problem with regard to its mathematical and physical modelling; first they are working

on a solution for the problem in teamwork and then they are working for their own to prepare a proposal for solution.

- They learn to evaluate, select and implement possible models and to simplify a real problem.
- They will be able to explain the different fundamentals of CFD and to use them to propose a solution to a posed problem.
- They learn to work as a team and to defend and to evaluate proposed solutions and, if necessary, to produce improvised possible solutions based on the examples they have worked out together.

Literature

From [MV-SAM-86365-K-4] Numerical Fluid Mechanics with Open Source Tools (/mhb/courses/MV-SAM-86365-K-4/):

Will be provided before the lecture.

Requirements for attendance (informal)

Explicitly addresses all students! Recommended:

Modules:

- [MAT-00-033-M-1] Higher Mathematics: Numerics (for Engineering Students) (M, 4.0 LP) (/mhb/modules/MAT-00-033-M-1/)
- [MV-SAM-101-M-4] Fluid Mechanics II (M, 5.0 LP) (/mhb/modules/MV-SAM-101-M-4/)
- [MV-SAM-137-M-7] Fluid Mechanics III/CFD (M, 3.0 LP) (/mhb/modules/MV-SAM-137-M-7/)
- [MV-SAM-24-M-4] Fluid Mechanics I (M, 5.0 LP) (/mhb/modules/MV-SAM-24-M-4/)

Requirements for attendance (formal)

None

References to Module / Module Number [MV-SAM-276-M-4]

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
[MV-EVT-MPOOL-6 (/mhb/modulepools/MV-EVT-MPOOL-6/)]	Wahlpflichtmodule Energie- und Verfahrenstechnik