

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

[TUK \(https://www.uni-kl.de\)](https://www.uni-kl.de) [MODHB \(https://modhb.uni-kl.de/\)](https://modhb.uni-kl.de/) [Homepage \(/\)](#)

Module EIT-AUT-451-M-4

Modeling and Identification (M, 5.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
EIT-AUT-451-M-4	<i>Modeling and Identification</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	[EN] English
Module Manager	Zhang, Ping, Prof. Dr.-Ing. (PROF DEPT: EIT) (/staff/351/)
Lecturers	Zhang, Ping, Prof. Dr.-Ing. (PROF DEPT: EIT) (/staff/351/)
Area of study	[EIT-AUT] Automation Control
Reference course of study	[EIT-88.781-SG#2010] M.Sc. Electrical and Computer Engineering [2010] (/mhb/FB-EIT/cos-556/)
Lifecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
3V+1U	EIT-AUT-451-K-4 (/mhb/courses/EIT-AUT-451-K-4/)	P	-	PL1	5.0	WiSe

- About [EIT-AUT-451-K-4]: Title: "Modeling and Identification"; Presence-Time: 56 h; Self-Study: 94 h

Examination achievement PL1

- Form of examination: **written exam (Klausur) (120 Min.)**
- Examination Frequency: each semester

Evaluation of grades

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

Contents

From [EIT-AUT-451-K-4] Modeling and Identification (/mhb/courses/EIT-AUT-451-K-4/):

- Definition of systems and subsystems
- Theoretical (first-principle) modelling (set up equations in electrical, mechanical and thermal systems)
- Identification of non-parametric models (step response, impulse response, frequency response)
- Empirical approaches to get transfer functions
- Correlation analysis, random variables and stochastic processes
- Least-squares approaches (performance index, direct solution and recursive solution), weighted least-squares and its property
- Analysis of the performance of least-squares estimates
- Prediction error method
- Instrumental variables approaches
- Subspace identification approaches
- Identification of closed-loop systems
- Model analysis, model validation and model reduction

Competencies / intended learning achievements

After completing this module you can...

- ... carry out mathematical modeling of technical systems by theoretical modeling and by model identification.
- ... explain stepwise abstraction of complex technical systems.
- ... carry out necessary experiments based on experiment planning and calculate system parameters.

Requirements for attendance (informal)

State space models, transfer functions

Modules:

- [EIT-AUT-457-M-4] Fundamentals of Automation (M, 5.0 LP) (/mhb/modules/EIT-AUT-457-M-4/)

Requirements for attendance (formal)

None

References to Module / Module Number [EIT-AUT-451-M-4]

Course of Study	Section	Choice/Obligation
[EIT-88.781-SG#2010] M.Sc. Electrical and Computer Engineering [2010] (/mhb/FB-EIT/cos-556/)	Specialization Modules	[P] Compulsory
[EIT-88.781-SG#2010] M.Sc. Electrical and Computer Engineering [2010] (/mhb/FB-EIT/cos-556/)	Specialization Modules	[P] Compulsory
[EIT-88.?-SG#2021] M.Sc. Electrical and Computer Engineering [2021] (/mhb/FB-EIT/cos-686/)	Major Automation & Control (AUT)	[P] Compulsory
[EIT-88.?-SG#2021] M.Sc. Electrical and Computer Engineering [2021] (/mhb/FB-EIT/cos-686/)	Major Mechatronics (MET)	[P] Compulsory
[EIT-88.?-SG#2021] M.Sc. Automation and Control (A&C) [2021] (/mhb/FB- EIT/cos-676/)	A&C Core Courses	[P] Compulsory