

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

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Module EIT-AUT-453-M-7

Methods of Soft Control (M, 3.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
EIT-AUT-453-M-7	<i>Methods of Soft Control</i>	3.0 CP (90 h)

Basedata

CP, Effort	3.0 CP = 90 h
Position of the semester	1 Sem. in WiSe
Level	[7] Master (Advanced)
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.
2V	EIT-AUT-453-K-7 (/mhb/courses/EIT-AUT-453-K-7/)	P	-	PL1	3.0	WiSe

- About [EIT-AUT-453-K-7]: Title: "Methods of Soft Control"; Presence-Time: 28 h; Self-Study: 62 h

Examination achievement PL1

- Form of examination: **written exam (Klausur) (90 Min.)**
- Examination Frequency: each semester

Evaluation of grades

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

Contents

From [EIT-AUT-453-K-7] **Methods of Soft Control** (/mhb/courses/EIT-AUT-453-K-7/):

- Fuzzy control: fuzzy sets and operators, membership function, fuzzification, fuzzy implication, defuzzification, basic working principle of fuzzy controllers, typical applications.
- Artificial intelligence and its application to control, modelling and diagnosis: supervised learning, unsupervised learning, Back-Propagation algorithm, radial basis function network, self-organizing map, support vector machine, reinforcement learning, training and validation of artificial neural networks, typical application scenarios.
- Genetic algorithms and evolutionary algorithms: stochastic optimization approaches, selection of parameters, application in optimization, application in modelling, control and diagnosis.

Competencies / intended learning achievements

After completing this module you can...

- ... explain the difference between classical control methods and computational intelligence based control methods (such as fuzzy control, artificial intelligence, genetic and evolutionary algorithms).
- ... summarize and explain computational intelligence based control methods and explain their basic ideas, the advantage and the disadvantages.
- ... identify typical application areas of these approaches.
- ... apply these methods to solve specific problems in modeling, control and diagnosis.

Requirements for attendance (informal)

Modules:

- [EIT-AUT-457-M-4] Fundamentals of Automation (M, 5.0 LP) (/mhb/modules/EIT-AUT-457-M-4/)
- [EIT-LRS-504-M-3] Linear Control (M, 5.0 LP) (/mhb/modules/EIT-LRS-504-M-3/)

Requirements for attendance (formal)

None

References to Module / Module Number [EIT-AUT-453-M-7]

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.?-SG#2021] M.Sc. Electrical and Computer Engineering [2021] (/mhb/FB-EIT/cos-686/)	Major Automation & Control (AUT)	[P] Compulsory
[EIT-88.A20-SG#2021] M.Sc. European Master in Embedded Computing Systems (EMECS) [2021] (/mhb/FB-EIT/cos-566/)	Elective Subjects	[W] Elective Module
[EIT-88.?-SG#2021] M.Sc. Automation and Control (A&C) [2021] (/mhb/FB-EIT/cos-676/)	A&C Core Courses	[P] Compulsory
[EIT-88.?-SG#2021] M.Sc. Embedded Computing Systems (ESY) [2021] (/mhb/FB-EIT/cos-677/)	Elective Subjects	[W] Elective Module