

DEPARTMENT OF MECHATRONIC ENGINEERING
COURSE SYLLABUS

Course Details				
Code		Academic Year		Semester
ETE456		4		
Title		T	A	L
System Identification and Intelligent Control		2	1	2
				ECTS
				6
Language	German			
Level	Undergraduate	x	Graduate	Postgraduate
Department / Program	Electric-Electronics Engineering			
Forms of Teaching and Learning	Formal			
Course Type	Compulsory		Elective	x
Objectives	The students acquire basic knowledge of stochastic signals and systems and the basic methods for system analysis, modeling and behavior predictions as well as for system control and optimization.			
Content	Basic identification process, deterministic and stochastic signals, systems and models, methods of least error squares, Kalman filter, Iterative learning control, subspace identification method, nonparametric estimation methods, nonlinear parameter estimation methods, model validation, experiment setup and signal design, introduction to machine learning			
Prerequisites	Signals and systems, digital signal processing			
Coordinator	Asst. Prof. Dr. Sanam Moghaddamnia			
Lecturer(s)				
Assistant(s)				
Work Placement				
Recommended or Required Reading				
Books / Lecture Notes	L. Ljung, System Identification: Theory for the User, (2nd Edition), Prentice Hall, 1999– T.Söderström and P. Stoica, System Identification, Prentice Hall International, 1989.			
Other Sources				
Additional Course Material				
Documents	Lecture slides and exercises			
Assignments				
Exams	Written midterm and final exam			
Course Composition				
Mathematics und Basic Sciences				10 %
Engineering				30 %

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Engineering Design			%
Social Sciences			%
Educational Sciences			%
Natural Sciences			%
Health Sciences			%
Expert Knowledge			60 %
Assessment			
Activity	Count		Percentage (%)
Midterm Exam	1		30
Quiz			
Assignments			
Attendance			
Recitations	14		10
Projects			
Final Exam	1		60
	Total		100
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	47	2	94
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	2	28
Projects			
Final Exam	1	2	2
	Total Work Load		168
	ECTS Points (Total Work Load / Hour)		6
Learning Outcomes			
1	Modeling and system analysis based on measurement data		
2	Planning of test signals to determine the system behavior		
3	Knowledge of system and model structure types		
4	Knowledge of the procedures for identifying parametric and non-parametric models		
5	Model validation		

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6	Intelligent creation of analysis models
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Weekly Content

1	Introduction to system identification and basic identification process, deterministic and stochastic signals
2	Systems and models, identification methods
3	Least Squares Method, Recursive Least Squares Method
4	Kalman Filters (and Extended Kalman Filters)
5	Iterative learner regulation
6	Subspace identification method part 1
7	Subspace identification method part 2
8	Nonparametric Estimation Methods Part 1
9	Nonparametric Estimation Methods Part 2
10	Nonlinear parameter estimation methods part 1
11	Nonlinear parameter estimation methods part 2
12	Model validation
13	Experiment setup and signal design
14	Introduction to machine learning
15	

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1							
2							
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11							
12							
Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High						
Compiled by:	Sanam Moghaddamnia						
Date of Compilation:	15.03.2020						