

## Module Description IPE ASM

Official data		
Course of studies	Field of study	Specialisation
International Program in Engineering	Production Systems Engineering	-

Description of module	Language	No. of module	Version	Responsible person of module
Automation Systems Engineering	English	T3IPE001	0002	Dr. Hisham ElMoquet Dr. Christian Kuhn, Dr. Andreas Schramm Dr. Tamas Ladics
Automation Systems Engineering				

Placement of modules on studies			
Semester	Precondition for participation	Type of module	Duration of module
1.	- no formal -	Local Profile Module	1 Semester

Used learning and examination methods			
Teaching and learning methods	Examination performance	Graded yes/no	Duration of examination
Methods: Lecture, Seminar	<ul style="list-style-type: none"> <li>▪ Exam (written or attestation/group work) and/or</li> <li>▪ Rated Seminar (presentation, poster, documentation)</li> </ul>	<ul style="list-style-type: none"> <li>▪ yes</li> </ul>	<ul style="list-style-type: none"> <li>▪ 60 min</li> </ul>

Workload und ECTS			
Workload (per h, a multiple of 30)	In total: (divided in)	150 h	ECTS: 5
	1. Attendance time (lecture and examination time)	56 h	-
	2. self-learning	94h	-

Intention of qualifications and competences	
Professional qualifications:	<ul style="list-style-type: none"> <li>- Learn and understand about key concepts, methods, processes, technologies, and systems in Automation Systems &amp; Processes</li> <li>- Understand the importance of integrating the human into the information flow and the proper use of information technologies</li> <li>- Identify and discuss new trends and concepts in automating processes and industrial engineering</li> <li>- Get to know and practice simulation-based approaches in automation engineering</li> </ul>
Social and ethical competence:	<ul style="list-style-type: none"> <li>- Understand how to solve problems in automation management with a team-based approach and intensive use of appropriate tools and procedures in information &amp; simulation management</li> </ul>
Personal competence:	<ul style="list-style-type: none"> <li>- Understand and discuss the engineering concepts and be able to transfer the knowledge to projects in the practice of companies</li> </ul>
Comprehensive professional competence:	<ul style="list-style-type: none"> <li>- Apply and combine knowledge in automation, engineering, computer sciences in order to solve problems and to support decisions</li> <li>- Be able to discuss comprehensive challenges with field experts</li> </ul>
<b>Feature</b>	

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**Prerequisites:**

- Basics in computer science/information management
- Principles of math (complex number theory, integral calculus)
- Signals and devices / system`s theory
- Electronics/electrical engineering
- Mechanical engineering
- automation & components in automation

<b>Learning units and contents</b>			
<b>Teaching and learning units</b>		<b>Attendance time h</b>	<b>Self-learning h</b>
<b>(teaching and learning unit 1):</b>	<b>Extended Concepts in Automation</b>	<b>24</b>	<b>30</b>
<b>English Term:</b>	<b>Extended Concepts in Automation</b>		
<b>Content</b> (non-binding guideline)			
<ul style="list-style-type: none"> <li>- Basic Concepts/Repetition: Automation Pyramid, Components, Sensors/Actors, Control Engineering, Market Overview</li> <li>- Shop Floor Interfaces: Field Bus Systems, OPC, WebServices/SOA</li> <li>- Human-Machine-Interfaces: SCADA, Work Instructions</li> <li>- Automatic Identification: Barcodes, RFID/NFC, Smart Items</li> <li>- Trends: Big Data/Smart Data, Industry 4.0</li> </ul>			
Didactic Concept: Flipped Classroom (seminars by students)			
<b>Literature</b>			
<ul style="list-style-type: none"> <li>- Heibold, Einführung in die Automatisierungstechnik Automatisierungssysteme, Komponenten, Projektierung und Planung, Hanser 2013</li> <li>- Langmann, Taschenbuch der Automatisierung, Hanser 2010</li> <li>- Bauernhansl, Thomas, ten Hompel, Michael, Vogel-Heuser, Birgit (Hrsg.) Industrie 4.0 in Produktion, Automatisierung und Logistik (Springer 2014)</li> </ul>			

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<b>(teaching and learning unit 2):</b>	<b>'Integrated Industry': Seminar and Excursion</b>	<b>8</b>	<b>18</b>
<b>English Term:</b>	<b>'Integrated Industry': Seminar and Excursion</b>		
<b>Content</b> (non-binding guideline)			
<ul style="list-style-type: none"> <li>- Excursion to Hannover Fair (&gt;= 1 day)</li> <li>- Introduction to Seminar goals, Self-Guided Tour</li> <li>- Reports &amp; Summary</li> </ul>			
<b>Literature</b>			
<ul style="list-style-type: none"> <li>- <a href="http://www.hannovermesse.de/en">http://www.hannovermesse.de/en</a></li> </ul>			

<b>(teaching and learning unit 3):</b>	<b>Simulative Engineering</b>	<b>25</b>	<b>25</b>
<b>English Term:</b>	<b>Simulative Engineering</b>		
<b>Content</b> (non-binding guideline)			
<ul style="list-style-type: none"> <li>- Software-based Modeling, Simulation and Visualization (of Technical Processes)</li> <li>- Discrete Fourier Transform</li> <li>- Physical and Mathematical Models, Basics of Simulation Technology (solvers for ordinary differential equations)</li> <li>- Practice/Examples with MATLAB/Simulink</li> </ul>			
<b>Literature</b>			
<ul style="list-style-type: none"> <li>- Moore: MATLAB for Engineers, Pearson</li> <li>- Hayes: Digital Signal Processing, Schaum's Outline series, McGraw-Hill books</li> <li>- Hwei: Signals and Systems, Schaum's Outline series, McGraw-Hill books</li> <li>- Tyagi: Matlab and Simulink for engineers, Oxford university press</li> <li>- Dabney: Mastering Simulink, Pearson Prentice Hall</li> <li>- Oppenheim: Discrete-time signal processing, Pearson</li> <li>- Vaseghi: Advanced signal processing and digital noise reduction, Teubner</li> </ul>			