TECHNISCHE HOCHSCHULE LÜBECK

Module: Secure Networked Control Systems

Level	Master	**Short Name**	SNCS
Responsible Lecturers	Oliver Stecklina, Prof. Dr.		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Applied Information Technology, Master		
Compulsory/elective	Elective	**ECTS Credit Points**	5
Semester of Studies	2	**Semester Hours per Week**	4
Length (semesters)	1	**Workload (hours)**	150
Frequency	WiSe	**Presence Hours**	60
Teaching Language	German/English	**Self-Study Hours**	90

The following section is filled only if there is **exactly one** module-concluding exam.

Exam Type	Oral Exam	**Exam Language**	German/English
Exam Length (minutes)	30	**Exam Grading System**	
Learning Outcomes	After successfully completing the course, students will be able to: • explain the basic terms of network security and classify them in the area of industrial control systems, • structure attack techniques and name possible countermeasures, • analyze and evaluate industrial systems with regard to possible weaknesses and vulnerabilities, • evaluate and implement countermeasures for industrial control systems taking into account the fields of application, and integrate reactive and preventive IT security measures into industrial control networks.		
Participation Prerequisites			

The previous section is filled only if there is **exactly one** module-concluding exam.

Consideration of Gender and Diversity Issues	✔ Use of gender-neutral language (THL standard) ✘ Target group specific adjustment of didactic methods ✔ Making subject diversity visible (female researchers, cultures etc.)
Applicability	The module can be used within the master of computer science.
Remarks	

TECHNISCHE HOCHSCHULE LÜBECK

Module Course: Secure Networked Control Systems (Lecture)

(of Module: Secure Networked Control Systems)

Course Type	Lecture	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	3
Participation Limit		**Semester Hours per Week**	3
Group Size		**Workload (hours)**	90
Teaching Language	German/English	**Presence Hours**	45
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	45
SL Length (minutes)		**SL Grading System**	

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents

With the introduction of Industry 4.0, the security of networked control systems is becoming increasingly important. Such a system can only be effectively used by a company in an industrial environment if the data generated by the system is reliable or it can be guaranteed that commands to the system will arrive unaltered and will also be executed as required.

The module deals with possible scenarios that arise with the increasing networking and autonomy of systems and gives solutions to install security in such a system or to develop secure systems,

Part 1: Basics of network security
- Basic terms of IT security
- Attacks and countermeasures in communication networks

Part 2: Information Security Management Systems (ISMS)
- Safety Analysis
- Security Management

Part 3: Industrial control technology
- Basics
- Security Analysis
- Attack Models

Part 4: Preventive and reactive safety in industrial control technology
- Firewalls
- Intrusion detection

	• Patch Management
Literature	In German: [1] Heinrich Kersten, IT-Sicherheitsmanagement nach der neuen ISO 270001; Springer 2016 [2] Claudia Eckert: IT-Sicherheit; De Gruyter 2018 [3] Michael Kofler und Andre Zingsheim et.al.: Hacking & Security. Das umfassende Handbuch; Rheinwerk 2018 [4] Matthias Seitz: Speicherprogrammierbare Steuerungen für die Fabrik- und Prozessautomation: Strukturierte und objektorientierte SPS-Programmierung, Motion Control, Sicherheit, vertikale Integration; Hanser 2012 [5] BSI: ICS-Securit Kompendium; BSI 2013
Remarks	

Module Course: Secure Networked Control Systems (Practical Training)

(of Module: Secure Networked Control Systems)

Course Type		**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	2
Participation Limit		**Semester Hours per Week**	1
Group Size	12	**Workload (hours)**	60
Teaching Language	German/English	**Presence Hours**	15
Study Achievements ("Studienleistung", SL)	Practical Training	**Self-Study Hours**	45
SL Length (minutes)		**SL Grading System**	Pass

The following section is filled only if there is a course-specific exam.

Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			

The previous section is filled only if there is a course-specific exam.

Contents	In this practical training, the knowledge of the lecture should be deepened in practical examples. Be in group work • Network protocols of industrial control systems will be analyzed, • Network filter will be set up, and Procedures for secure patch management will be implemented.
Literature	
Remarks	