# **Course Introduction to Fieldbus Systems**

Course

Meets requirements of following modules(MID) **Course Organization** Assessment Course components Lecture/Exercise Lab

Responsible: Prof. Dr. Rainer Bartz

# Course

# Meets requirements of following modules(MID)

- in active programs
  - Ba ET2012 FG
  - Ba ET2010 FG
  - Ba TIN2012 FG
  - Ba TIN2010 FB1
  - Ma Mechatronik FG

# **Course Organization**

Version		Course identifiers		
created	2013-06-20	Long name	Introduction to Fieldbus Systems	
VID	1	CID	F07_FG	
valid from	WS 2012/13	CEID (exam identifier)		
valid to				

Contact hours per week (SWS)		Total contact hours	
2	Lecture	30	Exercise (unspli
	Exercise (unsplit)	$\square$	Exercise (split)
1	Exercise (split)	15	Lab
1	Lab	15	Project
	Project		Seminar
	Seminar		
	Tutorial (voluntary)		
	<u> </u>	2 Lecture Exercise (unsplit) 1 Exercise (split) 1 Lab Project Seminar	2Lecture302Exercise (unsplit)11Exercise (split)151Lab15Project1

Max. capacity				
Exercise (unsplit)				
Exercise (split)	30			
Lab	8-12			
Project				
Seminar				

#### Total effort (hours): 150

### Instruction language

- German, 95%
- English, 5%

#### **Study Level**

Undergraduate

#### **Prerequisites**

- basic programming skills, incl.: for, while, if, switch
- data types in programming languages

### **Textbooks, Recommended Reading**

- eigenes Skript / own script
- Schnell, G.: Bussysteme in der Automatisierungstechnik, Vieweg
- Zimmermann, W.; Schmidgall, R.: Bussysteme in der Fahrzeugtechnik, Vieweg

#### Instructors

• Prof. Dr. Rainer Bartz

### **Supporting Scientific Staff**

• tba

#### **Transcipt Entry**

Introduction to Fieldbus Systems

#### Assessment

Туре		
wE	written exam	

Total effort [hours]				
wE	10			

Frequency: 2/year

# **Course components**

# Lecture/Exercise

#### **Objectives**

#### Contents

- topologies in communication networks: point-to-point, line, ring, star
- notations in communication standards: service description, sequence diagram, state chart (Mealy-type)
- ISO/OSI reference model: layer, encapsulation, functionality, service types (peer-to-peer, local), PDU-SDU-PCI-ICI, connection-oriented and connectionless communication
- bit coding: digital (NRZ, PRZ, BiPhase-L, DPLM,...), analog (ASK, FSK, PSK, ...)
- physical layer definitions of RS-232, RS-485
- error detection: parity, block codes, checksum, CRC, ...
- media access schemes: master/slave, token, CSMA/CD, CSMA/CA, ...
- PhL and DLL of CAN (controller area network): content-based adressing, arbitration, error detection, standard vs. extended CAN, bit timing, fault management, acknowledge mechanism, services and protocols

#### **Acquired Skills**

- students acquire fundamental knowledge on industrial communication systems
- they understand how communication standards are specified and can apply them to given tasks
- they understand fundamental concepts in the physical layer and can apply coding standards to create and analyze corresponding signal traces
- they understand data link layer functionality and can explain media access and error correction algorithms
- they know about all relevant aspects of CAN as a representative for industrial communications

# **Operational Competences**

- students can apply widespread error detection algorithms
- they can specify functionality and services of layers, using standard notation
- they are able to analyze protocols and extract information from data streams
- they are able to create protocol compliant data streams for transmitting specific information

#### **Additional Component Assessment**

Туре

fPS supervised/assisted problem solving

Contribution to course gradefPSnot rated

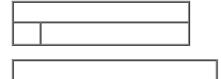
Frequency: 1/year

Lab

**Objectives** 

Contents

- microcontroller platform for fieldbus implementation
- developmeno to dugg our dentbeed talged says grames yed ng w dnt dl
- programming in C language for systems without OS
- performing CAN communication from a microcontroller program
- microcontroller arch er epassi bl be



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