Hochschule München
University of Applied Sciences

Fakultät für Elektrotechnik und Informationstechnik
Faculty of Electrical Engineering and Information Technology

Bachelor of Electrical Engineering and Information Technology

11.02.2016

Kommunikation (040) (English Workshop)

Modul

Module Name	Kommunikation (040)
Module Level	Bachelor
Credit Points per Module	4
Module Coordinator	Dr. Peter Klein

General Information about the Module

German Title	English Workshop
English Title	English Workshop
Code	EG311 – Compulsory Subject
Semester	4
Frequency of C. Offer	normally every semester
Credit Points per Course	2
Course Coordinator	Dr. Peter Klein
Hours per Week	2
Teaching Method	2 PR
Workload	28 PR + 32 preparation/post-processing = 60 hours
Language	englisch
Degree Programs	EI/RE/EM
Media	Multimedialer Einsatz von Videokamera, Dokumentenkamera, Computer, video projector, e-learning, Touchscreen

Lecturers

Wolfgang Braatz, Joyce McLean, Dipl.- Dolmetscher Tim Howe, Michael Drahota, Pamela Anne Price, Eric DEntremont, Prof. Dr. Nicole Brandstetter

Recommended Requirements

Einige Jahre Englisch als Fremdsprache in der Schule oder mindestens B1 (Gemeinsamer Europäischer Referenzrahmen)

Module Objectives and Planned Learning Outcomes

Contents

Literature
PONS: Collins/Klett: Großwörterbuch. D-E/E-D in 1 Band.
Macmillan: English Dictionary for advanced learners (American English Edition, Paperback with CD-ROM or British English Edition, Paperback with CD-ROM).
Oxford Advanced learner's dictionary (Oxford University Press / Cornelsen software PC-CD-ROM).
Merriam-Webster's collegiate dictionary.
Murphy, R.: English grammar in use: A self-study reference and practice book for intermediate students. With answers. Cambridge University press.
http://dict.leo.org/
http://dict.tu-chemnitz.de
de.pons.eu
www.linguee.com

Examination

Course Work Certificate: gemäß Vorgabe für laufendes Semester
Method and Duration of Examination: schriftliche Prüfung, 90 min (zählt anteilig zum Modul Kommunikation)
Mandatory Requirements: please see StPO

Advanced Analog Circuit Design

Modul

Module Name	Advanced Analog Circuit Design
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Reinhold Unterricker

General Information about the Module

German Title	Advanced Analog Circuit Design
English Title	Advanced Analog Circuit Design
Code	WF033 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	on demand, no fixed turn
Credit Points per Course	5
Course Coordinator	Dr. Reinhold Unterricker
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours hours
Language	Englisch oder Deutsch
Degree Programs	EI/RE/EM
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Christian Münker, Dr. Reinhold Unterricker

Recommended Requirements

Grundlegende Kenntnisse von CMOS- und Bipolartransistoren, Operationsverstärkern; Analysemethoden für elektrische Netzwerke, Schaltungssimulation (Basic knowledge of CMOS and bipolar transistors, operational amplifiers, analysis methods for electrical networks, circuit simulation)

Module Objectives and Planned Learning Outcomes

The students acquire the ability to analyze and understand discrete and integrated analog circuits. They know state of the art and advanced design techniques and understand the key parameters of commercial integrated circuits. They learn to read circuit diagrams of selected electronic circuits and to assess the circuit behaviour in practical applications. Typical analog functional blocks like filters and analog-to digital converters are analyzed in depth.

Contents

Review of electronic components Modeling and simulation Fundamental circuit techniques Amplifiers Operational amplifiers Data converters Active filters

Literature

Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer: Analysis and Design of Analog Integrated Circuits. John Wiley & Sons, 5. edition (international student version), 2010.
Willy M. C. Sansen: Analog Design Essentials. Springer, 2006.
Behzad Razavi: Design of Analog CMOS Integrated Circuits. McGraw-Hill Higher Education, 2003.
Ulrich Tietze, Christoph Schenk, Eberhard Gamm: Electronic Circuits: Handbook for Design and Application. Springer, 2008.

Examination

Course Work Certificate: please see StPO
Method and Duration of Examination: written examination / written exam (duration 90 min)

Mandatory Requirements: please see StPO

Digitale Signalverarbeitung

Modul

Module Name	Digitale Signalverarbeitung
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Christoph Rapp

General Information about the Module

German Title	Digitale Signalverarbeitung
English Title	Digital Signal Processing
Code	EI612 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	normally in summer semester
Credit Points per Course	5
Course Coordinator	Dr. Christoph Rapp
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Deutsch oder Englisch
Degree Programs	EI
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Christoph Rapp, Dr. Thomas Michael, Dr. Arne Striegler

Recommended Requirements

Signale und Systeme, Algorithmen und Datenstrukturen, Programmieren

Module Objectives and Planned Learning Outcomes

Students will master the basic analytical methods of digital signal processing, in particular the analysis and design of discrete-time systems (filters) in the time and frequency domain and the application of the Discrete Fourier Transform (FFT / DFT).
Students will learn and master the standard methods of design and implementation of digital filters. For specific tasks and certain constraints (e.g. technology issues), the students are able to select and to synthesize appropriate filter structures by using numerical tools, such as MATLAB. In addition, students can implement simple signal processing algorithms on a Signal Processor by means of a "C"language-based development environment.

Contents

Analysis of discrete-time signals and systems in time and frequency domain, sampling and reconstruction, DFT / FFT, difference equation, discrete convolution, z-transform, stability and complexity considerations. Specific applications of the DFT / FFT (short-term DFT, spectrogram, effects of different window functions). Design of Digital FIR and IIR filter (standard design methods, bilinear transform, realization structures for minimized computational effort or for robustness against numerical errors, IIR realization in the 2nd order sections-form). Special filters (allpass filter, differentiator, Hilbert filter, Nyquist filter). Basics of sample rate conversion (interpolation, decimation). Computer exercises using MATLAB / SIMULINK and labs with signal processor evaluation kit and C/C++ development environment.

Literature

D. v. Grünigen, Digitale Signalverarbeitung, Hanser Verlag, München, 2001
M. Werner, Digitale Signalverarbeitung mit MATLAB, Grundkurs mit 16 ausführlichen Versuchen; Vieweg/Teubner, 2012
H. Götz, Einführung in die digitale Signalverarbeitung, 3. Auflage, B.G.Teubner, Stuttgart 1998

K.D. Kammeyer, K. Kroschel, Digitale Signalverarbeitung: Filterung und Spektralanalyse mit MATLAB-Tutorialen, 5. Auflage, Teubner Studienbücher, 2002 (z.Vertiefung)
A.V. Oppenheim, R.W. Schafer, J.R. Buck, Zeitdiskrete Signalverarbeitung, 2. Auflage, Pearson Studium, 2004 (z. Vertiefung, aktuelle Auflage ausverkauft!)
A.V. Oppenheim, R.W. Schafer, J.R. Buck, „Discrete Time Signal Processing“, Third Edition, Pearson New Int. Ed., 2007/20013
E.C. Ifeachor, B.W. Jervis, Digital Signal Processing - A Practical Approach, Addison-Wesley, 2001
Steven W. Smith , The Scientist and Engineer's Guide to Digital Signal Processing, California Technical Publishing, 1999, http://www.dspguide.com

Examination

Course Work Certificate: Laboratory practical Digitale Signalverarbeitung
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO

Echtzeitbetriebssysteme

Modul

Module Name	Echtzeitbetriebssysteme
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Rainer Seck

General Information about the Module

German Title	Echtzeitbetriebssysteme
English Title	Realtime Operating Systems
Code	EI723 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	normally in summer semester
Credit Points per Course	5
Course Coordinator	Dr. Rainer Seck
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Deutsch oder Englisch
Degree Programs	EI
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Egon Sommer, Dr. Rainer Seck

Recommended Requirements

Grundlagen Programmieren, Digitaltechnik, Digitale Schaltwerke, Mikrocomputer

Module Objectives and Planned Learning Outcomes

Knowledge about the application, structure and functionality of selected realtime systems, fieldbuses and realtime operation systems. Knowledge about fundmentals to reliableness and safety. Knowledge about concepts of and methods in checking realtime conditions. Ability to master realtime verification tasks. Knowledge about otions to specify concurrent processes. Ability to design and to implement simple application-oriented software for realtime systems.

Contents

Introduction: terminology, classification of technically processes
Realtime operation: Requirements, structure, task management, threads, memory management, i/o-Systems
Scheduling strategies: static versus dynamic scheduling, first come first serve, round robin, deadline scheduling, sporadic scheduling,rate-monotonic scheduling.
Process data I/O transfer and connectio to realtime system: Memory mapped i/o, digital and analog I/O, polling versus interrupt transfer, DMA, dual ported RAM.
Introduction to fieldbusses: CAN, PROFIBUS/-NET, Realtime Ethernet e.g. EtherCAT.
Basics about reliableness and safety.
Tools for software engineering:state diagram, Petri net, programming languages, control flow, critical sections, priority inversion, events, signals, inter process communication (shared memory, sockets, pipes, message queues), event versus time triggered programming

Literature

IEEE 1003.1-2008
Peter Marwedel, Eingebette Systeme, Springer Berlin; Auflage: 1., Aufl. 2007. Korr. Nachdruck (28. Februar 2007)
Giorgio Buttazzo, Hard Real-Time Computing Systems, Springer 2nd ed., 2005

Dieter Zöbel, Echtzeitsysteme: Grundlagen der Planung, Springer Berlin; Auflage: 1, 2008

Examination

Course Work Certificate: Laboratory practical Echtzeitbetriebsysteme
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO

Embedded Systems

Modul

Module Name	Embedded Systems
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Alfred Irber

General Information about the Module

German Title	Embedded Systems
English Title	Embedded Systems
Code	EI621 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	normally in summer semester
Credit Points per Course	5
Course Coordinator	Dr. Alfred Irber
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Deutsch oder Englisch
Degree Programs	EI
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Alfred Irber, Dr. habil. Alfred Schöttl, Dr.-Ing. Gerhard Schillhuber

Recommended Requirements

Digitaltechnik, Digitale Schaltwerke, Mikrocomputer, Programmieren

Module Objectives and Planned Learning Outcomes

Objectives/learning outcome: - Knowledge of the structure of typical complex microcontrollers in embedded systems and of appropriate software development tools - Evaluation of appropriate measurement procedures and methods, skills in conception and realization of technical systems via embedded systems - Knowledge of the principal concepts of a real time operating system - Skills in handling of simulation tools - Competent validation of operating-safety and -reliability

Contents

Microcontroller: - Structure of the core of a modern microcontroller - Kinds of memory, address spaces and stack organization - Kind and complexity of peripheral components integrated on the chip - Kinds of interrupts and its handling
Development tools: - Features of a higher level programming language for microcontroller applications - Tools for testing and simulation - Features and usage of a simple real time operating system
Project work: - Practical exercise on microcontroller based system with successive extension of system complexity

Literature

Microcontroller C164 Family 16-Bit Single-Chip Microcontroller, Edition 2002-02, Published by Infineon Technologies AG, München.
Klaus, Rolf: Der Mikrokontroller C167, vdf Lehrbuch Elektrotechnik, 2. überarb. Aufl. 2005, VDF Hochschulverlag, ISBN 9783728130303.
John Catsoulis, Designing Embedded Hardware, O´Reilly Media, 2005.
Thomas Eißenlöffel: Embedded-Software entwickeln, 1. Auflage 2012, dpunkt.Verlag GmbH, Heidelberg.
Michael Haßelberg, Embedded Linux in der Mikrocontrollerpraxis, Elektor-Verlag GmbH, 2009, Aachen.

Examination

Course Work Certificate: Laboratory practical Embedded Systems
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO

Embedded Systems mit Simulink

Modul

Module Name	Embedded Systems mit Simulink
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Alfred Irber

General Information about the Module

German Title	Embedded Systems mit Simulink
English Title	Embedded Systems with Simulink
Code	WF019 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	on demand, no fixed turn
Credit Points per Course	5
Course Coordinator	Dr. Alfred Irber
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Englisch
Degree Programs	EI/RE/EM
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Alfred Irber

Recommended Requirements

Bereitschaft zur Einarbeitung in Matlab/Simulink, Physikalische Grundkenntnisse, Kenntnisse einer Programmiersprache (z.B. C oder C++)

Module Objectives and Planned Learning Outcomes

The student will be gently introduced step by step to Matlab/Simulink. He will get an overview of the methods and procedures of model based software development with Matlab/Simulink in the automotive area. For that purpose the necessary practical and theoretical skills are imparted by the development of a concrete electronic control unit (ECU). After finishing the course the students should be able to design and implement electronic control units.

Contents

Modeling and simulation of the physical model of a racing car with Matlab/Simulink Automatic code generation (C-code) with Real-Time-Workshop Implementing of the generated software on a microcontroller Presentation and realization of different methods of verifications (software-in-the-loop, hardware-in-the-loop) Real time simulation of a car racing with dSpace-ControlDesk

Literature

A. Angermann, M. Beuschel, M. Rau, U. Wohlfarth, Matlab - Simulink - Stateflow: Grundlagen, Toolboxen, Beispiele, Oldenbourg Wissenschaftsverlag, 2011
W.D. Pietruszka, Matlab und Simulink in der Ingenieurpraxis: Modellbildung, Berechnung und Simulation, View-eg+Teubner Verlag, 2011
A. Bosl, Einführung in Matlab/Simulink: Berechnung, Programmierung, Simulation, Carl Hanser Verlag, 2011

Examination

Course Work Certificate: Laboratory practical Embedded Systems mit Simulink
Method and Duration of Examination: written examination, 90 min

Mandatory Requirements: please see StPO

Fieldbus Systems

Modul

Module Name	Fieldbus Systems
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Egon Sommer

General Information about the Module

German Title	Fieldbus Systems
English Title	Fieldbus Systems
Code	WF005 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	on demand, no fixed turn
Credit Points per Course	5
Course Coordinator	Dr. Egon Sommer
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Englisch
Degree Programs	EI/RE/EM
Media	video projector, Blackboard, Overheadprojector, e-learning

Lecturers

Dr. Egon Sommer

Recommended Requirements

Fundamentals in Electrical Engineering, Basics in Programming, English Workshop

Module Objectives and Planned Learning Outcomes

Fundamental knowledge of communication principles. Understanding the basics of existing fieldbus solutions in manufacturing and vehicles. The students are able to understand and apply fieldbus systems to various technical systems (e.g., automation, vehicles). The students can configure and operate fieldbus systems.

Contents

Application fields of Fieldbuses in automation and vehicles. Fundamentals of communications systems, ISO/OSI reference model. Specifications of actual fieldbusses and application for manufacturing industry and use in vehicles. Seminar on actual developments in realtime networks. Configuration and operation of fieldbusses. Hands on experience and practical exercises in the lab.

Literature

Schnell G.: Bussysteme in der Automatisierungs- und Prozesstechnik, Vieweg Verlag, Wiesbaden, 2008 (in German)
Zimmermann W., Schmidgall, R.: Bussysteme in der Fahrzeugtechnik - Protokolle, Standards und Softwarearchitektur, Vieweg+Teubner, Wiesbaden, 2010 (in German)

Examination

Course Work Certificate: Laboratory practical Fieldbus Systems
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO

Network Security

Modul

Module Name	Network Security
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Manfred Paul

General Information about the Module

German Title	Network Security
English Title	Network Security
Code	WF009 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	on demand, no fixed turn
Credit Points per Course	5
Course Coordinator	Dr. Manfred Paul
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Englisch
Degree Programs	EI/RE/EM
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Manfred Paul

Recommended Requirements

Grundlagen Programmieren, Computernetze (siehe auch Details unter Inhalt), English Workshop

Module Objectives and Planned Learning Outcomes

Contents

Literature

Caswell, Hewlett; Snort Users Manual, www.snort.org
Fyodor; nmap Documentation, http://www.insecure.org/nmap.html
Gerloni et.al; Praxisbuch für Linux-Server und -Netze; Hanser Verlag
Kyas, a Campo; IT-Crackdown, Sicherheit im Internet, mitp Verlag
Nash et. al; PKI, E-Security implementieren, mitp Verlag
Northcutt et. al; Inside Network Perimeter Security, New Riders
Northcutt, Novak; Network Intrusion Detection, New Riders
Peterson, Davie; Computer Networks, Morgan Kaufman, dt. Ausgabe bei Dpunkt
Plate; Sicherheit in Computernetzen, http://www.netzmafia.de/skripten/index.html
Russell et. al; Hack Proofing Your Network: Internet Tradecraft, syngress Publishing
Schneier; Secrets and Lies, John Wiley and Sons, dt. Ausgabe bei DPunkt
Schneier; Applied Cryptography, John Wiley and Sons, dt. Ausgabe bei Addison Wesley

Examination

Course Work Certificate: Laboratory practical Network Security
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO

Sichere Nachrichtenübertragung

Modul

Module Name	Sichere Nachrichtenübertragung
Module Level	Bachelor
Credit Points per Module	5
Module Coordinator	Dr. Arne Striegler

General Information about the Module

German Title	Sichere Nachrichtenübertragung
English Title	Reliable Communication Techniques
Code	EI714 – Required Elective Subject
Semester	6/7
Frequency of C. Offer	normally in summer semester
Credit Points per Course	5
Course Coordinator	Dr. Arne Striegler
Hours per Week	4
Teaching Method	3 SU + 1 PR
Workload	42 SU + 14 PR + 94 preparation/post-processing = 150 hours
Language	Deutsch oder Englisch
Degree Programs	EI
Media	blackboard, flipchart, overhead projector, video projector, e-learning

Lecturers

Dr. Arne Striegler

Recommended Requirements

Signale und Systeme, Wechselstromnetze

Module Objectives and Planned Learning Outcomes

to be done

Contents

to be done

Literature

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Examination

Course Work Certificate: Laboratory practical Sichere Nachrichtenübertragung
Method and Duration of Examination: written examination, 90 min
Mandatory Requirements: please see StPO