

Courses Winter Term 20/21 - Kai Müller

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Hochschule Bremerhaven / University of Applied Sciences Bremerhaven



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² <http://www.oasis-open.org/docbook/>

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Courses Winter Term 2020/21

The following pages contain preliminary information on courses for the winter term 2020/21. Please inform [me](mailto:kmueller@hs-bremerhaven.de)¹ about mistakes or missing links.

All informations and course documentation can be accessed on these official pages. Announcements and changes of the schedule are made *only* here.

The pages are also available for printing ([PDF download](#))². The printed version may be slightly outdated.

¹ <mailto:kmueller@hs-bremerhaven.de>

² [assets/kmw21.pdf](#)

2

Bachelor Courses of Kai Mueller

[modules for *bachelor* programs]

- no bachelor courses in this term -

2.1. Wahlveranstaltungen im Wintersemester 2020/21 von Kai Müller (optional courses)

The module "[ES-MED](#)" ([Medical Systems](#)) may be selected by other master students as optional course. This course is mandatory for the master *ESD* (Embedded Systems Design).

The course language will be English.

3

Graduate Preparation Courses of Kai Mueller

[modules for *graduate preparation* programs]

3.1. Digital Systems / Microcontrollers [PR-DIGSM]

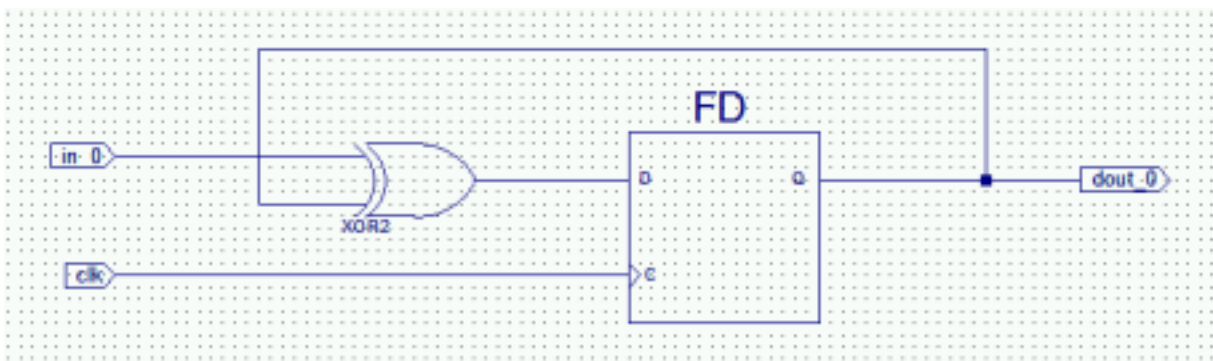


Table 3.1. Organization Digital Systems / Microprocessors

NEWS	<p>Expected start of course is Tuesday, October 27, 2020.</p> <p>This is an online course over the web.</p> <p>Later in semester some labs might be offered on real hardware in Univ. Bremerhaven.</p> <p>Please register on "elli"¹.</p> <p>Optional course for technical bachelors on request.</p>
Study Program	Graduate Preparation Semester [PRS]
Course Language	English
Mandatory Lab Reports	t.b.s.
Exam	at the end of the course (including lab report)
Credits	equivalent to 3 ETCS credits
Module Type	class: 1 hour/week lab: 1 hour/week

¹ <https://elli.hs-bremerhaven.de/>

Lecturer	Prof. Dr. Kai Mueller
Start of Course	Tuesday, Oktober 27, 2020, 14:15h, online
End of Course	Tuesday, February 09, 2021
Class/Lab Dates	Class/Lab: Tuesday, <i>block 4 (14:00h)</i> , online/room Z1090
Documents	====>> Course documentation (class & labs) ² PicoBlaze Atlys Port Definitions ³ [PicoBlaze User's Guide] ⁴ © Xilinx Corp. [PicoBlaze Instruction Set Summary] ⁵ © Xilinx Corp. [PicoBlaze Instruction Set Reference] ⁶ © Xilinx Corp.
Exams	====>> [PR-DIGS Sample Test] ⁷ ====>> [PR-DIGS Sample Test Solutions] ⁸ check this later!



3.1.1. Course contents

- Binary Numbers and Computation
- Combinational Logic / Boolean Logic
- Digital Circuits and Design Rules
- Sequential Logic / Flip-Flops
- Microprocessor Architectures
- Microprocessor Programming / Assembly, C

3.1.2. Complimentary Documentation

Heesel, N. und W. Reichstein: Mikrocontroller Praxis.
Vieweg, 1996

Limbach, S.: Kompaktkurs Mikrocontroller.
Vieweg, 2002

Raisonance 80C51 and XA Development Tools Manual.
Raisonance S.A., 2000

K. Urbanski u. R. Woitowitz: Digitaltechnik.
Springer, 2000

J. Wakerly: Digital Design: Principles and Practices.

² ../Skript/digsmpr_all.pdf

³ ../VHDL/AtlysPico_Ports.pdf

⁴ ../VHDL/ug129.pdf

⁵ ../VHDL/PB_Instr_Sum.pdf

⁶ ../VHDL/PB_Instr_Ref.pdf

⁷ ../Klausur/prsdig15_sample.pdf

⁸ ../Klausur/prsdig15_solutions.pdf

Prentice-Hall, 1999

Xilinx ISE Users's Guide.
Xilinx Corp., 2012

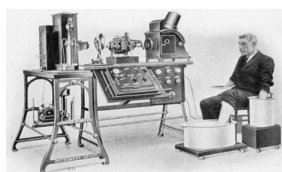
Xilinx Vivado Users's Guide.
Xilinx Corp., 2014

4

Master Courses of Kai Mueller

[modules for *master* programs]

4.1. Medical Systems [ES-MED / ESD2]




© Texas Instruments¹

Table 4.1. Organization Medical Systems

NEWS	<p><i>Start of course is Tuesday, October 27, 2020.</i></p> <p><i>This is a "hybrid" course (over the web and labs in Univ. Bremerhaven).</i></p> <p><i>Please register on "elli"².</i></p> <p><i>Labs will start on Thursday, Oct. 29.</i></p> <p>Mandatory/optional course for ESD, optional course for other technical masters</p>
Study Program	Master Embedded Systems Design [ESD2]
Course Language	English
Mandatory Lab Reports	<p>1. FFT algorithm programming (Java) with graphical output (jChard2D) The report must include a description of algorithm implementation and the results. The FFT should work with any $N=2^n$ samples (powers of two). <i>Deadline for submission: December 17, 2020.</i> <i>Missing this deadline will result in fail grading for the lab part ES-MED.</i></p> <p>2. CORDIC sine/cosine FPGA (lab #15a)</p>
Exam (1.)	t.b.s. (written exam)
Exam (2.)	t.b.s. (written exam)
Credits	5
Module Type	class: 2 hours/week

¹ <http://www.ti.com/>

² <https://elli.hs-bremerhaven.de/>

	lab: 2 hours/week
Lecturer	Prof. Dr. Kai Mueller
Start of Course	Tuesday, October 27, 2020, 10:30h, (online)
End of Course	Thursday, January 23, 2020
Class/Lab Dates	Organized on "elli" ³ .
Documents (fairly complete)	[course documentation] ⁴ [ANN doc (© material)] ⁵ YES, YOU WILL NEED THEM ALL FOR PASSING THE LAB!!!
 Exams	[ES-MED topics] ⁶ ==>> [ES-MED Sample Test] ⁷ ==>> [ES-MED Sample Test Solutions] ⁸

4.1.1. Course contents

- Physiology Basics for Medical Applications
- Medical Devices
- Biosignal Acquisition and Acquisition Electronics
- Digital Signal Processing
- Networking Embedded Devices
- Consumer Devices, Diagnostic and Therapy, Medical Imaging, Instruments
- GUI

4.1.2. Complimentary Documentation

Ashenden, Peter J.: The Designer's Guide to VHDL, 3rd. Ed.
Morgan Kaufmann, 2008

Al-Hashimi, Bashir M.: System-on-Chip: Next Generation Electronics.
Institution of Electrical Engineers, 2006

Below, Klaus and Dietrich, Karin: Medizinische Gerätetechnik (in German).
Europa-Lehrmittel, 2006

Jennings, D., Fint, A., Turton, BCH. and Nokes, LDM: Introduction to Medical Electronics Applications.
Edward Arnold PLC, 1995

Lipsett, Rger, Schaefer, Carls and Ussery Cary: VHDL Hardware Description and Design.
Kluwer Academic 1990

³ <https://elli.hs-bremerhaven.de/>

⁴ [../Skript/esmed_all.pdf](#)

⁵ [../Skript/ct1_ANN.pdf](#)

⁶ [../Klausur/esmed_topics.pdf](#)

⁷ [../Klausur/esmed_st1.pdf](#)

⁸ [../Klausur/esmed_lst1.pdf](#)

Lyons, Richard G.: Understanding Digital Signal Processing.
Prentice Hall, 2011

Predroni, Volnei A.: Circuit Design and Simulation with VHDL, 2nd. Ed.
MIT Press, 2010

Prutchi, David and Norris, Michael: Design and Development of Medical Electronic Instrumentation.
John Wiley&Sons, 2005

Reis, Ricardo, Lubaszewski, Marcelo and Jess, Jochen: Design of Systems on a Chip: Design and Test.
Springer, 2010

Reichardt, J. und Schwarz, B.: VHDL-Synthese.
Oldenbourg, 2001

Sass, Ron and Schmidt, Andrew G.: Embedded Systems Design with Platform FPGAs: Principles and Practices.
Elsevier Inc. 2010

Wakerly, John F. : Digital Design, Principles & Practices.
Prentice Hall, 2001

K. Urbanski u. R. Woitowitz: Digitaltechnik.
Springer, 2000

J. Wakerly: Digital Design: Principles and Practices.
Prentice-Hall, 1999

R. Lipsett, C. Schaefer and C. Ussery: VHDL: Hardware Description and Design.
Kluwer Academic Publishers, 1990

4.2. Embedded Systems Project [ES-PRO / ESD2] (mainly labs)



© Mentor Graphics⁹

Table 4.2. Organization Embedded Systems Project

NEWS	Course organization is done on
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⁹ <http://www.mentor.com/>

	<p>Please register on "elli"¹⁰.</p> <p>Project assignment for all students on:</p> <p>Tuesday, October 27, 16:00h, (online) (instead of project labs from Prof. Peter / Prof. Lindemann).</p>
Study Program	Master Embedded Systems Design [ESD2]
Course Language	English
Project Groups	<p>Responsabilites:</p> <ul style="list-style-type: none"> (1) Modelling/Simulation (2) Controller Design (3) Hardware Design (4) Software Design (5) Verification/Measurements <p>The group members must have knowledge on all aspects of design.</p> <p><i>Cart Pendulum:</i></p> <p>==>> Cart Pendulum Interface Hardware¹¹ <<==</p> <p><i>Pulse Oximeter:</i></p> <p>==>> Pulse Oximeter functional Requirements [Group X]¹²</p> <p>.xdc file (Arty-Z7) >> Pmod Poxi-II on JB!¹³ <i>this must be used without modifications!</i></p> <p>Pulse Oximeter hardware schematics¹⁴</p> <p>Pulse Oximeter pcb layout (magnified by 2.5)¹⁵</p> <p>DAC 4 channels 12 bits (Analog Devices)¹⁶</p> <p>ADC 1/2 channels 12 bits (Analog Devices)¹⁷</p> <p>PGA (Microchip)¹⁸</p> <p>OP (Analog Devices)¹⁹</p>

¹⁰ <https://elli.hs-bremerhaven.de/>

¹¹ [../w20ng/assets/CARTP/A_PrIO_board.pdf](#)

¹² [../w20ng/assets/POXI/Req_Gr3.html](#)

¹³ [../w20ng/assets/POXI/artyzpoxi.xdc](#)

¹⁴ [../w21ng/assets/POXI/poxi2_sch.pdf](#)

¹⁵ [../w21ng/assets/POXI/poxi2_brd.pdf](#)

¹⁶ [../w21ng/assets/AD5624R_5644R_5664R.pdf](#)

¹⁷ [../w21ng/assets/AD7887.pdf](#)

¹⁸ [../w21ng/assets/MC_1789213.pdf](#)

¹⁹ [../w21ng/assets/AD8605_8606_8608.pdf](#)

	<p><i>Magnetic Levitation:</i></p> <p>The ADCs and DAC require a dual lane SPI connection, i.e. the VHDL interface has 2 x sdo and 2 x sdi.</p> <p>.xdc file (ZedBoard) >> PmodDA2 on JC! / >> PmodAD1 on JD!²⁰ <i>this must be used without modifications!</i></p> <p>PMOD test program (.c)²¹ (should have a .c extension)</p> <p>PMODDA2 Manual²²</p> <p>PMODDA2 Schematics²³</p> <p>DAC121S101 12 bit DAC²⁴ (2 x on PMODDA2)</p> <p>PMODDA2 Manual²⁵</p> <p>PMODDA2 Schematics²⁶</p> <p>AD7476A 12 bit ADC²⁷ (2 x on PMODAD1)</p>
Exam	Colloquium and device presentation
Credits	12
Module Type	<p>lab #1: 2 hour/week (Embedded Project / Control Design, Prof. Peter)</p> <p>lab #2: 2 hour/week (Embedded Project / HW & SW, Identification, Prof. Mueller)</p> <p>lab #3: 2 hour/week (Embedded Project / Software development and modeling, Prof. Lindemann)</p> <p>lab #4: 2 hour/week (Embedded Project / Software development and networks, Prof. Prenzel)</p> <p>Colloquium (Prof. Peter, Prof. Mueller, Prof. Lindemann, Prof. Prenzel)</p>
Lecturers	<p>Prof. Dr. Karsten Peter</p> <p>Prof. Dr. Kai Mueller</p> <p>Prof. Dr. Mathias Lindemann</p> <p>Prof. Dr. Oliver Prenzel</p>
Start of Course	Tuesday, October 27, 2020, 16:00h, (online)
End of Course	Friday, February 12, 2021
Documents	==>> [ES-PRO documentation (Mue)] ²⁸

²⁰ ../w21ng/assets/pmod_pins.xdc

²¹ ../w21ng/assets/analogtst.txt

²² ../w21ng/assets/PMODDA2/PmodDA2_rm.pdf

²³ ../w21ng/assets/PMODDA2/PmodDA2_sch.pdf

²⁴ ../w21ng/assets/PMODDA2/dac121s101.pdf

²⁵ ../w21ng/assets/PMODAD1/PmodAD1_rm.pdf

²⁶ ../w21ng/assets/PMODAD1/PmodAD1_sch.pdf

²⁷ ../w21ng/assets/PMODAD1/AD7476_7477_7478.pdf

²⁸ ../Skript/espro_all.pdf

4.2.1. Course contents

- Safety and Security
 - Probabilistic methods
 - Safety and Security planing
 - Safety and Reliability analysis
 - Design of hardware/software structures
 - Hardware/software design process
 - Design of Algorithms
- Applications
 - System analysis and planing
 - Modeling and simulation
 - Interface specification
 - Hardware/Software specification
 - Embedded Controller design
 - Algorithm development
 - Industrial/medical application

4.2.2. Complimentary Documentation

Noergaard, T.: Embedded Systems Architecture:

A Comprehensive Guide for Engineers and Programmers (Embedded Technology).
Elsevier, 2005

Vahid, F. und Givargis, T.: Embedded System Design: A Unified Hardware/Software Introduction.
Wiley, 2001

Ganssle, J.: The Art of Designing Embedded Systems.
Newnes, 2008

Siewert, S.: Real-Time Embedded Components and Systems (Computer Engineering).
Charles River Media, 2006

Berger, A.: Embedded Systems Design: An Introduction to Processes, Tools and Techniques
CMP Books, 2001

Meyna, A; Pauli, B.: Taschenbuch der Zuverlässigkeits- und Sicherheitstechnik

Birrolini, A.: Quality and Reliability of Technical Systems

IEC 61508 - Funktionale Sicherheit sicherheitsbezogener elektrischer/
elektronischer/programmierbar elektronischer Systeme
(sowie IEC 61511, IEC 61513, EN 50128, IEC 62061, IEC 60601, ISO/DIS 26262)

DO160, Environmental Conditions and Test Procedures for Airborne Equipment

DO178 Software Considerations in Airborne Systems and Equipment Certification

ARP4761 Guidelines and Methods for Conducting the Safety Assessment Process
on Civil Airborne Systems and Equipment

ARP 4754 Certification Considerations for Highly-Integrated Or Complex Aircraft Systems

MIL STD 785B Reliability Program for Systems and Equipment Development and Production

MIL HDBK 217F Reliability Prediction of Electronic Equipment

J. Wakerly: Digital Design: Principles and Practices.
Prentice-Hall, 1999

R. Reis, M. Lubaszewski, J.A.G. Jess: Design of Systems on a Chip: Design and Test
Springer 2010

B.M. Al-Hashimi: System-on-Chip: Next Generation Electronics (Circuits, Devices and Systems)
Instit. of Eng. and Technology, 2006

Xilinx MicroBlaze™ Users's Guide.
Xilinx Corp., 2010

5

Bachelor / Master Thesis

Diplomarbeiten bzw. Master Thesis im Bereich Automatisierungstechnik, Regelungstechnik oder Messtechnik können am IAE oder in der Industrie angefertigt werden.

Angebote:

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Anschrift:

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6

Industriepaktika

Bei der Beschaffung geeigneter Praktikantenplätze können wir Unterstützung leisten.

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