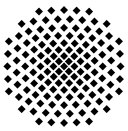

Universität Stuttgart
Germany

M.Sc. Program
Information Technology

Faculty for Computer Science, Electrical Engineering and Information Technology

Universität Stuttgart
Pfaffenwaldring 47
70569 Stuttgart, Germany
Tel.:+49.711.685-67820
Fax:+49.711.685-67821
e-mail:manfred.wizgall@f05.uni-stuttgart.de
http://www.infotech.uni-stuttgart.de

Program Coordinator and Study Dean
Prof. Dr.-Ing. A. Kirstädter
Chairperson Examination Commission
Prof. Dr-Ing. M. Radetzki
Course Director
Dr.-Ing. M. Wizgall

Module Handbook

Version 19

Master Programm INFOTECH – Prüfungsordnung ’09

Print Date: Wednesday, October 24, 2012

Section

Table of Contents

Preamble

INFOTECH (short for INFOrmation TECHnology) is an international, interdisciplinary (post) graduate Master study program offered by the Faculty (School) of Computer Science, Electrical Engineering and Information Technology of the University of Stuttgart, Stuttgart, Baden-Wuerttemberg, F.R. of Germany with English lectures and English exams for graduate students with a B.Sc. or similar in Electrical Engineering, Computer Science/Applications or Automation or similar.

INFOTECH aims at the interdisciplinary education and training of fundamental methods and scientific skills for development and research in information technology in areas like

- basic microelectronic and photonic technologies
- computer and communication systems architectures
- hardware and software design methodologies
- communication systems and networks
- visualization and multimedia communications
- IT management and web technologies.

reflected in the majors of the program.

INFOTECH is a very comprehensive and demanding 2-year program with pre-program German Language Class (6-weeks in September) for the required A1-level certificate, 3 study terms followed by an optionally break for the Industrial Internship and one-term (6 months) Master Thesis Project, see Macrostructure

INFOTECH offers a combination of courses from the

- electrical engineering and
- computer science, complemented by
- non-technical courses

INFOTECH offers four specializations

- Communication Engineering and Media Technology (CEMT)
- Embedded Systems Engineering (ES)
- Micro- and Optoelectonics (MO)
- Computer Hardware/Software Engineering (CHSE)

Graduates of INFOTECH are able to understand computer systems of hardware and software and are familiar with English technical literature, have interdisciplinary knowledge of the fundamentals of information, analysis, design and implementation methods. They are experienced in research and development projects and activities and are able to solve actual problems responsibly, performed individually and within a team according to the state-of-the-art practices. They are also familiar with non-technical subject areas of business management and administration, law and management. They are educated for professional work at vendor companies of information technology, equipment and systems, network and service providers, engineering offices, public administrations, universities and research organizations.

The specializations:

CEMT: Communications Engineering and Media Technology is a rapidly growing segment best reflected by the developments of the Internet, broadband, mobile and satellite networks, by competitive environments and deregulation.

Experts for strategic product definitions, service provision or network operation must not only be familiar with advanced methods and technologies in communications and computer science, but also need some basic knowledge of business and legal aspects.

ES: Automobiles, telecommunications, computer peripherals, aeronautics and space technology as well as medical equipment need sophisticated control by so-called embedded systems.

'Embedded Systems' covers all aspects of the design and application of these systems. Analogue, mixed-signal and digital circuit design, RF-technology, actuators and sensors form the basis at the physical level. Methods for hardware design on a higher, more abstract level comprise HDL supported logic design and CAD techniques. With respect to the increasing use of microprocessors and micro controllers, computer science and software engineering techniques complete the curriculum.

MO:Micro technologies are basic technologies for innovative engineering solutions and integration of technical intelligence in future products. The miniaturization of mechanical and electronic elements and their integration by embedded information processing to micro systems has the potential for a new generation of products in a wide spectrum of applications.

'Micro- and Optoelectronics' deals with materials and processes, technologies and devices, device physics and modeling, process and device simulation, circuit design and application, system design and packaging, characterization and testing, quality and reliability of microelectronic and optoelectronic devices, circuits and systems. These topics are complemented by enabling technologies and application technologies out of the communication, software and internet world.

CHSE: Computer systems are widely-used in Information Technology in very different application domains like measurement systems in industrial or scientific environments and factories, control systems, data management systems, computer networks, high performance computing systems etc. Typically, these systems are based on computer hardware and software components the interaction of which is the key factor for the system performance and capabilities. Therefore understanding of the characteristics and the design options for both hardware and software is essential for the design and operation of these computer systems.

The curriculum of the Major Computer Hardware/Software Engineering (CHSE) enables students to specialize in the design and applications of computer hardware/software systems for efficient real-.time operation, IT services and IT service management and intelligent applications.

Major-specific module lists for the different categories as listed in ‘Macrostructure’ can be found at http://www.uni-stuttgart.de/infotech/prog/2Prog_Courses_All.html

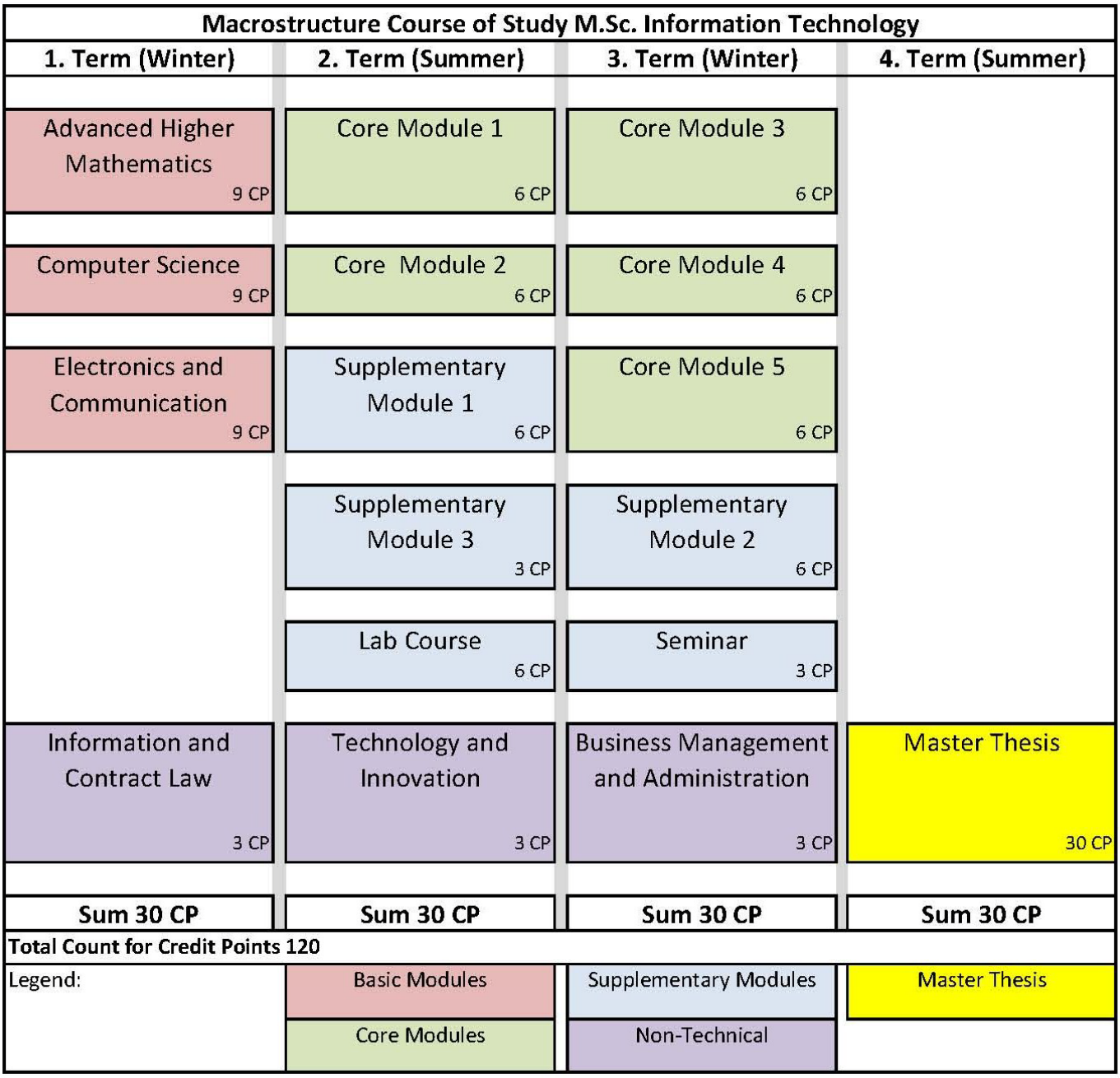

Figure: Macrostructure

Basic Modules - Grundlagenfächer

	Module	**Date: 10.02.2009**
1	Module Name	**Advanced Higher Mathematics**
2	Module ID	080310510
3	Credit Points (CP)	9
4	Credit Hours (Weekly Semester Hours, SWS)	6
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	In each winter term
7	Language	English
8	Module Responsible	Prof. Dr. Christian Rohde Institut für Angewandte Analysis und Numerische Simulation Tel.: 685 - 65524 E-Mail: christian.rohde@mathematik.uni-stuttgart.de
9	Lecturers	Lecturers of Fachbereich Mathematik
10	Application / Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	---
12	Learning Targets	• Students know the basics of core areas of higher mathematics, students can apply the methods taught in the course in • An independent and creative manner, • Students have the mathematical knowledge to understand quantitative models in applied sciences
13	Course Contents	• Vector calculus and linear algebra: vectors, linear mappings, determinant, eigenvalues and eigenvectors. • Ordinary differential equations: existence of solutions and basic solution techniques, systems of differential equations. • Multidimensional differential and integral calculus: • Partial derivatives, Taylor expansion, critical points, implicit function • Theorem, multiple integrals, surface integrals, integral theorems. • Probability theory: elementary combinatorics, basic probability models, random variables, probability distribution, conditional probability and independency, • Discrete mathematics und coding theory: • rings, finite fields, ideals, linear codes, Hamming codes
14	References/Learning Aids	• Marsden,J; Weinstein,A: Calculus • Kreyszig,E: Advanced Engineering Mathematics
15	Courses and Learning and Teaching Forms	Lecture Advanced Higher Mathematics, 4.0 SWS Exercises Advanced Higher Mathematics, 2.0 SWS
16	Estimation of Student Workload	Lecture and associated exercise: 90.00 h Self study: 180.00 h Total 270.00 h
17a	Study Achievements (Unmarked)	Tutorials in the associated exercises
17b	Examination Achievements (Marked)	Written (120 min)
18	Basis for ...	All modules of InfoTech
	Additional Information (optional)	
19	Media Form	Laptop and blackboard presentation
20	Description of Associated Module Examinations and Examination ID	---
21	Import-Export Module	From: Mathematics To: INFOTECH

Computer Science

	Module	**Date: 10.02.2009**
1	Module Name	**Computer Science (CS) I, II or III**
2	Module ID	
3	Credit Points (CP)	4.5 (CSI), 9.0 (CSII)or 13.5 (CSIII)
4	Credit Hours (Weekly Semester Hours, SWS)	NA
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	In each winter term
7	Language	English
8	Module Responsible	Dr.-Ing. M. Wizgall INFOTECH Course Director Tel.: 685 - 67820 E-Mail: manfred.wizgall@f05.uni-stuttgart.de
9	Lecturers	Lecturers of Department Computer Science
10	Application / Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	Counseling Interview (CoIn) to determine contents
12	Learning Targets	• See pertinent Sub-Modules
13	Course Contents	• This module is built up from 1 (CSI) to 3 (CSIII) sub-modules out of 4 listed in section 15 and made compulsory at CoIn
14	References/Learning Aids	NA
15	Courses and Learning and Teaching Forms	• Sub-Module Computer Architecture and Organization • Sub-Module Data Structures and Algorithms • Sub-Module Operating Systems • Sub-Module Concepts of Programming Languages
16	Estimation of Student Workload	Lecture and associated exercise: 45.00 h (CSI), 90.00 h (CSII), 135.00 h (CSIII) Self study: 90.00 h (CSI) , 180.00 h (CSII), 270.00 h (CSIII) Total 135.00 h (CSI), 270.00 h (CSII), 405.00 h (CSIII)
17a	Study Achievements (Unmarked)	NA
17b	Examination Achievements (Marked)	Written (60 min (CSI), 120 min (CSII), 180 min (CSIII)), Marks based on summed up points from contributing sub-modules
18	Basis for ...	All modules of InfoTech
	Additional Information (optional)	
19	Media Form	Laptop and blackboard presentation
20	Description of Associated Module Examinations and Examination ID	---
21	Import-Export Module	From:
		To:

	Sub Module	**DATE: 10.02.2009**
1	Module Name	**Operating Systems**
2	Module ID	**051200**162
3	Credit Points (CP)	4,5
4	Credit Hours (Weekly Semester Hours, SWS)	3,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Kurt Rothermel IPVS/VS Telefon: 7816-434 E-Mail: Kurt.Rothermel@ipvs.uni-stuttgart.de
9	Lecturers	Dr.Boris Koldehofe
10	Application/Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	None
12	Learning Targets	This module enables the student to understand the concepts and principles of modern operating systems. The accompanying exercises enable the student to apply the methods in practical application cases.
13	Course Contents	• System structures and organization, • Process Management and Interprocess communication, • Process Scheduling, • Synchronization and Deadlocks, • Virtual and Physical Memory Management, • Security and Protection
14	References/Learning Aids	• Stallings: Operating Systems Prentice Hall International (2004) • Silberschatz, Galvin, Gagne: Operating System Concepts Wiley & Sons (2005) • Tanenbaum: Modern Operating Systems. Prentice Hall International (2005)
15	Courses and Learning and Teaching Forms	Lecture Operating Systems, 2.0 SWS Exercises Operating Systems, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 45.00 Hours Self Study: 90.00Hours Sum: 135.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	Written Examination (Weight 0.7) and Exercises with oral presentation (Weight 0.3), Points 60 min, twice per year
18	Basis for ...	Lab Course Distributed Systems

Additional Information (Optional)

19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Sub Module	DATE: 10.02.2009
1	Module Name	**Concepts of Modern Programming Languages**
2	Module ID	**051510**201
3	Credit Points (CP)	4,5
4	Credit Hours (Weekly Semester Hours, SWS)	3,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter term
7	Language	English
8	Module Responsible	Prof. Dr. Erhard Plödereder ISTE/PS 0711-7816-322 ploedere@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Erhard Plödereder
10	Application/Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	There are no prerequisite courses within the Master program. However, some exposure to and initial experience in programming from any source is highly advisable to be able to understand and correlate the contents of this course. The course is not a programming course; it is assumed that some introductory programming course has been successfully passed as part of a Bachelor program.
12	Learning Targets	Students will have acquired an understanding of the major concepts that underlie the prevalent (object-oriented) programming languages of today. They are enabled to build their understanding of a new language on these concepts rather than on unreliable case experience. They will know about the security and safety issues of these constructs as well as some of the performance issues relating to the use of certain concepts. Students are thus enabled to make informed technical decisions about when and when not to apply particular concepts or paradigms.
13	Course Contents	The course presents concepts shared by many of the most-used programming languages today and illustrates these concepts in the syntax of several languages, notably Java, C++, Ada. Among others the following concepts are covered: • Visibility and name binding • Stack and heap regimes for memory management • Rich type models • Strong type enforcement systems • Inheritance of type, class and interface properties • Monomorphic and polymorphic variables and routines • Dynamic typing and static enforcement of dynamic typing constraints • Other core concepts of object-oriented programming The course contents and level may be adjusted annually in accordance with the average pre-existing qualifications of the students.
14	References/Learning Aids	Background reading: • Sebesta, Robert W.: Concepts of programming languages, 8th ed. – Pearson / Addison-Wesley, 2008 • Language reference manuals; international standards where in existence • Qualified introductory text books to programming in the respective programming languages (students' choice) • Lecture Notes (annually revised)
15	Courses and Learning and Teaching Forms	Lecture Concepts of Modern Programming Languages, 2.0 SWS Lab class Concepts of Modern Programming Languages, 1.0 SWS
16	Estimation of Student Workload	Attendance: 45 Hours Self Study: 90.00 Hours Sum: 135.00 Hours

17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination 60 minutes, twice a year
18	Basis for ...	
	Additional Information (Optional)	Guidelines should stipulate that this course cannot be taken for credit by Bachelors of Computer Science or similar study programs, whose Bachelor program included a course on programming language concepts. It can be taken as part of a Bachelor program in Computer Science, provided suitable safeguards against duplication at the home university of the student are in place.
19	Media Form	Laptop presentation, human voice, auxiliary media, chalk on blackboard
20	Description of Associated Module Examinations and Examination ID	Concepts of Modern Programming Languages, 051510201
21	Import-Export Module	from: Faculty 5
		to: International partners; t.b.d.

	Sub Module	DATE: 10.02.2009
1	Module Name	**Computer Architecture and Organization**
2	Module ID	**051200**131
3	Credit Points (CP)	4.5
4	Credit Hours (Weekly Semester Hours, SWS)	3.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	• None
12	Learning Targets	• Understanding Basic Concepts of Computer Architectures and • Organization, • Understanding the Architectures of Central Processing Units, Parallel Computer Architectures
13	Course Contents	• Introduction • Instruction Set Architectures • ALUs • Pipelining • Cache • Memory Hierarchy • RISC Architectures • Vector Processors • Parallel Processor Architectures
14	References/Learning Aids	• Patterson, David A.; Hennessy, John L.: Computer Architecture – A Quantitative Approach, Morgan Kaufmann Publishers, Inc´ • Stallings, William: Computer Organization and Architecture, Prentice Hall International, Inc., 2000
15	Courses and Learning and Teaching Forms	• Lecture Computer Architecture and Organization, 2.0 SWS • Exercises Computer Architecture and Organization,1.0 SWS
16	Estimation of Student Workload	Presence Time: 45 Hours Self Study: 90.00 Hours Sum: 135.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Written Examination • 60 Min, twice per year
18	Basis for ...	2nd and 3rd Semester Courses
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department
		to: Information Technology

	Sub Module	DATE: 10.02.2009
1	Module Name	**Data Structures and Algorithms**
2	Module ID	
3	Credit Points (CP)	4.5
4	Credit Hours (Weekly Semester Hours, SWS)	3.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Funke Institute of Formal Methods in Computer Science
9	Lecturers	Milsovljevich/Funke
10	Application / Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	Basic knowledge in math; some programming background.
12	Learning Targets	The student possesses detailed knowledge about data structures, algorithm design and analysis. This means primarily algorithmic complexity, recursion approaches, graph, sorting and searching algorithms.
13	Course Contents	This course gives a detailed explanation of data structures, algorithm design and analysis. The main emphasis is on algorithmic complexity, recursion approaches, graph, sorting and searching algorithms. The exercises "data structures and algorithms" are meant to consolidate the students' understanding of the material.
14	References/Learning Aids	• Kleinberg, Jon; Tardos, Eva: Algorithm Design, Addison Wesley, 2005 • Cormen, Thomas; Leiserson, Charles; Rivest, Ronald; Stein, Clifford: Introduction to Algorithms, MIT Press, 1997.
15	Courses and Learning and Teaching Forms	Lecture Data Structures and Algorithms, 2.0 SWS Exercises Data Structures and Algorithms, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 45.00 Hours Self Study: 90.00 Hours Sum:: 135.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination 60 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	PowerPoint Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from
		to:

Electronics and Communication

	Module	Date: 10.02.2009
1	Module Name	**Electronics and Communication (EC) I, II or III**
2	Module ID	
3	Credit Points (CP)	4.5 (CSI), 9.0 (CSII)or 13.5 (CSIII)
4	Credit Hours (Weekly Semester Hours, SWS)	NA
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	In each winter term
7	Language	English
8	Module Responsible	Dr.-Ing. M. Wizgall INFOTECH Course Director Tel.: 685 - 67820 E-Mail: manfred.wizgall@f05.uni-stuttgart.de
9	Lecturers	Lecturers of Department Electrical Engineering and Information Technology
10	Application / Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	Counseling Interview (CoIn) to determine contents
12	Learning Targets	• See pertinent Sub-Modules
13	Course Contents	• This module is built up from 1 (ECI) to 3 (ECIII) sub-modules out of 4 listed in section 15 and made compulsory at CoIn
14	References/Learning Aids	NA
15	Courses and Learning and Teaching Forms	• Sub-Module Communications • Sub-Module System and Signal Theory • Sub-Module Radio Frequency Technology: Introduction • Sub-Module Electronic Circuits
16	Estimation of Student Workload	Lecture and associated exercise: 45.00 h (ECI), 90.00 h (ECII), 135.00 h (ECIII) Self study: 90.00 h (ECI) , 180.00 h (ECII), 270.00 h (ECIII) Total 135.00 h (ECI), 270.00 h (ECII), 405.00 h (ECIII)
17a	Study Achievements (Unmarked)	NA
17b	Examination Achievements (Marked)	Written (60 min (ECI), 120 min (ECII), 180 min (ECIII)), Marks based on summed up points from contributing sub-modules
18	Basis for ...	All modules of InfoTech
	Additional Information (optional)	
19	Media Form	Laptop and blackboard presentation
20	Description of Associated Module Examinations and Examination ID	---
21	Import-Export Module	From:
		To:

	Sub-Module	DATE: 10.02.2009
1	Module Name	**System and Signal Theory**
2	Module ID	**051610**021
3	Credit Points (CP)	4.5
4	Credit Hours (Weekly Semester Hours, SWS)	3.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every first semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bin Yang ISB/LSS, Tel: 0711/68567330 bin.yang@LSS.uni-stuttgart.de
9	Lecturers	Dr.-Ing. Christof Zeile
10	Application/Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	Mathematics: Calculus
12	Learning Targets	Learn and understand the theory of deterministic and stochastic signals and linear systems
13	Course Contents	• Signals, properties of and operations on signals • Systems, different types of systems • Description of LTI systems • Convolution • Fourier transform, properties • Frequency response, amplitude and phase response • Random experiment, fundamentals of probability theory • Random variable, probability density function, moments • Stochastic process • Correlation function, spectrum
14	References/Learning Aids	• Proakis, J.; Manolakis, D.G.: Digital signal processing, Prentice-Hall, 1996. • Hsu, H.P.: Schaum's outline of signals and systems, McGraw-Hill, 1995. • Oppenheim, V.; Willsky, A.S.: Signals and Systems, Prentice-Hall, 1997. • Oppenheim,V.**;** Schafer, R.W.; J. R. Buck: Discrete time signal processing. • Papoulis, A: Probability, random variables and stochastic processes, 3. Edition, McGraw-Hill, 1991
15	Courses and Learning and Teaching Forms	Lecture System and Signal Theory, 2.o SWS Exercises System and Signal Theory, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 45.00 hours Self Study: 90.00 hours Sum: 135.00 hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, 60 min, twice per year
18	Basis for ...	• "Statistical and adaptive signal processing" • "Detection and pattern recognition"
	Additional Information (Optional)	
19	Media Form	Blackboard + Projector
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Sub Module	DATE: 10.02.2009
1	Module Name	**Radio Frequency Technology: Introduction**
2	Module ID	***050600****027*
3	Credit Points (CP)	4.5
4	Credit Hours (Weekly Semester Hours, SWS)	3.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Semester
7	Language	Englisch
8	Module Responsible	PD Dr.-Ing. Ningyan Zhu IHF 0711-685-67422 zhu@ihf.uni-stuttgart.de
9	Lecturers	PD Dr.-Ing. Ningyan Zhu
10	Application / Allocation to Curriculum	• Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	
12	Learning Targets	The students have knowledge and understanding of various circuits and systems at radio frequency.
13	Course Contents	Circuit elements at higher frequencies: passive elements, active elements; Transmitter and receiver concepts: block diagrams of transmitters, block diagrams of receivers; Transmitter and receiver circuit modules: oscillators, mixers, frequency processing, RF amplification; Noise: thermal noise, noise figure, noise temperature: Antennas and propagation: power flow and wave launching; power density, characteristic quantities of antennas, uniform rectangular aperture, free-space propagation, overview of different antennas, radar principles.
14	References/Learning Aids	Lecture script, Lee: Planar Microwave Engineering, Cambridge University Press, 2002, Pozar: Microwave Engineering, 3rd Ed., John Wiley & Sons, 2005,
15	Courses and Learning and Teaching Forms	Lecture Radio Frequency Technology:Introduction, 2.0 SWS Exercises Radio Frequency Technology:Introduction, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 45.00 Hours Self Study: 90.00 Hours Sum: 135.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Written Examination • 60 min, twice per year
18	Basis for ...	Basics of Radio Frequency Technology Antennas
	Additional Information (Optional)	
19	Media Form	Blackboard Presentation + Overhead Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from:
		to:

	Sub Module	DATE: 10.02.2009
1	Module Name	**Electronic Circuits**
2	Module ID	**050200**009
3	Credit Points (CP)	4.5
4	Credit Hours (Weekly Semester Hours, SWS)	3.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Manfred Berroth Institut für Elektrische und Optische Nachrichtentechnik 0711/68567922 Manfred.Berroth@int.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Manfred Berroth
10	Application/Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	Bachelor of Science
12	Learning Targets	Understanding of network analysis and design of electronic circuits
13	Course Contents	Linear network analysis Transistor models Two Port theory Analog circuits Digital circuits
14	References/Learning Aids	Lecture Notes Gray, Meyer: Analysis and Design of Analog Integrated Circuits, John Wiley and Sons, 1977 Sedra, Smith: Microelectronic Circuits, Oxford University Press, 2004 Pucknell, Eshraghian: Basic VLSI Design, Prentice Hall, 1994
15	Courses and Learning and Teaching Forms	Lecture Electronic Circuits, 2.0 SWS Exercises Electronic Circuits, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 45.00 Hours Self Study: 90.00 Hours Sum: 135.00 Hours
17a	Study Achievements (Unmarked)	*None*
17b	Examination Achievements (Marked)	Written Examination 60 min, twice a year
18	Basis for ...	

Additional Information (Optional)

19	Media Form	Laptop Presentation, Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Sub Module	DATE: 10.02.2009
1	Module Name	**Communications**
2	Module ID	0511100105
3	Credit Points (CP)	4,5
4	Credit Hours (Weekly Semester Hours, SWS)	3
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Joachim Speidel Institut für Nachrichtenübertragung Tel.: 0711-685-68017 E-Mail: joachim.speidel@inue.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Joachim Speidel
10	Application/Allocation to Curriculum	Master INFOTECH, Basic Modules, 1st semester
11	Prerequisites	None
12	Learning Targets	To be proficient with the principles of digital communications transmission
13	Course Contents	• Fundamentals in Information Theory: Information Source, Entropy, Redundancy, Source Coding • Digital Transmission of Analog Signals: Pulse Code Modulation, A/D-Conversion, D/A-Conversion, Transmission of Impulses, Intersymbol Interference, Noise, Error Probability, S/N-Ratio • Digital Modulation: Modulator, Demodulator, Constellation Diagram, ASK, PSK, QAM • Electrical Transmission Lines: Differential Equation, Transfer Function, Matched Line, Reflection, Refraction • Electrical Transmission Lines: Differential Equation, Transfer Function, Matched Line, Reflection, Refraction •
14	References/Learning Aids	• J. Proakis: Digital Communications, Mac Graw Hill, New York • E. Lee, D. Messerschmidt: Digital Communication, Kluwer Academic Publishers
15	Courses and Learning and Teaching Forms	Lecture Communications, 2.0 SWS Exercises Communications, 1.0 SWS
16	Estimation of Student Workload	Presence time: 45.00hours Self study: 90.00 hours Sum: 135.00 hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination 60 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

Core Modules – Vertiefungsfächer

	Module	Date: 12.2.2009
1	Module Name	**Advanced CMOS Devices and Technology**
2	Module ID	**052110**001
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing Joachim Burghartz Institut für Nano- und Mikroelektronische Systeme (INES) 0711-21855-200 joachim.burghartz@ines.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing Joachim Burghartz Dipl.-Phys. Martin Zimmermann
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basics in microelectronics and semiconductor technology
12	Learning Targets	Comprehensive understanding of the integration of microelectronic devices and interconnects for circuit integration, including aspects of process technology, miniaturization, optimization, compact modeling, basic circuit building blocks and volume manufacturing.
13	Course Contents	Coherent Description of CMOS-Technology: • History and Basics of IC Technology • Process Technology I and II • Process Modules • MOS Capacitor • MOS Transistor • Non-Ideal MOS Transistor • Basics of CMOS Circuit Integration • CMOS Device Scaling • Metal-Silicon Contact • Interconnects • Design Metrics • Special MOS Devices • Future Directions
14	References/Learning Aids	• Burghartz, Joachim: Skript „Advanced CMOS Devices and Technology“ (in Vorbereitung) • Neamon, Donald: Semiconductor Physics and Devices, Mc Graw-Hill, 2002 • Wolf, Stanley: Silicon Processing fort he VLSI Era, Vol. 2, Lattice Press, 1990 • Sze, Simon: Physics of Semiconductor Devices, 2nd Ed., Wiley Interscience, 1981 • Sze, Simon: Fundamentals of Semiconductor Fabrication, Wiley Interscience, 2003
15	Courses and Learning and Teaching Forms	Lecture Advanced CMOS Devices and Technology, 2.0 SWS Exercises Advanced CMOS Devices and Technology, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written examination, Weight 1.0, 120 min, twice per year Alternatively oral exams (<10 students in course), 60 minutes
18	Basis for ...	

	Module	**DATE: 10.05.2009**
1	Module Name	**Advanced Information Management**
2	Module ID	**051210**001
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0 SWS
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bernhard Mitschang IPVS 0711-7816-449 Bernhard.Mitschang@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Bernhard Mitschang Dr. Holger Schwarz
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module Master IMSE
11	Prerequisites	
12	Learning Targets	After attending the lecture, students understand the challenges behind the integration of heterogeneous data sources in consolidated data warehouses and the provisioning of analytical services. They know the typical data warehouse architecture as well as current trends, e.g., real-time data warehousing. Further topics are the structure of a data warehouse and the main processes for building data warehouses (extraction, transformation, and load). A special focus is on technologies to analyze data warehouse data, e.g. reporting, online analytic processing and data mining, and their role as part of analytic services.
13	Course Contents	1. Introduction to Data Warehousing 2. Data Warehouse Architecture 3. Data Warehouse Design 4. Extraction, Transformation, Load 5. ETL as a Services 6. Introduction to Analytics and Analytic Services 7. Real-Time Reporting 8. Online Analytic Processing as a Service 9. Data Mining as a Service
14	References/Learning Aids	Lecture notes
15	Courses and Learning and Teaching Forms	Lecture Advanced Information Management, 2.0 SWS Exercises Advanced Information Management, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, 60 min, twice a year (Weight 0.5) Exercises Examination (Weight 0.5)
18	Basis for ...	-

Additional Information (Optional)

19	Media Form	Laptop-Presentation, paper exercises and practical exercises
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Advanced Processor Architecture (APA)**
2	Module ID	**051700020**
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Hans-Joachim Wunderlich ITI/RA 0711/7816-362 sekretariat@iti.uni-stuttgart.de
9	Lecturers	Prof. Dr. Hans-Joachim Wunderlich
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	Good understanding of the basic concepts used in modern CPUs and computing systems. Sensibilization for the challenges in modern processor design and the reasoning behind current and future design trends.
13	Course Contents	This lecture covers advanced concepts in computer architecture. Beside classical concepts like processor design and manufacturing, performance evaluation and optimization, and computer arithmetic new trends are discussed like low power design. Low power design is essential in mobile computing and communication, which is expected to be a dominating application of microprocessors in a few years. Computation power is increasing by exploiting parallelism on all levels of computation. In this course we will discuss instruction level parallelism, thread level parallelism, multiprocessor systems and emerging many-core technologies found in current graphic accelerators.
14	References/Learning Aids	• Hennessy, Patterson: „Computer Architecture: A Quantitative Approach“ • Koren: “Computer Arithmetic Algorithms” • Iman, Pedram: „Logic Synthesis for Low Power VLSI Designs“
15	Courses and Learning and Teaching Forms	Lecture Advanced Processor Architecture, 3.0 SWS Exercises Advanced Processor Architecture, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Design and Test of Systems on a Chip
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Antennas**
2	Module ID	***050600****022*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every semester
7	Language	English (winter term), German (summer term)
8	Module Responsible	Prof. Dr. Hesselbarth. IHF 0711-685-67402 mail@ihf.uni-stuttgart.de
9	Lecturers	Jan Hesselbarth
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basics of Radio Frequency Technology
12	Learning Targets	The students have knowledge and basic understanding of various antenna types as well as of methods for its electromagnetic calculation and characterization.
13	Course Contents	Fundamental antenna properties, vector potentials, dipole and wire antennas, horns, mirrors and lenses, patch antennas, wideband antennas, small antennas.
14	References/Learning Aids	• Lecture script, • Balanis: Antenna Theory and Design, 3rd ed., John Wiley & Sons, 2005 • Lo, Lee: Antenna Handbook, Vol. I, II, III, Van Nostrand Reihold, 1993
15	Courses and Learning and Teaching Forms	Lecture Antennas, 2.0 SWS Exercises Antennas, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Blackboard Presentation + Overhead Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Bachelor Program Elektrotechnik und Informationstechnik to: Information Technology

	Module	**DATE: 26.04.2012**
1	Module Name	**Communication Networks II**
2	Module ID	**050901**021
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026 mail@ikr.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Andreas Kirstädter
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basic knowledge about communication networks and the Internet (like e.g. from the BSc lecture “Kommunikationsnetze I”)
12	Learning Targets	Understanding of architectures and mechanisms of high-performance communication networks and of methods for their analysis and design regarding quality of service, availability, and security
13	Course Contents	Architectures of high-speed local area networks and multi-layer wide-area networks (transport networks and Internet). Mechanisms for assuring quality of service, availability, and security Analysis and design methods for high-performance networks (traffic theory, performance simulation, graph theory, optimization).
14	References/Learning Aids	• Lecture Notes • Tanenbaum: "Computer Networks", Prentice-Hall, 2003 • Stallings: "Local Area Networks", Macmillan Publ., 1987 • Grover: "Mesh-Based Survivable Networks", Prentice Hall, 2004 • Robertazzi, "Planning Telecommunication Networks", IEEE Press, 1999
15	Courses and Learning and Teaching Forms	Lecture Communication Networks II, 3.0 SWS Exercises Communication Networks II, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Written Examination • Weight 1.0 • 120 min, twice per year
18	Basis for ...	Lab Course Communication Networks Mobile Communications II
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Elektrotechnik und Informationstechnik to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Communications III**
2	Module ID	051100103
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Joachim Speidel Institut für Nachrichtenübertragung Tel.: 0711-685-68017 E-Mail: joachim.speidel@inue.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Joachim Speidel
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	B.Sc. in Elektrotechnik und Informationstechnik
12	Learning Targets	To be proficient in design and application of digital data transmission and storage
13	Course Contents	• Characteristics of electrical and optical, fixed and mobile channels • Multipath wireless mobile channel • Intersymbol interference, eye diagram, discrete time equalizer • Correlative coding – Partial response technique • Joint Nyquist and matched filter condition • Multipulse communication and correlation receiver • Maximum a posteriori (MAP) and maximum likelihood (ML) symbol-by-symbol detection • Maximum Likelihood (ML) detection of sequences (Viterbi algorithm, Trellis diagram) • Code Division Multiple Access (CDMA) • Convolutional coding, turbo coding, iterative detection • Exercises: Theoretical problems and applications from wireless and wire-line data transmission and data storage
14	References/Learning Aids	• Proakis, J.: Digital Communications. McGraw-Hill • Johannesson, K.; Zigangirov: Fundamentals of Convolutional Coding, IEEE Press, 1999
15	Courses and Learning and Teaching Forms	Lecture Communications III, 3.0 SWS Exercises Communications III, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice a year
18	Basis for ...	---

	Module	**DATE: 10.02.2009**
1	Module Name	**Computer Interface Technology**
2	Module ID	**051200**132
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Computer Architecture & Organization
12	Learning Targets	Principals and characteristics of typical high-speed computer interfaces, e.g. USB 3.0 or PCI-Express. Especially the new USB 3.0 standard should be treated, on that the computer industry is currently working.
13	Course Contents	• Computer interface basics • OSI-Models • Net topologies • Line and error codes • Protocols • Compliance tests • Standardization groups, USB, PCI
14	References/Learning Aids	• “Universal Serial Bus 3.0 Specification”, ww.usb.org, Rev 1.0, 2008 • “PCI Express* Electrical Interconnect Design”, S. Gardiner, D. Coleman, S.; Peters, M.; Kolbehdari: Intel Press, 2001 • “USB Design by Example, 2nd Edition”, J. Hyde; Intel Press, 2001
15	Courses and Learning and Teaching Forms	Lecture Computer Interface Technology, 2.0 SWS Exercise Computer Interface Technology, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Module	**DATE: 10.02.2009**
1	Module Name	**Design and Test of Systems on a Chip (SOC)**
2	Module ID	**051710***021*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Hans-Joachim Wunderlich Institut für Technische Informatik, Abt. Rechnerarchitektur 0711-7816-391 wu@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Hans-Joachim Wunderlich Dipl.Inform. Melanie Elm Dipl.Inf. Michael Kochte
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Advanced Processor Architectures
12	Learning Targets	• Basic understanding of development and test of complex embedded hardware / software systems • Coverage of the essential steps of synthesis, validation, test and programming • Introduction to the relevant tools for design automation
13	Course Contents	Besides the different design styles, paradigms and standards the essential steps of automated design, test and programming of digital and mixed signal circuits are discussed. Exercises and labs serve to practice the use of commercial tools and designs. The course comprises: • Overview over system design • Reuse and cores • Standards and platforms • Elements of analog and mixed signal designs • Design validation and verification • Test and design for testability with the related standards • Application and programming of embedded processors
14	References/Learning Aids	• Lecture slides • Chang, H.: Surviving the SOC revolution: a guide to platform-based design , Boston: Kluwer Academic Publishers, 1999 • Furber, S.: ARM-Rechnerarchitekturen für System-on-Chip-Design , Bonn: mitp, 2002 • Ashenden, P.J.; Mermet, J.P.; Seepold, R.: System-on-chip methodologies & design languages, Boston: Kluwer Academic Publishers, 2001 • Keating, M.; Bricaud, P.: Reuse methodology manual for system-on-a-chip designs, Boston: Kluwer Academic Publishers, 2001 • Wolf, W.: Modern VLSI design: system-on-chip design, Prentice Hall PTR, 2002 • Hayes, J.P.: Computer architecture and organization , 3. ed - Boston, Mass.: WCB/McGraw-Hill,1998. • Patterson, D.A.; Hennessy, J.L.: Computer architecture: a quantitative approach, 3. print - San Mateo, Calif.: Morgan Kaufmann, 1993. • Culler; D.E.; Singh, J.P.; Gupta, A.: Parallel computer architecture: a hardware, software approach, San Francisco, Calif.: Morgan Kaufmann, 1999. • Wang, L.-T.; Wu, C.-W.; Wen, X.: VLSI Test Principles and Architectures - Design for Testability, Boston: Morgan Kaufmann Publishers, 2006 • Rajsuman, R.: System-on-a-chip: design and test, London: Artech House ed., 2000

15	Courses and Learning and Teaching Forms	Lecture Design and Test of Systems on a Chip, 2.0 SWS Exercises Design and Test of Systems on a Chip, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	*none*
17b	Examination Achievements (Marked)	• Written (1.5h) or Oral Examination, Weight 1.0 • Checked (and passed) Exercise as exam admission requirement
18	Basis for ...	

Additional Information (Optional)

19	Media Form	Laptop-Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Digital System Design**
2	Module ID	***051200133***
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	• Basic knowledge of digital circuit design • Experience in at least one programming language
12	Learning Targets	• Understanding advanced concepts of digital system design. • Hardware/software design methods for high performance computing with reconfigurable hardware and multi core processors.
13	Course Contents	• Basics in signaling • Insight into FPGA design • Signal integrity • Time analysis • Signaling, computation and simulation • Computer board design • Measurement techniques
14	References/Learning Aids	• Roth, C.H.: “Digital Systems Design Using VHDL” • Ball, S: “Embedded Microprocessor Systems: Real World Design” • Davis, J.: ”High-Speed Digital System Design”
15	Courses and Learning and Teaching Forms	Lecture Digital System Design, 2.0 SWS Exercise Digital System Design, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written examination Weight 1.0 120 min, twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Module	**DATE: 10.02.2009**
1	Module Name	**Discrete Optimization**
2	Module ID	29410
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every other semester, winter term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Stefan Funke Institute of Formal Methods in Computer Science Universitaetsstrasse 38 funke@fmi.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Stefan Funke
10	Application/Allocation to Curriculum	Master INFOTECH, Core/Supplementary Modules
11	Prerequisites	Basics in mathematics and algorithms
12	Learning Targets	The students know the basic methods and tools of discrete optimization and can apply them to real-world problems.
13	Course Contents	• Flow Problems (e.g. max flow/min cut; min cost flow; multicommodity flow) • Linear Programming (e.g. simplex algorithm, duality, algorithms for fixed dimension, subexponential algorithms) • Approximation of NP-hard optimization problems (e.g. knapsack, TSP, primal-dual algorithms, dual fitting, scheduling) • Online algorithms (e.g. competitive analysis, paging)
14	References/Learning Aids	• Approximation Algorithms, V.Vazirani; Springer
15	Courses and Learning and Teaching Forms	Lecture, 3.0 SWS Exercises 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours SelfStudy: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	Written examination, Weight 1.0, 120 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	From
		To

	Module	DATE: 10.02.2009
1	Module Name	**Distributed Systems**
2	Module ID	**051200**161
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Kurt Rothermel IPVS/VS Telefon: 7816-434 E-Mail: Kurt.Rothermel@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr. Kurt Rothermel
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	• 051200 122 Data structures und Algorithms • Basic knowledge of the Java programming language
12	Learning Targets	This module enables the student to understand the principles and algorithms of distributed systems. The accompanying exercises enable the student to apply the methods in practical application cases.
13	Course Contents	1. Introduction to Distributed Systems 2. System Models 3. Communication: Message Passing, Remote Procedure Call (RPC), Remote Method Invocation (RMI) 4. Naming: Generation and resolution 5. Time and Clocks in Distributed Systems: Applications, logical clocks, physical clocks, clock synchronization 6. Global State: Concepts, Snapshot algorithm, distributed debugging 7. Transaction Management: Serializability, locking mechanisms, 2-Phase Commit Protocol 8. Data Replication: Primary Copy, consensus protocols and other algorithms 9. Security: Methods for ensuring secrecy, integrity, authentication and authorization 10. Multicast Algorithms: Processing model, mulitcast semantics and algorithms
14	References/Learning Aids	• G. F. Coulouris, J. Dillimore, T. Kindberg: Distributed Systems: Concepts and Design, Addison-Wesley, 3rd Edition, 2001 • S. Tanenbaum: Distributed Systems: Principles and Paradigms, Prentice Hall, 2002 • P. A. Bernstein, V. Hadzilacos, N. Goodman: Concurrency Control and Recovery in Database Systems, Addison-Wesley, 1987 • S. Mullender (ed.): Distributed Systems, ACM Press Frontier Series, Addison-Wesley, 2nd Edition, 1993
15	Courses and Learning and Teaching Forms	Lecture Distributed Systems, 3.0 SWS Exercises Distributed Systems, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 42.00 Hours Self Study: 138.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	*none*
17b	Examination Achievements (Marked)	• Written Examination, Weight 1.0, 60 minutes, twice per year • Prerequisite for Exam: Exercise Certificate

18	Basis for ...	None

	Module	**DATE: 10.02.2009**
1	Module Name	**Embedded Systems Engineering**
2	Module ID	**051711**026
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Martin Radetzki Institut für Technische Informatik, Abt. Eingebettete Systeme 7816 - 270 martin.radetzki@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Martin Radetzki
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	Understanding of the design methodology and advanced design techniques for constructing and analyzing embedded hardware / software systems. Practical experience in utilizing and programming an embedded platform.
13	Course Contents	1. Introduction to embedded systems and their design constraints 2. High level synthesis, scheduling, allocation, binding 3. Pipelined data path and controller design 4. Software task scheduling and schedulability analysis 5. Static and dynamic methods for scheduling and priority assignment 6. Implementation architectures for embedded systems 7. Communication architectures; bus and memory systems 8. System synthesis; partitioning of specifications into hardware and software parts 9. Integrated hands-on exercises covering microcontroller programming, hardware / software interaction and cyclic executive scheduling of software tasks
14	References/Learning Aids	• Lecture Notes „Embedded Systems Engineering“. • Buttazzo, G:: Hard Real-Time Computing Systems. 2nd edition, Springer, 2005. • Eles, P.; Kuchcinski, K.; Peng, Z.: System Synthesis with VHDL. Kluwer Academic Publishers, 1998. • Marwedel,M.: Embedded Systems Design. Springer, 2006.
15	Courses and Learning and Teaching Forms	Lecture Embedded Systems Engineering, 3.0 SWS Exercises Embedded Systems Engineering, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	• Marked computer exercises, Weight 0.25, during the lecture period • Written examination, Weight 0.75, 90 minutes
18	Basis for ...	Embedded Systems Lab (051711036)
	Additional Information (Optional)	
19	Media Form	Laptop and Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	**DATE: 13.02.2009**
1	Module Name	**Flat Panel Displays**
2	Module ID	***051620****022*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Norbert Frühauf ISB/LfB 0711-685-66922 lfb@lfb.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Norbert Frühauf
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	Understanding the electro-optical effects used in flat panel displays, their driving concepts as well as manufacturing processes and display characterization methods
13	Course Contents	• Flat Panel Display Application Areas • Physiology of the visual system • Color Theory (Tristimulus Theory) • Electro-optical properties of liquid crystals • Organic Light Emitting Diodes • Electrophoretic Media • Other Electro optical effects • Plasma Displays • Passive and Active Matrix Addressing • Driver Circuits • Manufacturing Processes • Characterization of Flat Panel Displays
14	References/Learning Aids	• Lecture Notes „Flat Panel Displays“ • Lueder, E.: Liquid Crystal Displays, Wiley • Den Boer, W.: Active Matrix Liquid Crystal Displays, Newnes imprint of Elsevier
15	Courses and Learning and Teaching Forms	Lecture Flat Panel Display“, 3.0 SWS Exercises Flat Panel Displays, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Lab Course „Flat Panel Displays“
	Additional Information (Optional)	
19	Media Form	Laptop Presentation, Overhead Presentation, Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	From: Bachelor Program Elektrotechnik und Informationstechnik To: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Hardware Verification and Quality Assessment**
2	Module ID	**051710022**
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Hans-Joachim Wunderlich Institut für Technische Informatik, Abt. Rechnerarchitektur 0711-7816-391 wu@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Hans-Joachim Wunderlich
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	• Basic knowledge of methodologies and algorithms of functional and formal verification, diagnosis, test and design for testability of integrated circuits • Application of tools for simulation, verification and test insertion
13	Course Contents	Complex integrated circuits and systems are hardly designed fault free at first go. Also during production defects and an imperfect yield have to be expected. The course deals with the basic techniques to find and locate faults and defects in the design and in the manufactured, integrated system. The discussed methods are applied with the help of commercial and academic tools in exercises and labs. The course comprises: • Validation: Simulation and emulation in different design levels. • Formal verification: Equivalence checking and model checking. • Test: Fault simulation and test insertion. • Debug and diagnosis.
14	References/Learning Aids	Apart from lecture slides, the following books can be used to deepen on the topics of the lecture: • Börger, E.: Architecture Design and Validation Methods, Springer, 2000 • Abramovici, M.; Breuer, M.A.; Friedman, A.D.: Digital Systems Testing and Testable Design, IEEE Press, 1998 • Bushnell, M.L.; Agrawal, V.D.: Essentials of Electronic Testing, Kluwer, 2000 • Wang, L.T.; Wu, C.W.; Wen, X.: VLSI Test Principles and Architectures: Design for Testability, Morgan Kaufmann, 2006 • Hachtel, G.D.; Somenzi, F.: Logic Synthesis and Verification Algorithms, Kluwer, 1996 • Drechsler, R.; Becker, B.: Binary Decision Diagrams - Theory and Implementation, Kluwer 1998 • Kropf, T.: Introduction to Formal Hardware Verification, Springer, 2000 • Lam, W.K.: Hardware Design Verification, Prentice Hall, 2005 • McMillan, K.L.: Symbolic Model Checking, Kluwer Academic Publishers, 1993
15	Courses and Learning and Teaching Forms	Lecture Hardware Verification and Quality Assessment, 3.0 SWS Exercises Hardware Verification and Quality Assessment, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, twice per year
18	Basis for ...	

	Module	**DATE: 10.02.2009**
1	Module Name	**Hardware/Software Co-Design**
2	Module ID	**051711**031
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Not offered
7	Language	English
8	Module Responsible	Prof. Dr. Martin Radetzki Institut für Technische Informatik, Abt. Eingebettete Systeme 7816 - 270 martin.radetzki@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Martin Radetzki
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	none
12	Learning Targets	Ability to conceptualize systems so that an application-specific, optimized trade-off between hardware and software implementation of system functionality is achieved.
13	Course Contents	This module deals with the joint design and optimization of hardware and software for pre-defined applications, covering the following topics: 1. Models for system specification 2. Modelling and simulation with the SystemC library 3. Synthesis of system architectures 4. Resource allocation and operation binding 5. Partitioning of functionality among hardware and software 6. Scheduling and schedulability for parallel multi-core architectures 7. Methods for system optimization 8. Application specific instruction set processors (ASIPs) 9. Network-on-Chip (NoC) interconnect architectures
14	References/Learning Aids	Lecture Notes „Hardware/Software Co-Design“. J. Teich: Digitale Hardware-Software-Systeme. 2. Auflage, Springer, 2007 G. De Micheli, L. Benini: Networks on Chips. Morgan Kaufman Publishers, 2006.
15	Courses and Learning and Teaching Forms	Lecture Hardware/Software Co-Design, 3.0 SWS Exercises Hardware/Software Co-Design, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Marked computer exercises, Weight 0.25, during the lecture period • Written examination, Weight 0.75, 90 minutes
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop and Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	DATE: 10.02.2009
1	Module Name	**Hardware-Based Fault-Tolerance**
2	Module ID	**051710023**
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Hans-Joachim Wunderlich Institut für Technische Informatik, Abt. Rechnerarchitektur 0711-7816-391 wu@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Hans-Joachim Wunderlich
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	• Knowledge of methods for reliability assessment of circuits and systems • Error control coding • Self checking circuits
13	Course Contents	Micro- and Nano-electronic systems can exhibit failures both right after production and during their operation. Systems for which safety and security is of concern have to be designed in a way that the desired function can be delivered even if some components fail or produce erroneous outputs. This lecture presents the most important design techniques that allow tolerating hardware faults up to a certain degree. The topics of the lecture are as follows: • Terminology • Measures of fault tolerance • Techniques for structural and time redundancy • Error detection and diagnosis • Fault masking, repair, reconfiguration • Fault-tolerant distributed systems
14	References/Learning Aids	Apart from lecture slides, the following books can be used to deepen on the topics of the lecture: • Koren, I.; Krishna, C.M.:Fault-Tolerant Systems Morgan-Kaufman, 2007 • Lala, P.K.: Self-Checking and Fault-Tolerant Digital Design, Morgan Kaufmann Publishers (2001) • Pradhan, D.K.:Fault-Tolerant Computer Design, Prentice Hall (1996) • Rao, R.N.; Fujiwara, E.: Error Control Coding for Computer Systems, Prentice Hall (1989) • Bushnell, M.L.; Agrawal, V.D.:Essentials of Electronic Testing, Klumer Academic Publishers (2000) • Jha, N.; Gupta, S.:Testing of Digital Systems, Cambridge University Press (2003)
15	Courses and Learning and Teaching Forms	LectureHardware Based Fault Tolerance, 3.0 SWS Exercises Hardware Based Fault Tolerance, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	

	Module	DATE: 10.02.2009
1	Module Name	**Human-Computer Interaction**
2	Module ID	**051900**003
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Thomas Ertl VIS 0711-7816-331 thomas.ertl@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Thomas Ertl, Prof. Dr. Daniel Weiskopf Prof. Dr. Carsten Dachsbacher Prof. Dr. Gunther Heidemann
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Advanced Higher Mathematics
12	Learning Targets	Understanding of methods and concepts of HCI, especially graphical-interactive systems: Architecture and technical functionality of GUI systems; cognitive foundation and consequences for software ergonomics; practical experience with the development of user interfaces with different programming interfaces.
13	Course Contents	• Introduction: Relationship to other fields and history • Human factors: (visual) perception, motor function, memory • Computer aspects: Input/output devices, display architectures, event processing, multimedia basics, 2D graphics • Interaction concepts and styles • Window systems and GUI toolkits • Software ergonomics, design principles, norms, models, tools • Evaluation: expert and user evaluation • Specialized systems: mobile devices, virtual/augmented
14	References/Learning Aids	• Dix, A.; Finley, J.; Abowd, G.; Beale, R.: Human-Computer Interaction, 2004 • Preim, B.: Entwicklung interaktiver Systeme, 1999 • Shneidermann, B.; Plaisant, C.: Designing the User Interface, 2005
15	Courses and Learning and Teaching Forms	Lecture Human-Computer Interaction, 2.0 SWS Exercises Human-Computer Interaction, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	Exercises
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Informatik & Softwaretechnik to: Information Technology

	Module	**DATE: 10.02.2009**
1	Module Name	**Image Understanding**
2	Module ID	**051200**121
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. rer. nat. habil. Paul Levi Institute of Parallel and Distributed Systems, Image Understanding Department +49 711 7816 387 Paul.Levi@ipvs.uni-stuttgart.de
9	Lecturers	3rd term
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basic knowledge of programming techniques, data structures and algorithms, mathematics
12	Learning Targets	The student possesses theoretical and practical knowledge about essential operations and notions of images processing. This includes filtering, correlation, morphological and edge operations and segmentation approaches. The student is especially proficient with digital methods of image transformation.
13	Course Contents	Detailed explanation of essential operations and notions of images processing. The main points are Continuous fourier transform and convolution, discrete fourier transform and convolution, spatial and frequency filters, spatial & color image enhancement, image processing by stochastic models, edge detection, edge following and linking, hough-transformation, features extraction, threshold and region-based segmentation, graph-based and contour-based segmentation, mathematical morphology, application of mathematical morphology and an introduction into semantic image processing/understanding.
14	References/Learning Aids	• Gonzalez, R.C.; Woods, R.E.: Digital Image Processing, Addison-Wesley Publishing Company, 2002 • Faugeras, O.: Three-dimensional computer vision: A geometric viewpoint, The MIT Press, Cambridge, Massachusetts London, England, 1993 • Jain, A.K.: Fundamentals of digital image processing, Prentice-Hall Internation, Inc., 1989 • Haralick, R.M.; Shapiro, L.G.: Computer and Robot Vision, Vol. II, Addison Wesley, 1993 • Sagerer, G.; Niemann, H.: Semantic Networks for Understanding Scenes, Plenium Press, 1997 • Nilsson, N.J.: Artificial Intelligence: A new synthesis, Morgan Kaufmann Publishers, 1998 • Kropatsch, W.G.; Bischof, H. (Eds.): Digital Image Analysis: Selected Techniques and Applications, Springer-Verlag New York, 2001
15	Courses and Learning and Teaching Forms	Lecture Image Understanding, 2.0 SWS Exercises Image Understanding, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	

	Module	**DATE: 10.02.2009**
1	Module Name	**Imaging Science**
2	Module ID	**051900**210
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1 Semester
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andrés Bruhn VIS-IS
9	Lecturers	Prof. Dr.-Ing. Andrés Bruhn
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Advanced Higher Mathematics
12	Learning Targets	• The student knows the basics of digital image representation and processing and is able to solve problems of the field using the methods presented in the course..
13	Course Contents	• Fundamentals of optics such as pinhole camera and lens equation • Image acquisition: Cameras, lenses, illumination, acquisition process • Image representation: Discretization, color spaces • Basics of image processing, e.g. point operations such as contrast enhancement or binarization • Linear and nonlinear filtering such as convolution and morphological operations. • Fourier transform, image representation and processing in Fourier space, sampling theorem • Orthogonal transforms such as cosine transform and wavelets • Compression: Generic compression (RLE, entropy coding), methods specialized to domain of images (e.g. jpeg) • Video: file formats, compression (e.g. avi, mpeg) • Image enhancement and restauration • Basics of segmentation: Histograms, colors, contours
14	References/Learning Aids	• Bässmann, Henning; Kreyss, Jutta, Bildverarbeitung Ad Oculos, 2004 • Forsyth, David and Ponce, Jean, Computer Vision. A Modern Approach.: A Modern Approach Computer Vision. A Modern Approach, 2003 • Gonzalez, Rafael C.; Woods, Richard E.; Eddins, Steven L., Digital Image Processing, 2004 • Bigun, J.: Vision with Direction, 2006 • Klaus D. Tönnies, Grundlagen der Bildverarbeitung, 2005 • L. G. Shapiro, G. C. Stockman, Computer Vision, 2001
15	Courses and Learning and Teaching Forms	Lecture Imaging Science, 2.0 SWS Exercise Imaging Science, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	Exercises
17b	Examination Achievements (Marked)	Written or Oral Examination Weight 1.0 120 min, twice per year, Admission requirements
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	

21	Import-Export Module	From: Bachelor Program Informatik & Softwaretechnik
		to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Industrial Automation Systems**
2	Module ID	***050501****012*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Dr. h. c. Peter Göhner Institute of Industrial Automation and Software Engineering Tel.: 0711 / 685-67301 E-Mail: ias@ias.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Dr. h. c. Peter Göhner
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basics of Industrial Automation
12	Learning Targets	The students are capable to execute automation projects professionally and to use the required development and automation methods, and the required software tools.
13	Course Contents	Automation Projects, Automation Methods, Development Methods for Automation Systems, Automation with Qualitative Models, Safety and Reliability of Automation Systems
14	References/Learning Aids	• Stenerson: Industrial Automation and Process Control, Prentice Hall, 2002 • Lauber, R.; Göhner, P.:Prozessautomatisierung Volume 2 (3rd Edition), Springer, 1999 • Lecture Notes • Lecture portal with lecture records on http://www.ias.uni-stuttgart.de/ias
15	Courses and Learning and Teaching Forms	Lecture Industrial Automation Systems, 2 SWS Exercise Industrial Automation Systems, 2 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Lab Course Industrial Automation
	Additional Information (Optional)	
19	Media Form	Laptop Presentation with recording of lectures and exercises
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Elektrotechnik und Informationstechnik to: Information Technology

	Module	**DATE: 12.02.2009**
1	Module Name	**Intelligent Sensors and Actors**
2	Module ID	**050500** 001
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. habil. Jörg Schulze Institut für Halbleitertechnik 685 68000 schulze@iht.uni-stuttgart.de
9	Lecturers	Prof. Dr. habil. Jörg Schulze
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basic understanding in material science and microelectronic device functions.
12	Learning Targets	This course covers the design and fabrication of a range of silicon-based devices from diodes and transistors, to sensors and actuators such as those used in automotive applications. The course also covers all aspects of Si device processing, with most processes being available in our clean room. Students can therefore gain familiarity with fabrication techniques including deposition, photolithography, wet and dry etching, oxidation, and diffusion. Our institute has strong links with semiconductor manufacturing companies, reflected in the course syllabus.
13	Course Contents	• Sensor and actor principles • Micromachining in silicon • Integration with microelectronics circuits • Device principles, characteristics, monolithic integration techniques, packaging • Examples with emphasis on automotive applications.
14	References/Learning Aids	• Lecture Notes “Intelligent Sensors and Actors”, • Gardner, J.W.: Microsensors- Principles and Applications, Wiley
15	Courses and Learning and Teaching Forms	Lecture Intelligent Sensors and Actors, 2.0 SWS Exercises Intelligent Sensors and Actors, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written Examination “Intelligent Sensors and Actors” Weight 1.0 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Board, PowerPoint (laptop presentation)
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: to:

	Module	**DATE: 19.04.2011**
1	Module Name	**IT Service Management**
2	Module ID	05091007
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Annual (SS)
7	Language	english
8	Module Responsible	Dr.-Ing. Jürgen Jähnert, MFG Baden-Württemberg 0711 90715 501
9	Lecturers	Dr.- Ing. Jürgen Jähnert
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module, Supplementary Module
11	Prerequisites	CN
12	Learning Targets	In this lecture the basic knowledge and formal knowledge of IT service management is taught. At the end of the course the student has the ability to systematically and comprehensively solve current problems of the IT operation. The student further got an introduction in related aspects like (legal aspects of IT service management, business related aspects of IT Service management and basics of business process management)
13	Course Contents	Terminology and operating concepts, Security, Infrastructure design, Process modeling, Service, formal SLA agreement and management, economic efficiency, operational aspects, Identity Management, Access Management, Accounting, Billing, Charging,
14	References/Learning Aids	Lecture Notes, Nakhjiri & Nakhjiri: AAA and Network Security for Mobile AccessWiley press, ISBN: 0-47001194-7 Andrew S. Tannenbaum, Computer Networks, Prentice Hall, ISBN 0-13-038488-7 www.tmforum.org www.itil.org
15	Courses and Learning and Teaching Forms	Lecture IT Service Management, 2 SWS Exercises IT Service Management, 2 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	*none*
17b	Examination Achievements (Marked)	Oral Examination once a year, 90 min
18	Basis for ...	-
	Additional Information (Optional)	
19	Media Form	Laptop-Präsentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Modeling, Simulation, and Specification**
2	Module ID	**051711**021
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Martin Radetzki Institut für Technische Informatik, Abt. Eingebettete Systeme 7816 - 270 martin.radetzki@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Martin Radetzki
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	none
12	Learning Targets	Understanding of and practical experience with fundamental models of computation and their simulation, ability to apply them to embedded systems specification.
13	Course Contents	Given the complexity and implementation cost of contemporary electronic systems, it is essential to specify their intended functionality before elaborating the implementation. This course focuses on the model-based and executable specification of embedded systems and covers the following topics: Hardware description with VHDL; Kahn process networks, synchronous data flow networks; specification of timing, concurrency, and non-functional aspects; object-oriented modeling of embedded systems; event-driven simulation; modeling levels with emphasis on transaction level modeling; application to embedded systems specification; integrated hands-on exercises using VHDL and SystemC.
14	References/Learning Aids	• Lecture Notes “Modeling, Simulation, and Specification”. • Jantsch: Modeling Embedded Systems and SoCs Concurrency and Time in Models of Computation. Morgan Kaufman Publishers, 2004. • Black, D.; Donovan,D.: SystemC from the Ground Up. Kluwer Academic Publishers, 2004. • Ashenden, P.J.: The Designer’s Guide to VHDL. 2nd edition, Morgan Kaufman Publishers, 2002. • Ashenden, P.J.: The Student’s Guide to VHDL. Morgan Kaufman Publishers, 1998.
15	Courses and Learning and Teaching Forms	Lecture Modeling, Simulation, and Specification, 3.0 SWS Exercises Modeling, Simulation, and Specification, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	• Marked computer exercises, Weight 0.25, during the lecture period • Written examination, weight 0.75, 90 minutes
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop and Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:

		nach: Bachelorstudiengang Informatik (als Wahlfach aus einem Masterprogramm)

	Module	DATE: 10.02.2009
1	Module Name	**Networks and Processes**
2	Module ID	**050400***001*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every 2nd semester, summer term
7	Language	English
8	Module Responsible	Prof. Volker Diekert Institut für Formale Methoden der Informatik (FMI) 7816-329 diekert@fmi.uni-stuttgart.de
9	Lecturers	Variable
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	The aim of this course is to enable students to grasp and apply the basics of formally specifying and verifying parallel, distributed systems. The students shall learn how to model and analyse systems with Petri-nets. Moreover, the students are able to express system properties in the temporal logics LTL and CTL, and to model check such properties against a finite system description (Kripke structure). Finally, basic implementation issues are to be understood by an introduction to BDDs and an algorithm to identify strongest connected components in a directed graph.
13	Course Contents	The first part of this course gives an introduction to the modeling and analysis of parallel and distributed systems with Petri-nets. Basic analysis techniques, like reachability- and coverability graph, place invariants, and traps are considered. The second part introduces the specification of system properties with temporal logics both linear time (with LTL) and branching time (with CTL). Suitable model-checking techniques for both LTL and CTL are given to verify properties on systems. Such techniques form the basics of computer aided verification algorithms. Finally the course ends with the consideration of binary decision diagrams (BDD) as the predominant data structure for representing sets in implementations of the verification procedures described earlier.
14	References/Learning Aids	• Reisig: Elements of Distributed Algorithms: Modeling and Analysis with Petri Nets, Springer, 1998 • Reisig: Petrinetze: Eine Einführung, Springer, 1986 • Clarke; Grumberg; Peled: Model Checking, MIT Press, 1999 • Thomas, W:: Automata on Infinite Objects, Chapter 4 in Handbook of Theoretical Computer Science • Holzmann, G.: The Spin Model Checker, Addison-Wesley, 2003 • Andersen, H.R.: An Introduction to Binary Decision Diagrams, Lecture notes, Department of Information Technology, IT University of Copenhagen, http://www.itu.dk/people/hra/bdd97-abstract.html
15	Courses and Learning and Teaching Forms	Lecture Networks and Processes, 3.0 SWS Exercises Networks and Processes, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	

	Module	**DATE: 10.02.2009**
1	Module Name	**Optical Signal Processing**
2	Module ID	***051620****021*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Norbert Frühauf ISB/LfB 0711-685-66922 lfb@lfb.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Norbert Frühauf
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	System and Signal Theory
12	Learning Targets	Understanding the principles and methods used in physical (wavebased) optics, being able to describe and analyze optical systems using system theory based approaches
13	Course Contents	• Optical Signals • Coherence Theory • Systems Theory of Linear Optical Systems • Analog Optical Signal Processing • Free Space Optical Propagation • Paraxial • Fresnel and Fraunhofer Approximations • Near Field Optics • Optical Imaging • Resolution Limit • Fourier Optics • Optical Filtering and Correlation • Optical Storage, CD • DVD • Blue Ray • Holography • Thin Hologram • Kogelnik Coupled Wave Equations • Volume Holograms • Optical Sensors
14	References/Learning Aids	• Lecture Notes „Optical Signal Processing“ • E. Hecht, Optics, Addison-Wesley • M. Born and E. Wolf, Principles of Optics, Pergamon Press • G.B. Parrent and B. J. Thomson, The New Physical Optics Notebook: Tutorials in Fourier Optics, SPIE Optical Engineering Press • A. Vander Lugt, Optical Signal Processing, Wiley
15	Courses and Learning and Teaching Forms	Lecture Optical Signal Processing, 3.0 SWS Exercises Optical Signal Processing, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, twice per year
18	Basis for ...	Lab Course Optical Signal Processing
	Additional Information (Optional)	

19	Media Form	Laptop Presentation, Overhead Presentation, Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	From: Master Program Elektrotechnik und Informationstechnik
		To: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Optoelectronic Devices and Circuits I**
2	Module ID	050513001
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr. habil. Jürgen H. Werner Institut für Physikalische Elektronik, Pfaffenwaldring 47, 70569 Stuttgart (0711) 6856 7140 juergen.werner@ipe.uni-stuttgart.de
9	Lecturers	Prof. Dr. habil. Jürgen H. Werner
10	Application / Allocation to Curriculum	Pflichtmodul, 6. Fachsemester, BSc. Elektrotechnik und Informationstechnik; Schwerpunkt: Mikro-und Optoelektronik Master INFOTECH, Core Module
11	Prerequisites	Basics of Physics, Mathematics and Electrical Engineering
12	Learning Targets	• Fundamentals of incoherent and coherent radiation and its generation using light emitting diodes and semiconductor lasers • Communication via glass fibers • Radiation detection with photodetectors.
13	Course Contents	• Basics of incoherent and coherent radiation • Semiconductor basics • Excitation and recombination processes in semiconductors • Light emitting diodes • Semiconductor lasers • Glass fibers • Photodetectors
14	References/Learning Aids	• Hecht, E.: Optics 3rd edition (Addison Wesley, Peading, MA, 1998). • Wagemann, H.G.; Schmidt, H.: Grundlagen der optoelektronischen Halbleiterbauelemente (Teubner, Stuttgart, 1998). • Weber, H.; Herziger, G.: Laser – Grundlagen und Anwendungen (Physik-Verlag Weinheim, 1972). • Gerthsen, C.; Kneser, H.O.; Vogel, H.: Physik 16. Auflage (Springer. Berlin, 1989). • Pankove, J.I.: Optical Processes in Semiconductors (Dover Publications, New York, 1971). • Bludau, W.: Halbleiteroptoelektronik: Die physikalischen Grundlagen der LEDs, Diodenlaser und pn-Photodioden (Carl Hanser, München, 1995). • Leigh, W.L.: Devices for Optoelectronics (Dekker, New York, 1996). • Strobel, O.: Lichtwellenleiter – Übertragungs- und Sensortechnik (VDE-Verlage, Berlin, 1992). • Daleh, B.E.; Teich, M.T.: Fundamentals of Photonics (Wiley Interscience, New York, 1981). • Winstel, G.; Weyrich, C.: Optoelektronik II (Springer-Verlag, Berlin, 1986).
15	Courses and Learning and Teaching Forms	Lecture Optoelectronic Devices and Circuits I, 2.0 SWS Exercises Optoelectronic Devices and Circuits I, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, twice a year
18	Basis for ...	

	Module	DATE: 10.02.2009
1	Module Name	**Optoelectronic Devices and Circuits II**
2	Module ID	**050200**007
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Manfred Berroth Institut für Elektrische und Optische Nachrichtentechnik 0711/68567922 Manfred.Berroth@int.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Manfred Berroth
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Bachelor of Science
12	Learning Targets	Understanding of integrated waveguides and active optical devices for telecommunication applications
13	Course Contents	• Wave propagation in planar waveguides • Integrated waveguides an passive structures • Optical amplifiers • Semiconductor lasers • Modulators • Photodiodes • Systems
14	References/Learning Aids	• Lecture Notes • Ebeling: Integrated Optoelectronics, Springer-Verlag, Berlin, 1992 • Grau; Freude: Optische Nachrichtentechnik, Springer-Verlag, Berlin, 1991 • Pollock: Fundamentals of Optoelectronics, Irwin-Verlag, Berlin, 1995 • Unger: Optische Nachrichtentechnik Teil 1 und 2, Huethig-Verlag, Heidelberg, 1992/1993
15	Courses and Learning and Teaching Forms	Lecture Optoelectronic Devices and Circuits II, 2.0 SWS Exercises Optoelectronic Devices and Circuits II, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Written Examination • Weight 1.0 • 120 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation, Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	DATE: 10.02.2009
1	Module Name	**Physical Design of Integrated Circuits**
2	Module ID	**050200***006*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Manfred Berroth Institut für Elektrische und Optische Nachrichtentechnik 0711/68567922 Manfred.Berroth@int.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Manfred Berroth
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Bachelor of Science
12	Learning Targets	Understanding of integrated circuit design, technology, design methods and tools for design and test of integrated circuits
13	Course Contents	• VLSI-design • Top-Down-Design • Technologies for integrated circuits • Design tools • Test of integrated circuits • Clock distribution and asynchronous circuits • Alternative technologies und Logic families
14	References/Learning Aids	• Lecture Notes • Hoffmann: VLSI-Entwurf, Modelle und Schaltungen, Oldenburg Verlag 1996 • West; Eshraghian: Principles of CMOS VLSI Design, A Systems Perspective, Addison-Wesley Publishing Company 1988 • Wojtkowiak: Test und Testbarkeit digitaler Schaltungen, Teubner 1988 • Wunderlich: Hochintegrierte Schaltungen: Prüfgerechter Entwurf und Test, Springer Verlag 1991 • Reifschneider: CAE-gestützte IC-Entwurfsmethoden, Prentice Hall 1998
15	Courses and Learning and Teaching Forms	Lecture Physical Design of Integrated Circuits, 2.0 SWS Exercises Physical Design of Integrated Circuits, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation, Blackboard Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Radio Frequency Technology**
2	Module ID	***050600****026*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Semester
7	Language	English
8	Module Responsible	Prof. Jan Hesselbarth IHF 0711-685-67422 mail@ihf.uni-stuttgart.de
9	Lecturers	Dr. Mahler, IHF.
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basic knowledge of Radio Frequency Technology
12	Learning Targets	The students have knowledge and understanding of various electromagnetic waveguiding phenomena as well as of cavity resonators and radio frequency amplifiers including receiver noise phenomena.
13	Course Contents	Coupled transmission lines, directional couplers, rectangular hollow waveguide, circular hollow waveguide, cavity resonators, hollow waveguide circuits, two-port amplifiers and stability, noise and its treatment in radio frequency circuits.
14	References/Learning Aids	• Lecture script, • Collin: Foundation of Microwave Engineering, 2nd Ed., John Wiley & Sons, 2002, • Collin: Field Theory of Guided Waves, John Wiley & Sons, 1999, • Marcuvitz, Waveguide Handbook, Inst. of Eng. and Techn., 1986, • Pozar: Microwave Engineering, 3rd Ed., John Wiley & Sons, 2005, • Schiek, Rolfes, Siweris : Noise in High-Frequency Circuits and Oscillators, John Wiley & Sons, 2006.
15	Courses and Learning and Teaching Forms	Lecture Radio Frequency Technology, 2.0 SWS Exercises Radio Frequency Technology, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Blackboard Presentation + Overhead Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Elektrotechnik und Informationstechnik to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Real-time Programming**
2	Module ID	**051510**301
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer or Winter term, as announced
7	Language	English
8	Module Responsible	Prof. Dr. Erhard Plödereder ISTE/PS 0711-7816-322 ploedere@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Erhard Plödereder
10	Application/Allocation to Curriculum	• Master INFOTECH, Core Module • Master-Programm Informatik, Vertiefungsmodul; Wahlpflicht; beliebig • Master-Programm Softwaretechnik, Vertiefungsmodul; Wahlpflicht; beliebig
11	Prerequisites	None within the Master program. However, significant programming experience (not necessarily in real-time application) from any source is highly advisable to be able to follow the contents of this module. Knowledge of Ada, C, Java and Unix are helpful, but not specifically required.
12	Learning Targets	Students will have acquired knowledge about the major differences that distinguishes general programming from real-time programming. They know the mechanisms by which tools can assist to provide guarantees about maximum memory requirements. They are capable to judiciously apply certain language features to construct highly reliable software that meets deadlines imposed on timely response. They understand the mechanisms that allow early guarantees that deadlines will be met. They can assess the specific and identifiable risks associated with the use of certain features commonly present in today's programming languages.
13	Course Contents	The course focuses on the specific requirements arising from programming real-time (or embedded) systems. These systems differ from the typical, more traditional information processing systems and hence place new requirements on the programming language as well as the programmer. The following topics are covered: • Introduction to real-time systems • Memory management • Fault tolerance and error recovery • Scheduling in real-time applications • Concurrency • Communication and synchronization • Device communication and interrupts • Response Time Analysis
14	References/Learning Aids	Textbook: • Burns, A.: Wellings,A.: Real-Time Systems and Programming Languages, Addison Wesley (March 2001) • Lecture Notes (annually revised)
15	Courses and Learning and Teaching Forms	Lecture Real-Time Programming, 3.0 SWS Lab class: Real-Time Programming, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Real-Time Programming Weight 1.0, 120 minutes written, twice a year

18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop presentation, human voice, auxiliary media, chalk on blackboard
20	Description of Associated Module Examinations and Examination ID	Real-Time Programming, 051510301
21	Import-Export Module	from: Faculty 5
		to: t.b.d.

	Module	DATE: 12.02.2009
1	Module Name	**Semiconductor Technology I**
2	Module ID	**050500** 002
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. habil. Jörg Schulze Institut für Halbleitertechnik 685 68000 schulze@iht.uni-stuttgart.de
9	Lecturers	Prof. Dr. habil. Jörg Schulze
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Device principles, material engineering
12	Learning Targets	The student understands the basics of device fabrication and integrated circuits manufacture, improved understanding of frond end of line (FEOL) processing and related equipment.
13	Course Contents	• Semiconductor materials and semiconductor devices: raw materials. • Crystal growth: refining, methods. • Epitaxy: surface, chemical vapor deposition (CVD). • Doping methods: diffusion, ion implantation, profiles, defects, in situ analysis. • Film deposition: dielectric films, thermal oxide, plasma enhanced deposition, poly-Si, • Metals, silicide contacts, interconnect. • Structuring: photolithography, resolution limits, etching techniques, wet etching, dry etching, anisotropy, selectivity, lift off. • Bonding techniques and mounting. • Semiconductor measurement techniques. • Semiconductor devices: diodes, bipolar transistors, field effect transistors, integrated circuits, planar technology, self adjustment
14	References/Learning Aids	• Lecture Notes “Semiconductor Technology I”, • Chang, C.Y.; Sze, S.: ULSI-Devices, Wiley • Hilleringmann, U.: Silizium-Halbleitertechnologie, Teubner
15	Courses and Learning and Teaching Forms	Lecture Semiconductor Technology I, 2.0 SWS Exercises Semiconductor Technology I, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written Examination “Semiconductor Technology I” Weight 1.0, 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Board, Powerpoint (laptop presentation)
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from:
		to:

	Module	DATE: 12.02.2009
1	Module Name	**Software Engineering for Real-Time Systems**
2	Module ID	***050501****011*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Dr. h. c. Peter Göhner Pfaffenwaldring 47, 70550 Stuttgart Tel.: 0711 / 685-67301 E-Mail: ias@ias.uni-stuttgart.de
9	Lecturers	Dr.-Ing. Christof Ebert
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Basics of computer science
12	Learning Targets	Acquire basic knowledge and skills about software engineering for embedded real-time software systems; understand the specific challenges of software engineering for real-time systems; understand the development process for real-time software from requirements to maintenance
13	Course Contents	Introduction to real-time systems and embedded systems; challenges of software engineering for real-time systems; real-time software development process; analysis and design methods for real-time software; model-driven development, requirements engineering; design of real-time systems; software verification and validation; industrialization of software; project management.
14	References/Learning Aids	• Sommerville, I.: Software Engineering Addison Wesley, 2006 • Cooling, J.: Software Engineering for Real-Time Systems Addison-Wesley, 2002 • Heath, S.: Embedded Systems Design (2nd ed.), Newnes, 2002 • Lewis, W.E.: Software Testing and Continuous Quality Improvement, Auerbach Publications, 2000 • Lecture portal with lecture records on http://www.ias.uni-stuttgart.de/ser
15	Courses and Learning and Teaching Forms	Lecture Software Engineering for Real-Time Systems, 2.0 SWS Exercises Software Engineering for Real-Time Systems, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop presentation; printed lecture and exercise handouts; case studies; Internet accessible recording of lectures and exercises
20	Description of Associated Module Examinations and Examination ID	Software Engineering for Real-Time Systems
21	Import-Export Module	from: to: Information Technology

	Module	**DATE: 10.02.2009**
1	Module Name	**Solid State Electronics**
2	Module ID	050513021
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr. habil. Jürgen H. Werner Institut für Physikalische Elektronik, Pfaffenwaldring 47, 70569 Stuttgart (0711) 6856 7140 juergen.werner@ipe.uni-stuttgart.de
9	Lecturers	Prof. Dr. habil. Jürgen H. Werner
10	Application / Allocation to Curriculum	Wahl-Pflichtmodul, 1. Fachsemester, MSc. Elektrotechnik und Informationstechnik; Schwerpunkt: Mikro- und Optoelektronik. Master INFOTECH, Core Module
11	Prerequisites	Knowledge in Microelectronics
12	Learning Targets	Basic understanding of the quantization of electronic states in semi-conductors, band structure and band models
13	Course Contents	• Electrons described by waves • Electronic bands in Solids • Quasi-Fermi-levels • Emission of electrons from solids • Schottky contacts • Optoelectronic effects in semiconductors • Characterization of semiconductors
14	References/Learning Aids	Pierret, R.F.: Advanced Semiconductor Fundamentals, 2nd ed., (Prentice Hall, Upper Saddle River, NJ USA), 2002
15	Courses and Learning and Teaching Forms	Lecture Solid State Electronics, 2.0 SWS Exercises Solid State Electronics, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	PowerPoint, Black Board
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: to

	Module	DATE: 10.02.2009
1	Module Name	**Statistical and Adaptive Signal Processing**
2	Module ID	**051610**022
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bin Yang ISB/LSS Tel: 0711/68567330 bin.yang@LSS.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Bin Yang
10	Application/Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Course “Advanced Higher Mathematics”, “System and Signal Theory”
12	Learning Targets	Students learn advanced statistical methods and algorithms for parameter estimation (classical and Bayes parameter estimation), design of optimum filters (Wiener and Kalman filter) and adaptive filters.
13	Course Contents	• Parameter estimation, bias, covariance matrix, mean square error (MSE) • Classical parameter estimation, minimum variance unbiased estimator (MVUE), Cramer-Rao bound, maximum-likelihood (ML) estimator, least-squares (LS) estimator, transform of parameters • Bayesian parameter estimation, maximum a posteriori (MAP), minimum mean square error (MMSE), linear MMSE • Wiener filter, method of steepest descent • Linear prediction, Levinson-Durbin algorithm, lattice filter • Kalman filter
14	References/Learning Aids	• Lecture slides; • Kay, S. M.:: Fundamentals of statistical signal processing: Estimation theory, vol. 1, Prentice-Hall, 1993 • Haykin,S.: Adaptive filter theory, 4. Auflage, Prentice-Hall, 2002 • Manolakis, D.G. et al.: Statistical and adaptive signal processing, McGraw-Hill, 2000
15	Courses and Learning and Teaching Forms	Lecture Statistical and adaptive signal processing, 2.5 SWS Exercises Statistical and adaptive signal processing, 1.5 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, once per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Blackboard + Projector + Beamer
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	**DATE: 10.02.2009**
1	Module Name	**Visualization**
2	Module ID	**051900**013
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1 Semester
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Daniel Weiskopf VISUS Tel. 0711 / 7816-368 E-Mail: weiskopf@visus.uni-stuttgart.de
9	Lecturers	Prof. Dr. Thomas Ertl, Prof. Dr. Daniel Weiskopf Prof. Dr. Carsten Dachsbacher
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	Advanced Higher Mathematics Introductory course on programming (e.g. as covered in 051520005 Programmierung und Software-Entwicklung), basic programming skills, knowledge of linear algebra, numerical mathematics
12	Learning Targets	Students will have obtained knowledge about the foundations, algorithms, and data structures of visualization as well as practical skills through working with visualization software.
13	Course Contents	Visualization deals with all aspects of visual representation of data from scientific experiments, simulation, medical scanners, or similar data sources. The goal is to obtain a deeper insight or a simpler representation of complex phenomena or facts. To achieve this goal, established techniques from the field of interactive computer graphics as well as newly developed techniques are applied. The following topics are covered in this course: • Introduction, history, visualization pipeline • Data acquisition and representation (sampling, reconstruction, grids, data structures) • Perceptual aspects • Basics of visual mappings • Visualization of scalar fields (isosurface extraction, volume rendering) • Vector field visualization (particle tracing, texture-based methods, topology) • Tensor fields, multi-attribute data • High-dimensional data and information visualization
14	References/Learning Aids	Course slides will be provided; material and assignments for exercises will be provided. Literature: • Schumann, H.; Müller, W.: Visualisierung: Grundlagen und allgemeine Methoden, 2000 • Hansen, C.D.; Johnson, C.R. (eds.): The visualization handbook, Elsevier, 2005 • Ware: Information Visualization: Perception for Design, 2004 • Engel, K.; Hadwiger, M.; Kniss, J.M.; Rezk-Salama, C.; Weiskopf, D.: Real-time Volume Graphics, 2006
15	Courses and Learning and Teaching Forms	Lecture Visualization, 3.0 SWS Exercises Visualization, 1 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	Exercises

17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 120 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	From: Informatik & Softwaretechnik
		to: Information Technology

	Module	**DATE: 13.07.2010**
1	Module Name	**Web Technologies**
2	Module ID	052061???
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr. Frank Leymann Institute of Architecture of Application Systems (IAAS) 0711-7816 470 leymann@iaas.uni-stuttgart.de
9	Lecturers	Prof. Dr. Frank Leymann, JP Dr. Dimka Karastoyanova
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	The main goal of the lecture is to describe the evolution oft he Web into an integration platform. Students should understand Web technologies as integration technology. The goal is to understand the big picture behind the numerous Web service standards and standard proposals: The evolution of a „"service bus“.
13	Course Contents	The lecture covers the field of Web based application integration using Web technologies. First of all integration at the UI level is covered. In particular the access to and visualization of information using HTTP, HTML, WAP, CSS, and Servlets/JSPs. E-Mail protocols used for the “integration of humans” are covered. In the last part of the lecture Web services are discussed in detail. Standards such as SOAP, WSDL, WS-Policy, WS-Coordination, WS-BPEL, etc. are discussed.
14	References/Learning Aids	• Lecture Notes Web Technology • Weerawarana, S.; Curbera, F.; Leymann, F.; Storey, T.; Ferguson, D.: “Web Services Platform Architecture”, Prentice Hall 2005 • Alonso, G.; Casati, F.; Kuno, H.; Machiraju, V:“Web Services” Springer 2004 • Wilde, E.: “World Wide Web”, Springer 1999 • Papazoglou, M.P.: “Web Services: Principles & Technology”, Pearson Education Limited 2008
15	Courses and Learning and Teaching Forms	Lecture Web Technologies, 2.0 SWS Exercises Web Technologies, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, 60 min, twice a year (Weight 0.5) Exercises Examination (Weight 0.5)
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Informatik to: Information Technology

Supplementary Modules – Spezialisierungsfächer (Fachspezifische Ergänzungsfächer,Wahlfächer 1 und 2) - SM12

	Module	**DATE: 10.02.2009**
1	Module Name	**Data Compression**
2	Module ID	***051200****134*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	• Basic Knowledge of Mathematics • Basic Knowledge of a Programming Language
12	Learning Targets	Good understanding of data compression concepts and fundamental compression algorithms, understanding of image and video compression processes, overview of the modern compression standards.
13	Course Contents	• Introduction to data compression: Entropy • Fundamental lossless data compression algorithms: • Huffman Coding • Arithmetic Coding • Dictionary Methods • Context-based Compression • Fundamentals of lossy compression, reduction of irrelevancy, • Quantization • Image representation and image transforms • Applications of Data Compression Algorithms • e.g. Facsimile Transmission, JPEG, MPEG
14	References/Learning Aids	• Sayood, K: “Introduction to Data Compression” • Salomon, D.: “Data Compression Reference” • Acharya, T.; Tsai, P.-S.: “JPEG2000 Standard for Image Compression” • Symes, P.D.: “Video Compression”
15	Courses and Learning and Teaching Forms	Lecture Data Compression, 2.0 SWS Exercises Data Compression, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Detection and Pattern Recognition**
2	Module ID	**051610**023
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bin Yang ISB/LSS Tel: 0711/68567330 bin.yang@LSS.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Bin Yang
10	Application/Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	Course “Advanced Higher Mathematics”, “System and Signal Theory”
12	Learning Targets	Students learn advanced statistical methods and algorithms for detection and pattern recognition.
13	Course Contents	• Detection theory, Neyman-Pearson Theorem, receiver operating characteristics (ROC), Bayes risk, hypothesis testing, matched filter, likelihood-ratio test • Pattern recognition • Feature selection, feature transform • Supervised learning, Bayesian classification, Gaussian mixture model, linear discriminant functions, nearest neighbours, neural networks • Unsupervised learning, k-means clustering
14	References/Learning Aids	• Lecture slides; • Kay, S.M.: Fundamentals of statistical signal processing: Detection theory, vol. 2, Prentice-Hall, 1993 • Duda, R.O.; Hart, P.E.; Stork, D.G.: Pattern classification, Wiley-Interscience, 2001.
15	Courses and Learning and Teaching Forms	Lecture Detection and Pattern Recognition, 2.5 SWS Exercises Detection and Pattern Recognition, 1.5 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Blackboard + Projector + Beamer
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Modul	**STAND: 23.07.2009**
1	Module Name	**Error Control Coding and Encryption**
2	Module ID	**0509**1006
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026 mail@ikr.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Paul J. Kühn
10	Application / Allocation to Curriculum	• Masterstudiengang Elektrotechnik und Informationstechnik • Wahlmodul Schwerpunkt Informations- und Kommunikationstechnik • Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	Module Advanced Higher Mathematics
12	Learning Targets	Students are able and have competences in • Channel coding schemes for automatic error detection and correction • Construction of codes and their implementation • Introduction to cryptographic methods • Public and private key systems and key management • Electronic signatures
13	Course Contents	• Concepts of coding and encryption • Algebra of finite fields, modulo arithmetics • Block codes: Binary group codes, linear systematic codes, cyclic binary codes (Hamming, Fire, BCH, Reed Solomon) • Convolutional codes, Viterbi, Wozencraft and Fano decoding • Linear feedback shift register theory • Encoding and decoding algorithms and circuits • Pseudo random number generation • Scrambling crypto systems • Classical and modern cipher methods • Private and public key systems, key management • Electronic signatures and attack protection
14	References/Learning Aids	• Lin, J.; Costellu, D.: Error Control Coding: Fundamentals and Applications. Prentice-Hall, Inc. • Peterson, W.W.; Weldon, E.J.: Error Correcting Codes. MIT Press, Cambridge/Mass. • Sklar, D.B.: Digital Communications – Fundamentals and Applications. Prentice-Hall, Inc. • Ford, W.: Computer Communications Security. Prentice-Hall, Inc.
15	Courses and Learning and Teaching Forms	Lecture Error Control Coding and Encryption, 3.0 SWS Exercise Error Control Coding and Encryption, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written examination (120 Min., 2 times per year)
18	Basis for ...	Project work, Master Thesis projects

	Module	**Date: 12.2.2009**
1	Module Name	**Integrated Smart Micro Systems (ISMS)**
2	Module ID	ISMS
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Summer Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing Joachim Burghartz Institut für Nano- und Mikroelektronische Systeme (INES) 0711-21855-200 joachim.burghartz@ines.uni-stuttgart.de
9	Lecturers	Dr. C. Burwick, burwick@ims-chips.de Dr. H. Richter, richter@ims-chips.de
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	None
12	Learning Targets	Overall understanding of the design and implementation of integrated smart micro systems. Major components of such systems are: integrated sensors, analogue and digital circuits, drivers for integrated or external actuators. The emphasis of the module will be on the principles of sensor properties and the processing of sensor signals including amplification, linearization and analogue to digital conversion.
13	Course Contents	Comprehensive overview on function and design of Integrated Smart Micro Systems: • History and Basics of IC Technology and integrated sensors / actuators • MOS Transistors; DC and AC behavior • Basics of CMOS analogue circuits components, voltage and current references, amplifiers, comparators • integrated light sensors from single photo diode to HDRC VGA image sensor • other CMOS compatible sensors • principle of analogue to digital conversion • high voltage and high current driver circuits (smart power) • System integration
14	References/Learning Aids	• Lecture notes
15	Courses and Learning and Teaching Forms	Lecture Integrated Smart Micro Systems, 2.0 SWS Problems Integrated Smart Micro Systems, 1.0 SWS Laboratory Integrated Smart Micro Systems,1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written examination, Weight 1.0 120 Min; twice per years
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Module	**DATE: 13.07.2010**
1	Module Name	**Messaging**
2	Module ID	052001???
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Frank Leymann Institute of Architecture of Application Systems (IAAS) 0711-7816 470 leymann@iaas.uni-stuttgart.de
9	Lecturers	Prof. Dr. Frank Leymann, JP Dr. Dimka Karastoyanova
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module; Master IMSE, Core Module
11	Prerequisites	None
12	Learning Targets	After attending the lecture, students understand the problem of application integration as origin for Web Service technology, and the generic principle for solving this problem, which is based on the use of Message-Oriented Middleware. The architecture of MOM is clear, as well as details about the MQI and JMS. The relevant patterns used to solve the integration problem are mastered. The principle of asynchronous programming is understood.
13	Course Contents	The lecture covers the field of message-based application integration using messaging technologies. RPC and Tight Coupling are discussed. MOM Architecture and Interfaces (MQ, JMS) are introduced. The major categories of Integration Pattern are sketched and the details these patterns are elaborated as there are: Endpoints, Messages, Channels, Routing, Transformations, Construction, Management.
14	References/Learning Aids	• Lecture Notes Message-Based Applications • Hapner, et al. Java Messaging Service API Tutorial and Reference Addison-Wesley 2002 • Hohpe, Woolf. Enterprise Integration Patterns. Addison-Wesley 2004
15	Courses and Learning and Teaching Forms	Lecture Messaging, 2.0 SWS Exercises Messaging, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, 60 min, twice a year (Weight 0.5) Exercises Examination (Weight 0.5)
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Informatik to: Information Technology

	Modul	STAND: 10.02.2009
1	Module Name	**Net-based Applications and E-Commerce**
2	Module ID	**051200**xxx
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Bernhard Mitschang Institut/Lehrstuhl: IPVS/AS Telefon: 0711/7816-424 E-Mail: Bernhard.Mitschang@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Bernhard Mitschang Prof. Kurt Rothermel
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	None
12	Learning Targets	Understanding basic concepts, methods, and technologies of net-based applications and e-commerce systems, namely, web technologies XML technologies, database concepts and programming, application-layer network protocols, web services, security methods, payment methods.
13	Course Contents	This course covers concepts, methods, and technologies that are required to realize net-based applications and e-commerce systems: • web technologies • databases concepts and programming • XML technologies • application-layer network protocols • web services • security methods • payment methods
14	References/Learning Aids	• Lecture Notes „Net-based Applications and E-Commerce“ • Tanenbaum, A.S.; Steen, M.v.: Distributed Systems – Principles and Paradigms. Prentice Hall, 2002 • Coulouris, G.; Dollimore, J.; Kindberg, T.: Distributed Systems – Concepts and Design. 3rd Ed., Addison Wesley, 2002 • Harold, E.; Means, W.: XML in a Nutshell. O Reilly, 2nd Ed., June 2002 • Vist, E.van der : XML Schema. O'Reilly, 2002 • McLaughlin, B.: Java & XML. O'Reilly, 2nd Ed., 2001 • Steinmetz, R.: Wehrle, K.: Peer-to-Peer Systems and Applications, Springer, 2005 • Silberschatz, A.; Korth, H.; Sudershan, S.: Database Systems Concepts. 4th Edition, McGraw-Hill, 2002 • Melton, J.; Eisenberg, A.: Understanding SQL and Java Together. Morgan Kaufmann, 2000
15	Courses and Learning and Teaching Forms	Lecture Net-based Applications and E-Commerce, 2.0 SWS Exercisdes Net-based Applications and E-Commerce, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written exam Weight 1,0 120 min, twice a year
18	Basis for ...	

	Module	**DATE: 10.02.2009**
1	Module Name	**Parallel Systems**
2	Module ID	**051200**135
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	• Basic Knowledge in Computer Architecture • Basic Knowledge of a Programming Language
12	Learning Targets	• Understanding Advanced Concepts of Parallel Systems and • Platform Concepts, • Understanding the Impact of Parallel Hardware Architectures • On the Programming Model
13	Course Contents	1. Multicore Processors and Programming Models 2. Graphics Processing Units (GPU) 3. General Purpose GPU 4. Programming Model of GPGPUs 5. Field Programmable Gate Arrays (FPGAs) 7. Reconfigurable Computing 8. Systolic Arrays – SIMD-Architectures
14	References/Learning Aids	• Grama, A.; Gupta, A.; Karypis, G.: “Introduction to Parallel Computing” • Kung, S.Y.: “VLSI Array Processing”
15	Courses and Learning and Teaching Forms	Lecture Parallel Systems, 2.0 SWS Exercises Parallel Systems, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination Weight 1.0 120 min, twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Modul	STAND: 23.07.2009
1	Module Name	**Performance Modeling and Simulation**
2	Module ID	**050901003**
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026 mail@ikr.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Paul J. Kühn Prof. Dr.-Ing. Andreas Kirstädter
10	Application / Allocation to Curriculum	• Masterstudiengang Elektrotechnik und Informationstechnik, Wahlmodul Schwerpunkt Informations- und Kommunikationstechnik • Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	• Advanced Higher Mathematics • Communication Networks I, II (helpful for applications)
12	Learning Targets	Students are able and have competences in • Modeling of stochastic service systems • Elementary queuing theory • Simulation techniques and simulation tools • Application to communication and computer systems • System resource management • Network and system planning
13	Course Contents	• Modeling structures, operation modes, dynamic traffic demands and quality of service • Introduction to theory of random variables and stochastic processes • Types of stochastic processes (Markov, renewal, non-renewal processes) • Mathematical analysis of queuing systems and networks (Markovian and non-Markovian models) • Method of system simulation • Random number generation and transformations • Event-by-event and Monte Carlo simulation • Sampling theory and traffic measurements • Confidence intervals • Simulation tools and libraries • Setup and evaluation of a network simulation task in small teams • Applications to system resource management, network and system planning
14	References/Learning Aids	• Kobayashi, H.: Modelling and Analysis-An Introduction to System Performance Evaluation. Addison-Wesley Publ. Corp. • Kleinrock, L.: Queuing Systems. Vol. I: Theory; Vol. II: Computer Applications. John Wiley&Sons, Inc. • Akimaru, H.; Kawashima, K.: Teletraffic Theory and Applications. Springer-Verlag, 2nd Edition. • Pioro, M.; Medhi, D.: Routing, Flow and Capacity Design in Communication and Computer Networks. Elsevier, Inc. • Mac Dougall, M.H.: Simulating Computer Systems-Techniques and Tools. The MIT Press • Higginbottom, Gray N.: Performance Evaluation of Communication Networks, Artech House
15	Courses and Learning and Teaching Forms	Lecture Performance Modelling and Simulation, 2.0 SWS Exercises Performance Modelling and Simulation, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements	Report Simulation Project

	(Unmarked)	
17b	Examination Achievements (Marked)	Written examination (120 Min., 2 times per year)
18	Basis for ...	Project work, Master Thesis projects
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation, Overhead, Blackboard
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	

	Modul	STAND: 02.02.2009
1	Module Name	**Space-Time Wireless Communications**
2	Module ID	051100104
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second term, SS
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Joachim Speidel Institut für Nachrichtenübertragung Tel.: 0711-685-68017 E-Mail: joachim.speidel@inue.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Joachim Speidel
10	Application / Allocation to Curriculum	Elektrotechnik und Informationstechnik Master, Vertiefungsmodul, Wahlfach, 2 oder 4 Master INFOTECH, Supplementary Modules SM12, Lecture Course
11	Prerequisites	B.Sc. in Elektrotechnik und Informationstechnik
12	Learning Targets	To be proficient in design and application of wireless data communications systems with multiple antennas at transmitter and receiver (multiple input multiple output, MIMO)
13	Course Contents	• Multiple Input Multiple Output (MIMO) channel: linear flat fading and frequency selective fading wireless MIMO channel • Spatial multiplex, diversity principles • MIMO receiver: Zero Forcing, Minimum Mean Square Error, Maximum Likelihood • MIMO channel capacity, methods to achieve capacity • Space-time coding methods: Convolutional coding, Turbo coding, block and trellis coding • Decoding principles, iterative receivers • Applications • Exercises: Theoretical problems, and applications from UMTS, WLAN etc.
14	References/Learning Aids	• Speidel, J.: Multiple Input Multiple Output (MIMO) – Drahtlose Nachrichtenübertragung hoher Bitrate und Qualität mit Mehrfachantennen. Telekommunikation Aktuell, Verlag Wissenschaft und Leben, vol. 59, issue 7-10/05, July-Oct. 2005, pp. 1-63 • Larsson, E.; Stoica, P.: Space-Time Block Coding for Wireless Communications. Cambridge University Press, 2003 • Paulraj, A. et al.: Introduction to Space-Time Wireless Communications. Cambridge University Press, 2003
15	Courses and Learning and Teaching Forms	Lecture Space Time Wireless Communication, 3.0 SWS Exercises Space Time Wireless Communication, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Exam Weight 1.0 120 min, twice a year
18	Basis for ...	---

	Module	**DATE: 13.07.2010**
1	Module Name	**Workflow Management**
2	Module ID	052001???
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Frank Leymann Institute of Architecture of Application Systems (IAAS) 0711-7816 470 leymann@iaas.uni-stuttgart.de
9	Lecturers	Prof. Dr. Frank Leymann, JP Dr. Dimka Karastoyanova
10	Application / Allocation to Curriculum	Master INFOTECH, Core Module
11	Prerequisites	None
12	Learning Targets	At the end of the lecture the students understood the fundamental elements of languages for specifying workflow/process models. The concept of a workflow-based application (or process aware information system, respectively) and corresponding lifecycle is clear. The architecture of workflow environments is understood. The formal syntax and operational semantics underlying many workflow languages has been comprehended. Especially the languages BPEL and BPMN can be used to create own models. Advanced mechanisms like fault- and exception handling in workflows are clear.
13	Course Contents	The lecture introduces the foundations of the field of workflow systems. The evolution of Workflow Technology is discussed and the principles of Business Reengineering (BPM Lifecycle, Tools,…) is explained. Workflow Languages and Notations (BPMN, FDL, BPEL) are introduced. Process Model Graphs (Mathematical Syntax and operational Semantics) as basis of workflow metamodels are covered. Transaction Support in Workflows is discussed. The overall Architecture of WFMS (Navigator, Executor, Worklist Manager,…) is sketched. Advanced Features like subprocesses, model- and instance modifications are touched.
14	References/Learning Aids	• Lecture Notes Workflow Management • Leymann, Roller. Production Workflow. Prentice Hall 2000.
15	Courses and Learning and Teaching Forms	Lecture Workflow Management, 2.0 SWS Exercises Workflow Management, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 56.00 Hours Self Study: 124.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, 60 min, twice a year (Weight 0.5) Exercises Examination (Weight 0.5)
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Master Program Informatik to: Information Technology

Supplementary Modules – Spezialisierungsfächer (Fachspezifische Ergänzungsfächer- Wahlfach 3) - SM3

	Modul	**STAND: 08.01.2009**
1	Module Name	**Automotive Electronics – Semiconductor Applications in Traffic Engineering**
2	Module ID	?
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every 2nd term, summer term
7	Language	English
8	Module Responsible	Prof. Dr.habil Jörg Schulze Pfaffenwaldring 47, 70569 Stuttgart Tel.: 0711 / 685-68003 E-Mail: post@iht.uni-stuttgart.de
9	Lecturers	Prof. Dr.rer.nat Reinhart Kühne
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	Basics in electronical engineering Physics Mathematics
12	Learning Targets	To achieve basics and in depth knowledge in semiconductor applications in traffic engineering, traffic control and driver influencing systems as well as practical insights in sensor and actuator technology and – production.
13	Course Contents	• Base technologies using semiconductors • The purpose of traffic engineering • Semiconductor applications in traffic engineering • Sensor technology including smart sensors • Actuator technology • Display technology • Communication-technology in traffic engineering • Charge carrier mobility and vehicular traffic flow
14	References/Learning Aids	Kühne, R.: Automotive Electronics – Semiconductor Applications in Traffic Engineering. Lecture Notes 2006
15	Courses and Learning and Teaching Forms	Lecture Automotive Electronics – Semiconductor Applications in Traffic Engineering, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	none
17b	Examination Achievements (Marked)	Written Exam Weight 1.0 60 min, twice every year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

	Modul	STAND: 21.01.2009
1	Module Name	**Basics of Radio Frequency Technology**
2	Module ID	???
3	Credit Points (CP)	3.0
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	PD. Dr.-Ing. N. Zhu, Institut für Hochfrequenztechnik, Pfaffenwaldring 47, 70569 Stuttgart, 0711 685 67422, zhu@ihf.uni-stuttgart.de
9	Lecturers	PD. Dr.-Ing. N. Zhu
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules, Lecture Course
11	Prerequisites	Radio Frequency Technology: Introduction
12	Learning Targets	This module equips the students with the basic knowledge of the radio frequency technology and enables them to apply this knowledge to the daily work of an RF engineer like analyzing and designing passive RF circuits which consist of both lumped and distributed elements.
13	Course Contents	• Maxwell equations • Plane waves, Waves on transmission lines • Transforming circuits; Scattering matrices • Reflection of plane waves at boundaries • Rectangular waveguides; Microwave resonators.
14	References/Learning Aids	• Lecture script, • Lee: Planar Microwave Engineering, Cambridge University Press, 2002, • Pozar: Microwave Engineering, 3rd Ed., John Wiley & Sons, 2005,
15	Courses and Learning and Teaching Forms	Lecture Basics of Radio Frequency Technology, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Exam Weight 1.0 60 min, twice every year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	Von nach

	Modul	STAND: 10.02.2009
1	Module Name	**Hardware Description Languages**
2	Module ID	051711015
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Not offered anymore – contents are now taught as part of “Modelling, Simulation and Specification”.
7	Language	English
8	Module Responsible	Prof. Dr. Martin Radetzki Institut für Technische Informatik, Abt. Eingebettete Systeme 7816 - 270 martin.radetzki@informatik.uni-stuttgart.de
9	Lecturers	Prof. Dr. Martin Radetzki Prof. Dr. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	None
12	Learning Targets	Understanding of fundamental constructs and simulation mechanisms of hardware description languages. Knowledge of syntax and semantics of VHDL. Ability to apply VHDL to circuit simulation and register transfer level synthesis.
13	Course Contents	Hardware description languages are being used for describing digital circuits on the levels of algorithms, register transfer, and logic gates. They facilitate an event-driven simulation and provide concepts for describing hierarchy, concurrency and timing. The following topics are covered by this course: 1. Design hierarchy: entities, architectures, instances, connections 2. VHDL library concept 3. Concurrent sequential processes 4. VHDL type system 5. Modeling styles for describing typical hardware structures 6. VHDL for hardware synthesis; synthesis semantics 7. Description of repeated and recursive structures 8. Simulation mechanisms 9. Testbenches and files 10. Organization of VHDL based projects
14	References/Learning Aids	• Lecture Notes “Compact Course VHDL”. • Ashenden, P.J.: The Designer’s Guide to VHDL. 2nd edition, Morgan Kaufman Publishers, 2002. • Ashenden, P.J.: The Student’s Guide to VHDL. Morgan Kaufman Publishers, 1998.
15	Courses and Learning and Teaching Forms	Lecture Hardware Description Languages, 1.0 SWS Exercises Hardware Description Languages, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17	Study Achievements (Unmarked)	none
18	Examination Achievements (Marked)	Exercises Weight 0.5 Written Exam Weight 0.5 30 min, twice a year
19	Basis for ...	

	Modul	STAND: 10.2.2009
1	Module Name	**High Frequency Methods in Diffraction Theory**
2	Module ID	***0506000222***
3	Credit Points (CP)	3.0
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every summer semester
7	Language	English
8	Module Responsible	PD. Dr.-Ing. N. Zhu, Institut für Hochfrequenztechnik, Pfaffenwaldring 47, 70569 Stuttgart, 0711 685 67422, zhu@ihf.uni-stuttgart.de
9	Lecturers	PD. Dr.-Ing. N. Zhu i
10	Application / Allocation to Curriculum	• Masterstudiengang Elektrotechnik und Informationstechnik, Wahlmodul • Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	Experimental Physics, Electrodynamics
12	Learning Targets	This module equips the master and PhD students with the basic knowledge of asymptotic methods in diffraction theory and enables them to apply this knowledge to the daily work of an engineer such as analyzing scattering and propagation of high-frequency waves of different nature.
13	Course Contents	Why asymptotic methods? Geometrical optics; Kirchhoff's approach (Physical Optics): Paraxial approximation
14	References/Learning Aids	• Lecture script, • Jones: Methods in Electromagnetic Wave Propagation, Clarendon, 1994, • Kravtsov and Zhu: Theory of Diffraction: Heuristic Approaches; Alpha Science, 2010,
15	Courses and Learning and Teaching Forms	Lecture High Frequency Methods in Diffraction Theory, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 60 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	n
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	k

	Module	**DATE: 10.02.2009**
1	Module Name	**Microcontroller Programming**
2	Module ID	***051200****136*
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Dr.-Ing. Marek Wróblewski, Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	Basic Knowledge in Computer Architecture
12	Learning Targets	• Understanding of basic concepts of microcontroller architectures • Good understanding and fundamental techniques for developing code optimized for the target architecture • Capability to develop assembly programs of medium complexity, incl. I/O-programming
13	Course Contents	• Introduction to microcontroller architectures • Fundamentals of assembly programming • Exploitation of hardware properties of the microcontroller to optimize the code • Overview of the special function registers of a selected microcontroller • Programming exercises (loops, addressing modes, arithmetic, I/O programming, controlling external components)
14	References/Learning Aids	• Noergaard, T.: Embedded Systems Architecture • Ayala, K.J.: The 8051 Microcontroller • Klaus, R.: Die Mikrokontroller 8051, 8052 und 80C517 • Calcutt, D.; Cowan, F.; Parchizadeh, H.: 8051 Microcontroller: An Applications-Based Introduction
15	Courses and Learning and Teaching Forms	Lecture Microcontroller Programming, 1.0 SWS Exercises Microcontroller Programming, 1.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written exam Weight 1.0 60 min, twice a year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Modul	**STAND: 23.02.2009**
1	Module Name	**Mobile Network Architecture Evolution**
2	Module ID	*05091005*
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026 mail@ikr.uni-stuttgart.de
9	Lecturers	Dr.-Ing. Michael Schopp
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	• Bachelor-Degree with major Information Technology • Lecture „Communication Networks“
12	Learning Targets	Understand advanced concepts of mobile communications systems including: • Organization of the transmission medium / the radio resources (including advanced techniques like OFDM and MIMO) • Functions to protect transmission on the radio channel • Protocol architectures and advanced protocol functions • Network architectures and their evolution towards 4G • Networking aspects for the support of mobility, quality of service and security
13	Course Contents	**Introduction:** From 2G to 4G mobile communications systems **Part 1: Radio resource related functions** • Organizing the Transmission Medium (Duplexing / Multiplexing; Frequency / Time / Space / Code Division) • Using the Radio Resources (Mapping and organization of Logical Channels, Transport Channels, and Physical Channels) • Protecting the Radio Channel (Channel Coding, Radio Link Control, Hybrid ARQ, Ciphering and Source Coding) **Part 2: Network Architectures and Protocols** • Network Architectures (network functions and the evolution towards a 4G network architecture) • The Protocols (Access Stratum / Non Access Stratum; Control Plane / User Plane; air interface / terrestrial interfaces). • Examples (end-to-end scenarios for location management, session management, handover management and security management)
14	References/Learning Aids	• Eberspächer, J.; Vögel, H.-J.; Bettstetter, Ch.; Hartmann, Ch.: GSM – Architecture, Protocols and Services, 3rd edition, John Wiley & Sons, ISBN 978-0-470-03070-7, December 2008 • Walke, B: Mobile Radio Networks – Networking, Protocols and Traffic Performance, John Wiley & Sons, ISBN 978-0-471-49902-2, 2001 • Holma, H.; Toskala, A. (Eds.): HSDPA/HSUPA for UMTS: High Speed Radio Access for Mobile Communications, John Wiley & Sons, ISBN 978-0-470-01884-2, 2006 • Holma, H.;Toskala, A. (Eds.): WCDMA for UMTS – HSPA Evolution and LTE, 4th Edition, John Wiley & Sons, ISBN 978-0-470-31933-8, 2007 • Dahlman, E.; Parkvall, S.; Skold, J.; Beming,P.: 3G Evolution – HSPA and LTE for Mobile Broadband, Academic Press, ISBN 978-0-12-372533-2, 2007
15	Courses and Learning and Teaching Forms	Lecture Mobile Networks Architecture Evolution, 2.0 SWS

16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written exam Weight 1.0 60 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: Elektrotechnik und Informationstechnik
		nach: Information Technology

	Modul	**STAND: 21.12.2011**
1	Module Name	**Multi-Rate Filters, Filter Banks and Wavelets**
2	Module ID	***051610014***
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every 2nd semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bin Yang ISS
9	Lecturers	Dr. Andreas Menkhoff
10	Application / Allocation to Curriculum	• Master/Bachelor- Studiengang Elektrotechnik und Informationstechnik, Vorgezogene Master-Module, Wahlmodule • Master INFOTECH, Supplementary Modules SM3, Specialization Communication Engineering and Media Technology
11	Prerequisites	Knowledge of design of digital filters is recommended.
12	Learning Targets	Students • master advanced methods for the design of multirate filters, filter • banks, and wavelets • can solve practical problems by using these techniques, • can estimate the complexity of these solutions in advance.
13	Course Contents	• sampling rate conversion • multirate filters • filter banks • wavelets • computationally efficient filters and filter banks
14	References/Learning Aids	• G. Strang and T. Nguyen: Wavelets and filter banks, Wellesley-Cambridge 1997 • P. P. Vaidyanathan: Multirate systems and filter banks, Prentice-Hall, • 1992 • N. Fliege: Multiraten Signalverarbeitung, Teubner, 1993
15	Courses and Learning and Teaching Forms	Lecture Multi-Rate Filters, Filter Banks and Wavelets, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Oral Examination, Weight 1.0, 30 min
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation, Blackboard, ILIAS
20	Description of Associated Module Examinations and Examination ID	

	Modul	**STAND: 10.2.2009**
1	Module Name	**Network Security**
2	Module ID	***05091004***
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every 2nd semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026, mail@ikr.uni-stuttgart.de
9	Lecturers	Dr.-Ing. Joachim Charzinski
10	Application / Allocation to Curriculum	• Masterstudiengang Elektrotechnik und Informationstechnik, Wahlpflichtmodul Schwerpunkt Informations- und Kommunikationstechnik • Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	Communication Networks II (can be taken in parallel)
12	Learning Targets	Understanding security objectives, attacks, impact of network architectures, communication protocols and their implementations. Ability to apply cryptographic mechanisms, perform risk analysis. Knowledge about the principles of secure design and programming and the working and application of modern security devices.
13	Course Contents	1. Security objectives 2. Vulnerabilities, attacks and attack vectors 3. Risk analysis 4. Cryptography basics 5. Security mechanisms 6. Security protocols 7. Security frameworks 8. Identity management 9. Principles of secure design and programming 10. Security assessment of protocols and architectures 11. Security paradigms and architectures 12. Anomaly detection 13. Firewalls and advanced security devices
14	References/Learning Aids	• Lecture Notes „Communication Networks II“ • Comer, D.E.: Interworking with TCP/IP, Vol. 1, 2, Prentice Hall, 2006 • Stallings, W.: Network Security Essentials, Pearson Prentice Hall, 2007 • Schaefer, G.: Security in Fixed and Wireless Networks, Wiley, 2003 • Ferguson, N.; Schneier, B.: Practical Cryptography John Wiley & Sons, 2003
15	Courses and Learning and Teaching Forms	Lecture Network Security, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written Examination, Weight 1.0, 60 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation
20	Description of Associated Module Examinations and	

	Examination ID	
21	Import-Export Module	von: Elektrotechnik und Informationstechnik
		nach: Information Technology, Mechatronik

	Modul	STAND: 10.2.2009
1	Module Name	**Reliable Distributed Programming**
2	Module ID	*051200 XXX*
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	Prof. Dr. Kurt Rothermel IPVS/Verteilte Syteme Telefon: 07117816434 E-Mail: Kurt.Rothermel@ipvs.uni-stuttgart.de
9	Lecturers	Dr. Boris Koldehofe
10	Application / Allocation to Curriculum	• Masterstudiengang Elektrotechnik und Informationstechnik, Wahlmodul Schwerpunkt Informations- und Kommunikationstechnik • Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	
12	Learning Targets	The lecture provides basic programming principles and abstractions in the design of reliable distributed applications. Participants should learn how to design own applications in a modular way, develop an understanding for underlying assumptions on the distributed system, and be able to reason about the correctness of the application.
13	Course Contents	• Distributed Programming Model • Failures and Failure Detection • Reliable End-to-End Communication • Reliable Broadcast • Distributed Shared Registers • Reaching Consensus • Data Replication and Coordination using Consensus
14	References/Learning Aids	• Guerraoui, R.; Rodrigues, l.: Introduction to Reliable Distributed Programming, Springer. • Lynch, N.: Distributed Algorithms, Morgan Kaufmann. • Tel, G.: Introduction to Distributed Algorithms, Cambridge University Press. • Welch, J.L.; Attiya, H.: Distributed Computing: Fundamentals, Simulations and Advanced Topics, Morgan Kaufmann.
15	Courses and Learning and Teaching Forms	Lecture Reliable Distributed Programming, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written Exam Weight 1.0 60 min, twice every year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	

	Modul	STAND: 10.02.2009
1	Module Name	**Semiconductor Technology II - Epitaxy**
2	Module ID	**050500** 003
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, summer semester
7	Language	English
8	Module Responsible	Prof. Dr. habil. Jörg Schulze Institut für Halbleitertechnik 685 68000 schulze@iht.uni-stuttgart.de
9	Lecturers	Prof. Dr. habil. Jörg Schulze
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules SM3, Lecture Course
11	Prerequisites	
12	Learning Targets	In depth understanding of a research instrument for nanostructure and nonodevice fabrication
13	Course Contents	• Principles and Methods of Epitaxy. • Atomic surface structure and adatom adsorption. • Growth mechanisms and lattice perfection • Ultra-high vacuum generation and measurement. • Molecular beam epitaxy (MBE) equipment and subsystem. • Doping mechanisms and surface segregation. • Heterostructure formation. SiGe/Si alloy system Critical thickness • Surface morphology (growth modes) Quantum wells and quantum dots
14	References/Learning Aids	• Lecture notes • Kasper, E.; Bean, J.C.: Silicon Molecular Beam Epitaxy, CRC Press
15	Courses and Learning and Teaching Forms	Lecture Semiconductor Technology II, 2.0 SWS
16	Estimation of Student Workload	Presence Time: 28.00 Hours Self Study: 62.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	
17b	Examination Achievements (Marked)	Written exam Weight 1.0 60 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Black board, PowerPoint
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: nach:

Supplementary Modules – Spezialisierungsfächer (Fachspezifische Ergänzungsfächer, Fachpraktikum) – Laboratory Course

	Module	DATE: 10.02.2009
1	Module Name	**Laboratory Course Industrial Automation**
2	Module ID	**050501**01*3*
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Dr. h. c. Peter Göhner Institute of Industrial Automation and Software Engineering Tel.: 0711 / 685-67301 E-Mail: ias@ias.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Dr. h. c. Peter Göhner
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basics of Industrial Automation
12	Learning Targets	The students have basic knowledge of today's topics of industrial automation (for example conception & realization of bus-systems, development of real-time automation systems and rapid prototyping development process) and they have an overview of the development tools for industrial automation systems.
13	Course Contents	Introduction into CAN, real-time programming using Ada 95, microcontroller-programming, Rapid-Prototyping using Ascet-SD, programmable logic controls (PLC) and scheduling using semaphores
14	References/Learning Aids	• Stenerson: Industrial Automation and Process Control, Prentice Hall, 2002 • Lauber, R.; Göhner, P.: Prozessautomatisierung Volume 2 (3rd Edition), Springer, 1999 • Script Industrial Automation I • Portal at http://www.ias.uni-stuttgart.de/lcia
15	Courses and Learning and Teaching Forms	Laboratory Course Industrial Automation, 4.0 SWS
16	Estimation of Student Workload	Presence time: 25.00 hours Private study: 155.00 hours Sum: 180.00 hours
17a	Study Achievements (Unmarked)	Preparation tasks
17b	Examination Achievements (Marked)	Written Examination Weight 0,2 45 min, once per year Oral Examination 0,8 75 min, once per year
18	Basis for ...	
	Additional Information (Optional)	
19	Media form	Hardware demonstrators for the laboratory experiments, online-experiments
20	Description of Associated Module Examinations and Examination ID	4801
21	Import-Export Module	from: Master Program Elektrotechnik und Informationstechnik to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Laboratory Course Embedded Systems**
2	Module ID	**051711**036
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4,0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, Winter Term
7	Language	English
8	Module Responsible	Prof. Dr. Martin Radetzki Institut für Technische Informatik, Abt. Eingebettete Systeme 7816 - 270 martin.radetzki@informatik.uni-stuttgart.de
9	Lecturers	Scientific Staff, Dept. of Embedded Systems Engineering
10	Application/Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Embedded Systems Engineering (051711026)
12	Learning Targets	Ability to apply the design methodology and commercial design tools for constructing and analyzing embedded hardware / software systems. Practical experience in software programming and debugging, digital circuit design and verification, usage of lab equipment such as logic analyzers. Experience in preparing structured technical documentation of specifications and designs.
13	Course Contents	This lab course focuses on analysis, design and implementation of embedded hardware/software systems and issues involved in the development of such systems. 1. Embedded software development 2. Usage of drivers for peripheral components 3. Cross-compilation 4. Remote debugging 5. Software performance profiling 6. Design of accelerator hardware digital circuits 7. Digital circuit simulation 8. FPGA implementation (synthesis) of digital circuits 9. Hardware / software interfacing 10. Integrated functional verification of hardware and software
14	References/Learning Aids	Lab handouts Documentation of development tools (provided in the lab)
15	Courses and Learning and Teaching Forms	Laboratory Course Embedded Systems, 4.0 SWS
16	Estimation of Student Workload	Preparation Time:60.00 hours Presence Time: 45.00 hours Self Study: 45.00 hours Documentation: 30.00 hours Sum: 180.00 hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Marked lab assignments, weight 0.7, during the lecture period • Marking of the student's lab documentation, weight 0.3, during the lecture period
18	Basis for ...	

	Module	**DATE: 10.02.2009**
1	Module Name	**Laboratory Course Computer Architectures and Communication Networks**
2	Module ID	050910004
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	One Semester per year
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Andreas Kirstädter IKR 0711-685-68026 mail@ikr.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Andreas Kirstädter
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basics of Computer Architecture and Communication Networks
12	Learning Targets	The student understands complex computer and communication systems, knows how to structure them, how define interfaces and to implement configure and test subsystems and is familiar with team work and presentations.
13	Course Contents	The Lab Course is organized as a project course where students perform a joint project in a team. Examples of such projects are: • Implementation of Cache Architectures • Implementation of Super-Scalar Processors • Concepts of Mobile Communications • Analytic, simulation and measurement analysis of the performance of communication systems
14	References/Learning Aids	Lab Course Notes Course Notes of Computer Engineering and Communication Networks Literature retrieved by the students
15	Courses and Learning and Teaching Forms	Laboratory Course Computer Architectures and Communication Networks, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 42 hrs Self Study: 138 hrs
17a	Study Achievements (Unmarked)	Preparation Tests
17b	Examination Achievements (Marked)	Tests and Presentation
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	Import from Master EI

	Module	**DATE: 10.02.2009**
1	Module Name	**Laboratory Course Computer Board Design**
2	Module ID	**051200**138
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basic knowledge of digital circuit design
12	Learning Targets	Understanding of the Design Principles, Board Layout Rules and Board Layout Software to Design Computer Boards
13	Course Contents	• Board Layout Basics • Multilayer Board Design • Vias • Stripline, Microstripline • Board Layout Software • Rapid Prototyping of a Multilayer Board • Test
14	References/Learning Aids	Will be defined in the Lab Course.
15	Courses and Learning and Teaching Forms	Laboratory Course Computer Board Design, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 42.00 Hours Self Study: 138.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written or Oral Examination Weight 1.0 once or twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Module	**DATE: 10.02.2009**
1	Module Name	**Laboratory Course High Performance Programming with Graphics Cards**
2	Module ID	**051200**139
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Irregular
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Sven Simon IPVS 0711-7816-450 simon@ipvs.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Sven Simon
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basic knowledge of digital circuit design
12	Learning Targets	Understanding of the Architecture and Programming Model of Graphics Cards
13	Course Contents	• Architectures of Graphics Processing Units (GPUs) • Treads • Kernel Calls • Memory Architecture • Data Transfer between GPUs and CPUs • Number formats • Benchmarking • Deviations between CPU and GPU Programs
14	References/Learning Aids	Will be defined in the Lab Course.
15	Courses and Learning and Teaching Forms	Laboratory Course High Performance Programming with Graphics Cards, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 42.00 Hours Self Study: 138.00 Hours Sum: 180.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written or Oral Examination Weight 1.0 once or twice per year
18	Basis for ...	Master Thesis in the Field of Computer Hardware/Software Systems
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from: Computer Science Department to: Information Technology

	Module	DATE: 10.02.2009
1	Module Name	**Laboratory Course Optical Communication**
2	Module ID	050200008
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	One Semester per year
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Manfred Berroth Institut für Elektrische und Optische Nachrichtentechnik 0711/68567922 Manfred.Berroth@int.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Manfred Berroth
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basics of Statistical Signal Communication
12	Learning Targets	Students are familiar with optical components and their practical applications
13	Course Contents	• Digital filters • Attenuation / Polarization • Laser Diodes • Photo Diodes • Optical communication Systems
14	References/Learning Aids	Lab Course Notes Course Notes of Optoelectronic Devices and Circuits
15	Courses and Learning and Teaching Forms	Laboratory Course Optical Communication, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 25 hrs Self Study: 155 hrs
17a	Study Achievements (Unmarked)	Presentation Tasks
17b	Examination Achievements (Marked)	Tests
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	Import from Master Program EI

	Module	**DATE: 10.02.2009**
1	Module Name	**Laboratory Course Radio Frequency**
2	Module ID	
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	One Semester per year
7	Language	English
8	Module Responsible	Prof. Dr. Hesselbarth. IHF 0711-685-67402 mail@ihf.uni-stuttgart.de
9	Lecturers	Prof. Dr. Hesselbarth
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basics of Radio Frequency Technology
12	Learning Targets	Students understand electromagnetic phenomenons antenna fields, waveguides, filters, resonance cavity, etc. They are familiar with measurements by use of a network analyzer, antenna measurements, noise parameters, etc., use of RF circuit simulation software, software tools, planning and optimization of mobile networks
13	Course Contents	Measurements, analysis and design of RF circuits and systems
14	References/Learning Aids	Course Notes on RF RF literature
15	Courses and Learning and Teaching Forms	Laboratory Course Radio Frequency, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 25 hrs Self Study: 155 hrs
17a	Study Achievements (Unmarked)	Preparation Tasks
17b	Examination Achievements (Marked)	Tests and Presentations
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	Import from Master Program EI

	Module	DATE: 10.02.2009
1	Module Name	**Laboratory Course Statistical Signal Processing**
2	Module ID	
3	Credit Points (CP)	6
4	Credit Hours (Weekly Semester Hours, SWS)	4.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	One Semester per year
7	Language	English
8	Module Responsible	Prof. Dr.-Ing. Bin Yang ISB/LSS Tel: 0711/68567330 bin.yang@LSS.uni-stuttgart.de
9	Lecturers	Prof. Dr.-Ing. Bin Yang
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Lab Course
11	Prerequisites	Basics of Statistical Signal Processing
12	Learning Targets	Students have good knowledge of statistical signal processing in selected application areas. They are able to analyze complex practical problems and to structure problems within a team, to document and to present the results.
13	Course Contents	Classification of music signals
14	References/Learning Aids	Course Notes on “Stochastic Processes” “Statistical and Adaptive Signal Processing” and “Detection and Pattern Recognition” Responsible retrieval of literature (Books, Journals, Internet)
15	Courses and Learning and Teaching Forms	Laboratory Course Statistical Signal Programming, 4.0 SWS
16	Estimation of Student Workload	Presence Time: 42 hrs Self Study: 138 hrs
17a	Study Achievements (Unmarked)	Presentation Tasks
17b	Examination Achievements (Marked)	Tests
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	Import from Master Program EI

Supplementary Modules – Spezialisierungsfächer (Fachspezifische Ergänzungsfächer, Seminar) - Seminar

	Module	**DATE: 10.02.2009**
1	Module Name	**Seminar INFOTECH**
2	Module ID	
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Each term
7	Language	English
8	Module Responsible	Study Dean
9	Lecturers	Lecturers INFOTECH program
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Module, Seminar
11	Prerequisites	None
12	Learning Targets	The students have learned to deal with original scientific literature and to research up-to-date information on their own. They are able to acquire deep insight into a given subject, mainly based on self-study, to prepare a scientific report, to give a presentation of the subject utilizing adequate presentation techniques, and to defend the subject in a scientific discussion. Moreover, they have participated in the scientific discussion of subjects presented by fellow students.
13	Course Contents	The technical content varies. Seminars are offered on diverse up-to-date subjects of current scientific interest in the field of Information Technology. The concrete subjects are announced prior to the beginning of the lecture term, usually by means of the institutes' blackboards and internet presence.
14	References/Learning Aids	Literature references are given to the students at the beginning of the seminar. Additional references shall be researched by the students..
15	Courses and Learning and Teaching Forms	Seminar, 2.0 SWS, to be selected from a catalogue, which is updated every term
16	Estimation of Student Workload	Presence Time: 21.00 Hours Self Study: 69.00 Hours Sum: 90.00 Hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Active contribution, report and presentation Weight 1.0
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	from:
		to:

Supplementary Modules – Spezialisierungsfächer (überfachliche Schlüsselqualifikation) – Non-Technical Modules

	Module	DATE: 10.02.2009
1	Module Name	**Information and Contract Law**
2	Module ID	
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2.0
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, winter semester
7	Language	English
8	Module Responsible	RA Horst Speichert 0177/3008889 horst@speichert.de
9	Lecturers	RA Horst Speichert
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules NTM, Lecture Course
11	Prerequisites	
12	Learning Targets	• Introduction to basics of contract law, international contract and information law as well as Internet and data protection law. • Students are made familiar with methods for lawful contracts and contracts checking, especially with regard to future management positions
13	Course Contents	• Introduction: Objectives and mechanism of law, The legal system (overview), The system of national law, The European system of law, International law • Contract law: General remarks, Requirements for a contract in general, Terms of contract, Irregularities in the performance of the contract, Disputes, arbitration, law-suits • Types of contract: act of sale, UN Convention on Contracts for the International Sale of Goods (CISG), contract for services, contract of work and labor • The law on torts (liability): General remarks, Tort liability based on fault, Product liability, Warranty, Compensation • Selected fields of law (overview): Labor law, The law of business associations, Company law, Commercial law, Competition law, advertising, Copyright, patent, brands and related rights • E-commerce and Internet: Web publishing, Liability, Multi media, European legislation, IT-Security law (overview) • Data protection, Privacy policy, European legislation
14	References/Learning Aids	• James, P.S.; Glover, G.N.: Introduction to English Law, 9. Edition 1976, Butterworths • McCormick-Watson, J.; Watson, B.; Bourne, N.: Essential English Legal System (Essential Law), 2006, Routledge Cavendish • Jewell, M.: An Introduction to English Contract Law, 2. Edition 2002, Nomos • Taylor, R.D.: Law of Contract, 5. Edition 1995, Blackstone • Ward, R.; Walker & Walker 's English Legal System, 8. Edition 1998, Butterworths • Farnsworth, E.A.: An Introduction to the Legal System of the United States, 3. Edition 1996, Oceana Publ. • Smith, P.F.; Bailey, S.H.: The Modern English Legal System, 1984, Sweet & Maxwell • Hay, P.: An Introduction to the U.S. Law, 2. Edition 1991, Butterworths • Clark, D.S.; Tugrul, A.: Introduction to the Law of the United States, 2. Auflage 2001, Kluwer Law International • Eddey, K.J.; Darbyshire, P.: Eddey and Darbyshire on the English Legal System, 7. Edition 2001, Sweet & Maxwell • Rutherford, L.; Bone, S.: Osborn's Concise Law Dictionary, 8. Edition 1993, Sweet & Maxwell • Schlechtriem, P.; Butler, P.: UN Law on International Sales. The UN

		Convention on the International Sale of Goods, 1. Edition 2007, Springer • Martin, E.A.: A dictionary of law, 6. EDition 2006, Oxford University Press • Schlechtriem, P.; Schwenzer, I.: Commentary on the UN Convention on the International Sale of Goods (CISG), 2. Edition 2005, Oxford University Press • Speichert, H.: Praxis des IT-Rechts, 2. Edition 2007, Vieweg
15	Courses and Learning and Teaching Forms	Lecture Information and Contract Law, 2.0 SWS
16	Estimation of Student Workload	Presence time: 28.00 hours Self study: 62.00 hours Sum: 90.00 hours
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	Written exam Weight 1.0 90 min, twice a year
18	Basis for ...	
	Additional Information (Optional)	
19	Media Form	Laptop-Presentation
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von:
		nach:

	Module	DATE: 10.02.2009
1	Module Name	**Technology and Innovation Management**
2	Module ID	072010007
3	Credit Points (CP)	3
4	Credit Hours (Weekly Semester Hours, SWS)	2
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Every second semester, summer semester
7	Language	English
8	Module Responsible	Udo-Ernst Haner Universität Stuttgart Institut für Arbeitswissenschaft und Technologiemanagement +49 711 970 5470 udo-ernst.haner@iat.uni-stuttgart.de
9	Lecturers	Udo Ernst Haner Dr. Rainer Bamberger
10	Application / Allocation to Curriculum	Master INFOTECH, Supplementary Modules NTM, Lecture Course
11	Prerequisites	None
12	Learning Targets	Die Studierenden erlangen anhand realer Beispiele Kenntnis von den theoretischen Ansätzen des Technologie- und Innovationsmanagements in Unternehmen. Sie verstehen die Bedeutung von Technologiestrategien und Innovationsvorhaben im Rahmen der Marktstrategien der Unternehmen. Hierbei erlenen sie den Ansatz von Technologieportfolios und das Projektmanagement in Technologieprojekten. Sie verstehen, wie Technologien und Innovationen in Unternehmen geplant und sinnvoll eingesetzt werden.
13	Course Contents	• Technologie-basierte Wettbewerbsfähigkeit • Integriertes Technologiemanagement: Definitionen / Modelle • Strategische Ansätze und „Gesetzmäßigkeiten“ im Technologiemanagement • Wettbewerbs- und Technologiestrategien • Strategische Technologieentscheidungen • (Technologie-)Portfolios • Innovationsmanagement und Innovationsprozesse • Arten und Charakteristika von Innovationen • Widerstände und Rollen im Innovationsprozess • Projektmanagement für Technologieprojekte • Organisatorische Einbindung von Projekten im Unternehmen • Phasen und Methoden des Projektmanagement • Instanzen im Projekt
14	References/Learning Aids	• Vorlesungsskript „Technology & Innovation Management“ • Brockhoff, K. et al.: The Dynamics of Innovation: Strategic and Managerial Implications, Springer 1999 • Burgelman, R.A.: Strategic Management of Technology and Innovation, Osborne McGraw-Hill 2000 • Project Management Practitioner´s Handboock; by Ralph L. Kleim and Irwin S. Ludin; 1998 • Visualizing Project Management; by Kevin Forsberg, Hal Mooz and Horward Cottermann; 2000
15	Courses and Learning and Teaching Forms	Lecture Technology and Innovation Management, 2.0 SWS
16	Estimation of Student Workload	Presence time: 28.00 hours Self study: 62.00 hours Sum: 90.00 hours
17a	Study Achievements (Unmarked)	keine
17b	Examination Achievements (Marked)	Klausur (60 Min., 2 x pro Jahr)

18	Basis for ...	keine
	Additional Information (Optional)	
19	Media Form	Laptop / Beamer
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	von: Fak. 7
		nach: Fak 5

Masterarbeit – Master Thesis Project

	Module	**DATE: 10.02.2009**
1	Module Name	**Master Thesis Project - Generic**
2	Module ID	
3	Credit Points (CP)	30
4	Credit Hours (Weekly Semester Hours, SWS)	2
5	Module Duration (Number of Semesters)	1
6	Rotation Cycle	Each Semester
7	Language	English
8	Module Responsible	Study Dean Int. Study Programs, currently: Prof. Dr.-Ing. Paul J. Kühn, ETI 2/IKR Phone: 0711/ 685-68027 Mail: kuehn@ikr.uni-stuttgart.de
9	Lecturers	Professors and Lecturers of INFOTECH
10	Application / Allocation to Curriculum	Master of Science Program INFOTECH Final Project (4th Semester)
11	Prerequisites	Successful passing of all required examinations and industrial internship
12	Learning Targets	Students are able to solve hard engineering problems based on scientific fundamental and/or experimental methods. Graduates are familiar with the typical phases and social processes of research projects. Students have gained problem solution competences by supervisory project guidance. They are able to transfer technical and methodical knowledge to solve complex problems. During the course of the Master project students have become familiar with systematic knowledge retrieval and literature inquiries in the related research area and are able to solve scientific problems responsibly and to document and present the results.
13	Course Contents	• Familiarization with the Thesis topic by literature studies and development of a project plan • Execution of technical studies/design tasks./ implementations in hardware/ software • Discussion and assessment of results and documentation in Master Thesis • Presentation of the results in a colloquium and defense
14	References/Learning Aids	Initial references are provided. Knowledge learned in the Seminars with respect to literature retrieval, assessment and documentations
15	Courses and Learning and Teaching Forms	Individual project meetings. Colloquium
16	Estimation of Student Workload	Total amount of time: 900 hrs, where 21 hrs (2 SWS) presentation colloquia 49 hrs preparation of presentation 830 hrs Master project work
17a	Study Achievements (Unmarked)	None
17b	Examination Achievements (Marked)	• Performance • Research Results • Documentation • Presentation
18	Basis for ...	Master Thesis
	Additional Information (Optional)	
19	Media Form	
20	Description of Associated Module Examinations and Examination ID	
21	Import-Export Module	