Course Handbook Master of Science in Applied Informatics

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Master of Science in Applied Informatics - mandatory courses (overview)

Title of module	Code	Semester	Learning and teaching methods	ECTS	Module convenor
Business Computing	PIM-BC	8	2V+2U	6	Prof. Dr. Klaus-Jürgen Schmidt
Business Management und Consulting	PIM-BMC	7	2V+1U+1P	6	Prof. Dr. Klaus-Jürgen Schmidt
Databases and Information Systems	PIM-DBI	7	3V+1U	6	Prof. Dr. Klaus Huckert
Decision Support Systems	PIM-DSS	9	3V+1U	6	Prof. Dr. Klaus Huckert
Distributed Application Architectures	PIM-AVA	9	3V+1P	6	Prof. Dr. Ralf Denzer
Higher Analysis	PIM-HA	8	4V	6	Prof. Dr. Helmut Salzmann
Master Thesis	PIM-MT	10	-	30	Prof. Dr. Helmut Folz
Project Work	PIM-PA	9	2V	10	Prof. Dr. Helmut Folz

Security and Cryptography	PIM-SK	9	3V+1U	6	Prof. Dr. Damian Weber
Semantic Interoperability	PIM-SIVS	8	3V+1U	6	Prof. Dr. Reiner Güttler
Software Architecture	PIM-SAR	7	4V	6	Prof. Dr. Reiner Güttler
Software Development Processes	PIM-SEP	8	3V+1P	6	Prof. Dr. Helmut Folz
Theoretical Informatics	PIM-TI	7	4V	6	Prof. Dr. Thomas Kretschmer
Theoretical Informatics Seminar	PIM-STI	8	4V	6	Prof. Dr. Thomas Kretschmer

Master of Science in Applied Informatics - optional courses (overview)

Title of module	**Code**	**Semester**	**Learning and teaching methods**	**ECTS**	**Module convenor**
Algorithms and Complexity	PIM-WI10	7	4V	5	Prof. Dave Swayne
Business English	PIM-WN10	8	2V	2	Prof. Dr. Christine Sick
Content Management Systems	PIM-WI15	7	2V+2PA	5	Dipl.-Inform. Roman Jansen-Winkeln

Distribution Logistics	PIM-WN50	7	2V	3	Prof. Dr. Klaus-Jürgen Schmidt
Embedded Systems	PIM-WI25	7	2V+2P	5	Prof. Dr. Martina Lehser
English for Technical Purposes	PIM-WN11	7	2V	2	Prof. Dr. Christine Sick
Formal Methods in Telecommunications	PIM-WN15	7	2V+2U	5	Prof. Dr. Reinhard Brocks
Human/Computer Interaction	PIM-WI30	7	4V	5	Prof. Dr. Ralf Denzer
IT Governance	PIM-WN35	9	2V	2	Prof. Dr. Klaus Huckert
IT, Telecommunications and the Law	PIM-WN40	8	2V	2	RA Cordula Hildebrandt
Industrial Ecology	PIM-WN30	7	2V	2	Prof. Dr. Ralf Denzer
Intelligent Networks	PIM-WN20	8	2V	3	Prof. Dr. Horst Wieker
Introduction to Robotics	PIM-WI20	7	2V+2P	5	Dipl.-Ing. Dirk Ammon
Medical Informatics	PIM-WI40	7	2V	3	Dr. Helmut Jäger
Presenting Information	PIM-WI35	8	2V+2U	5	Prof. Dr. Thomas Kretschmer
Project Management	PIM-WN12	9	2V	3	Dipl.-Ing. Michael Sauer

Project Management	PIM-WN45	8	2V	2	Prof. Dr. Klaus-Jürgen Schmidt
Protocols in Public and Private Networks	PIM-WN25	7	4V	5	Prof. Dr. Horst Wieker
Software Quality Management	PIM-WI45	8	2V	3	Prof. Dr. Helmut Folz
Stochastics 1	PIM-WI50	7	2V	3	Prof. Dr. Barbara Grabowski
Stochastics 2	PIM-WI51	8	2V	3	Prof. Dr. Barbara Grabowski
Virtual Machines and Program Analysis	PIM-WI55	7	2V+2P	5	M.Sc. Jörg Herter
Web Services	PIM-WI60	8	2V+2P	5	Prof. Dr. Martina Lehser

Master of Science in Applied Informatics - mandatory courses

Distributed Application Architectures

Title of module: Distributed Application Architectures
Degree programme: Master of Science in Applied Informatics
Code: PIM-AVA
Learning and teaching methods: 3V+1P (4 hours per week)
ECTS credits: 6
Semester: 9

Mandatory course: yes

Language of instruction:
German

Assessment:
Oral examination: 50 %; case study/student assignment: 50 %

Degree prog. incorporating this module:
KI705 Master of Computer Science and Communication Systems, semester 7, mandatory course
PIM-AVA Master of Science in Applied Informatics, semester 9, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Ralf Denzer

Teaching staff:
Prof. Dr. Ralf Denzer

Learning outcomes/skills:
Students will be taught the important techniques deployed in the development of complex, distributed systems. The course covers in detail some of the advanced concepts used in developing distributed systems such as ODP and OMA. Students will also be taught the underlying theoretical framework required to develop complex, distributed applications. Areas addressed include the transaction concept, distributed mutual exclusion, distributed termination, clock synchronization and replication mechanisms.
[*updated 08.05.2008*]

Outline content:
1. Examples of large software systems
2. Middleware
3. Open Distributed Processing (ODP)
4. Object Management Architecture (OMA)
5. Software development model for designing distributed systems
6. Formal specifications of distributed systems
7. Case studies

[*updated 08.05.2008*]

Reading list:
POPIEN, Claudia: Verteilte Verarbeitung offener Systeme, Aachener Beiträge zur Informatik, 1996
SPANIOL, Otto; Linnhoff-Popein, Claudia; Meyer, Bernd: Trends in Distributed Systems: CORBA and Beyond 96, Aachen, Germany, October 12, 1996, Proceedings
COLOURIS, George; DOLLIMORE, Jean; KINDBERG, Tim: Distributed Systems Concepts , Addison Wesley. 4th Edition 2005
COLOURIS George; DOLLIMORE Jean; KINDBERG Tim: Verteilte Systeme - Konzepte, Addison Wesley 2002.
[*updated 08.05.2008*]

Module offered in:
WS 2008/09

Business Computing

Title of module: Business Computing

Degree programme: Master of Science in Applied Informatics

Code: PIM-BC

Learning and teaching methods: 2V+2U (4 hours per week)

ECTS credits: 6

Semester: 8

Mandatory course: yes

Language of instruction:
German

Assessment:
Written examination: 40 %; lab course: 40 %; assessed exercises: 20 %

Degree prog. incorporating this module:
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-BC Master of Science in Applied Informatics, semester 8, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Klaus-Jürgen Schmidt

Teaching staff:
Prof. Dr. Klaus-Jürgen Schmidt

Learning outcomes/skills:
After completing this course, students will be in a position to model and code programming concepts for selected modules in standard enterprise resource planning (ERP) systems, and to modify and extend existing modules. They will understand the architecture of these business applications and can assess and adapt the so-called outcome logic models for business processes in companies. They will also have experience of incorporating and discussing their own ideas in advanced colloquia dealing with the design, implementation and application of enterprise-wide ERP and SCM systems.
[*updated 08.05.2008*]

Outline content:
1. Fundamentals of modelling ERP systems
2. Dialogue programming in standard ERP systems
3. Implementing business model applications
a. in procurement and logistics systems
b. in enterprise-wide SCM processes
4. Modelling and development tools
5. Software implementation using the development interface of common ERP systems
[*updated 08.05.2008*]

Reading list:
KELLER, Horst: ABAP-Referenz, Heidelberg 2004
KELLER, Horst; Krüger, Sascha: ABAP-Objects Einführung in die SAP-Programmierung, Heidelberg 2001
[*updated 08.05.2008*]

Module offered in:
SS 2008

Business Management und Consulting

Title of module: Business Management und Consulting

Degree programme: Master of Science in Applied Informatics

Code: PIM-BMC

Learning and teaching methods: 2V+1U+1P (4 hours per week)

ECTS credits: 6

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam: 40 %; case study/student assignment/extended essay: 60 %; attendan

Degree prog. incorporating this module:
KI746 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-BMC Master of Science in Applied Informatics, semester 7, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Klaus-Jürgen Schmidt

Teaching staff:
Prof. Dr. Klaus-Jürgen Schmidt

Learning outcomes/skills:
By systematically analysing the foundations of the subject, students will acquire the skills necessary to design, implement, modify and optimize business structures and processes. Part I of the module (Personnel management and company management) aims to teach the skills required for analysing, designing, applying and developing modern management methods in companies, company divisions and departmental teams. Part II (Consulting) teaches the methods and techniques that can be used to assess and improve the performance of companies, divisions and departments, business structures, business processes and resource deployment.

Overall, students will gain a broad-based structured understanding of the skills and approaches currently used in designing and optimizing business processes and structures and associated personnel management processes so that companies can achieve their stated business objectives.
[*updated 08.05.2008*]

Outline content:
Part I Personnel and company management
- Fundamentals and perspectives of business management (company management; management research; legal basis)
- History and evolution of personnel management and business management (pioneers and early implementation; organizers and classifiers; the behaviourist model; the strategists view and his instruments; striving for control; business culture and excellence)
- Task-centred business management (business tasks; competence and responsibility; management at company, divisional and group levels)
- Personnel-centred business management (management elements; managing human resources at the corporate, divisional, departmental and individual levels)
- Process-centred business management (management processes at the corporate, divisional and departmental levels)
- Specific aspects of personnel management (human resource mangement; staff training and instructional methods, staff development tools)
- Company case studies on location

Part II Business consulting
- Fundamentals (consulting and business advisory services; the consulting market; marketing of consulting services)
- The consulting process (process participants: consultants and clients; the client-consultant relationship; the aims, phases and risks of the consulting process)
- Consulting concepts and their implementation (consulting strategies; analysis and evaluation methods; methods for designing and changing business processes)
- IT consulting
- Project conception and proposal development
- Case studies and individual student analyses

[*updated 08.05.2008*]

Reading list:
- Schmidt, K.-J.: Specialist notes covering selected topics + Exercises (see information provided during lectures)

Human resource and corporate management
- MEIER, Harald Unternehmensführung, Herne/Berlin 2002
- OLFERT, Klaus; PISCHULT, Helmut: Unternehmensführung, hrsg. von K. Olfert, Ludwigshafen 2004
- PORTER, Michael F.: Wettbewerbsstrategie. Frankfurt, 1999
- PORTER, Michael F.: Wettbewerbsvorteile. Frankfurt, 1999
- DOPPLER, Klaus; Lauterburg, Chr.: Change Management, Frankfurt, 1999
- Additional print and web-based references will be provided.

Corporate consulting
- BLOCK, Peter: Erfolgreiches Consulting, Das Berater-Handbuch, München 2002
- MEIER, Harald Unternehmensführung, Herne/Berlin 2002
- NIEDEREICHHOLZ, Christel: Unternehmensberatung, Band I, Beratungsmarketing und Auftragsakquisition, München, 2004
- NIEDEREICHHOLZ, Christel: Unternehmensberatung, Band II, Beratungsmarketing und Auftragsakquisition, München, 2003

Additional print and web-based references will be provided throughout the course.
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Databases and Information Systems

Title of module: Databases and Information Systems

Degree programme: Master of Science in Applied Informatics

Code: PIM-DBI

Learning and teaching methods: 3V+1U (4 hours per week)

ECTS credits: 6

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Written examination; attendance at problem-solving classes

Degree prog. incorporating this module:
PIM-DBI Master of Science in Applied Informatics, semester 7, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Klaus Huckert

Teaching staff:
Prof. Dr. Klaus Huckert

Learning outcomes/skills:
This course of lectures aims to provide students with a deeper understanding of the methods and techniques used in the design, implementation and application of complex databases.

The deployment of databases in larger information systems is explained and possible extensions are discussed.
[*updated 08.05.2008*]

Outline content:

1. Architectural models of database systems
   a. Physical architecture design
   b. Server architectures for database systems
   c. Transactions
   d. Error handling in database systems
   e. Distributed database systems
   f. Homogeneous distribution
   g. Heterogeneous distribution
   h. Parallel database systems

2. Database design and quality assurance
   a. Initial considerations when designing a quality compliant database
   b. The database life cycle
   c. Design phases
   d. Data modelling concepts
   e. Conceptual and logical design
   f. Implementation design
   g. Physical design
   h. Mapping object-oriented design in relational databases
   i. Reverse engineering

3. Data integration and analysis in creating information systems
   a. Data integration
   b. Data warehouses
   c. Principles of online analytical processing
   d. Data mining

4. Database applications in information systems
   a. Databases in the world wide web
   b. Multimedia databases
   c. Mobile databases
   d. XML and databases

[*updated 08.05.2008*]

Reading list:

LAUSEN, Georg: Datenbanken. Grundlagen und XML. Elsevier, 2005
DATE, Chris: Introduction to database systems, Addison Wesley 8th Ed. 2003
ELMASRI, Ramez; NAVATHE, Shamkant: Grundlagen von Datenbanksystemen, Addison Wesley 3. Auflage 2005
JAROSCH, Helmut: Datenbankentwurf. Vieweg 2002
VOSSEN, Gottfried: Datenmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2000

Additional print and web-based references will be provi

[*updated 08.05.2008*]

Module offered in:

WS 2008/09, WS 2007/08

Decision Support Systems

Title of module: Decision Support Systems
Degree programme: Master of Science in Applied Informatics
Code: PIM-DSS
Learning and teaching methods: 3V+1U (4 hours per week)
ECTS credits: 6
Semester: 9
Mandatory course: yes
Language of instruction: German
Assessment: Written exam, attendance at problem-solving classes
Degree prog. incorporating this module: PIM-DSS Master of Science in Applied Informatics, semester 9, mandatory course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 180 hours (equivalent to 6 ECTS credits). There are therefore 120 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Klaus Huckert
Teaching staff: Prof. Dr. Klaus Huckert Prof. Dave Swayne

Learning outcomes/skills:
This course of lectures aims to provide students with a fundamental understanding of the methods and techniques used in the design, implementation and application of decision support systems (DSS). Students will learn how business economics, mathematics, database technology and artificial intelligence (expert systems) are linked in decision support systems.

Students will acquire the skills required to be able to model specific problems and to guarantee the provision of data to these models by deploying appropriate technologies, such as data warehouses.

The use of DSSs will be illustrated by applications in business economics and in a number of knowledge-based systems deployed in the field of environmental planning.
[*updated 08.05.2008*]

Outline content:
Part 1
1. Historical development of information systems
2. An overview of decision support systems
3. DSSs and their areas of application
4. Design methods for DSSs
5. The architecture of decision support systems
6. The role of databases in DSSs
7. Models and model banks
8. Methods and method banks
9. The role of graphics in DSSs
10. Data supply strategies for DSSs
11. Planning languages as DSS generators
12. Implementation of decision support systems in the area of business economics

Part 2 (in English)
13. Artificial intelligence (AI)
14. Agent architectures in AI
15. Knowledge and reasoning
16. Building a knowledge base
17. Logical reasoning systems
18. Uncertain knowledge and reasoning
19. Applications in environmental informatics

[*updated 08.05.2008*]

Reading list:
GRIESE, Joachim: Integrierte Informationsverarbeitung 2: Planungs- und Kontrollsysteme in der Industrie, 9. Auflage, Gabler 2002
GLUCHOWSKI, Peter; GABRIEL, Roland; CHAMONI, Peter: Management Support Systeme und Business Intelligence, Springer, 2. Auflage 2005
HUCKERT, Klaus.: Entwurf und Realisierung von PC-gestützten Decision Support-Systemen. In: Angewandte Informatik 30, 988, pp. 425 434
ROMMELFANGER, Heinrich: Fuzzy Decision Support-Systeme, 2. Auflage, Springer 1994
RUSSELL, Stuart: Artificial Intelligence: A Modern Approach, Pearson Higher Education 2004

Additional print and web-based references will be provided
[*updated 08.05.2008*]

Module offered in: WS 2008/09

Higher Analysis

Title of module: Higher Analysis
Degree programme: Master of Science in Applied Informatics
Code: PIM-HA
Learning and teaching methods: 4V (4 hours per week)
ECTS credits: 6
Semester: 8
Mandatory course: yes
Language of instruction: German
Assessment: Written examination
Degree prog. incorporating this module: PIM-HA Master of Science in Applied Informatics, semester 8, mandatory course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 180 hours (equivalent to 6 ECTS credits). There are therefore 120 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Helmut Salzmann
Teaching staff: Prof. Dr. Helmut Salzmann

Learning outcomes/skills:
After a discussion of topological spaces, students will be given a comprehensive introduction to the central concept of convergence and will be taught how it is applied in those areas of mathematics that are of relevance in informatics.

After completing this module, students will be in a position to understand from a more general perspective those mathematical methods and procedures used in the bachelor-level courses.
[*updated 08.05.2008*]

Outline content:
1. Topological spaces
2. Metric spaces
3. The topology of R_n space
4. Fixed point theorems
5. The Weierstrass approximation theorem
6. Fourier series and fast Fourier transforms (FFT)
7. Differential calculus of functions f: R_n ->R_m
8. Numerical methods of solving nonlinear systems of equations
9. The basic terminology of differential geometry

[*updated 08.05.2008*]

Reading list:
APPELL, Jürgen, VÄTH, Martin: Elemente der Funktionalanalysis, Vieweg 2005
BARNSLEY, Michael F.: Fraktale, Spektrum Akad. Verlag 1995
PLATO, Robert: Numerische Mathematik kompakt, Vieweg-Verlag, 2. Auflage 2004
VON QUERENBURG, Boto: Mengentheoretische Topologie, Springer-Verlag, 3. Auflage 2001
WÜNSCH, Volkmar: Differentialgeometrie, Teubner 1997
[*updated 08.05.2008*]

Module offered in:
SS 2008

Master Thesis

Title of module: Master Thesis

Degree programme: Master of Science in Applied Informatics

Code: PIM-MT

ECTS credits: 30

Semester: 10

Mandatory course: yes

Language of instruction:
German

Assessment:
Master thesis: 80 %; oral examination: 20 %

Degree prog. incorporating this module:
PIM-MT Master of Science in Applied Informatics, semester 10, mandatory course

Total student study time:
The total student study time for this course is 900 hours.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Helmut Folz

Teaching staff:
Prof. Dr. Helmut Folz

Learning outcomes/skills:
Students will conduct an academically oriented research and/or development project whose results demonstrate an openness to innovative technologies and their applications.

Students will show that they are capable of applying and improving on current ideas drawn from the relevant research and development fields. They will generate new results and these results will be implemented and presented as new concepts or solutions.
[*updated 08.05.2008*]

Outline content:
1. Topic of final-year masters thesis assigned to student
2. Analysis of problem
3. Development of novel theoretical or application-specific approaches
4. Evaluation of the various alternative solutions, including those based on provisional or incomplete research results
5. Individual conceptual and implementational development of the chosen solution
6. Documentation of the results in the form of a written thesis
7. Presentation of thesis in a research colloquium

[*updated 08.05.2008*]

Reading list:
Students will study the scientific literature for references relevant to their chosen research topic.
[*updated 08.05.2008*]

Project Work

Title of module: Project Work

Degree programme: Master of Science in Applied Informatics

Code: PIM-PA

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 10

Semester: 9

Mandatory course: yes

Language of instruction:
German

Assessment:
Project work: 80 %; oral examination: 20 %

Degree prog. incorporating this module:
PIM-PA Master of Science in Applied Informatics, semester 9, mandatory course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 300 hours (equivalent to 10 ECTS credits).
There are therefore 270 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Helmut Folz

Teaching staff:
Prof. Dr. Helmut Folz

Learning outcomes/skills:
Developing the skills needed to design, execute and present computer science projects. Students will be able to apply their current knowledge in a specific area to a larger problem of interest. They will generate new results and these results will be implemented and presented as new concepts or solutions.
[*updated 08.05.2008*]

Outline content:
1. The execution of complex projects
2. Defining the problem to be solved through consultation with the project sponsor
3. Analysing the project task and creating a project plan
4. Executing the project steps in accordance with the project plan including regular reviews with the project sponsor and academic supervisors
5. Documentation of project results
6. Presentation of project results

[*updated 08.05.2008*]

Reading list:
WIECORREK, Hans. W.; MERTENS, Peter: Management von IT-Projekten, Berlin 2004
MAYRSHOFER, Daniela; KRÖGER, Hubertus, A.: Moderation in der Praxis, Bd.4 - Prozesskompetenz in der Projektarbeit: Ein Handbuch für Projektleiter, Prozessbegleiter und Berater, 2001.

The academic supervisors will also provide additional project-related references.
[*updated 08.05.2008*]

Module offered in:
WS 2008/09

Semantic Interoperability

Title of module: Semantic Interoperability

Degree programme: Master of Science in Applied Informatics

Code: PIM-SIVS

Learning and teaching methods: 3V+1U (4 hours per week)

ECTS credits: 6

Semester: 8

Mandatory course: yes

Language of instruction:
German

Assessment:
Written exam: 60 %; presentation: 40 %

Degree prog. incorporating this module:
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-SIVS Master of Science in Applied Informatics, semester 8, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Reiner Güttler

Teaching staff:
Prof. Dr. Reiner Güttler

Learning outcomes/skills:
Students will learn the significance of semantic integration as an important and frequently underestimated component of software architectures. Why do we need semantic interoperability? Why is it so difficult to implement? After being introduced to the fundamental definitions and terminology of semantics, students will learn to recognize that semantic conflicts are unavoidable and therefore have to be treated appropriately.

Students will become acquainted with the ideas and approaches used in solving semantic interoperability problems, and with their use in typical applications such as a e-business and Enterprise Application Integration (EAI).
[*updated 08.05.2008*]

Outline content:
1. The meaning of semantic interoperability
2. Fundamentals of semantics
3. Semantic conflicts and solution patterns
4. Metadata and ontology design patterns
5. Interoperability architectures
6. Semantic Web
7. Infrastructure
8. Case studies

[*updated 08.05.2008*]

Reading list:
POLLOCK, Jeffrey, T.; HODGSON, Ralph: Adaptive Information, Wiley 2004
Proceedings of Semantic Web Conferences, e.g. ISWC 2004
Websites of relevant stakeholders and special-interest groups: e.g. http://www.wsmo.org/
[*updated 08.05.2008*]

Module offered in:
SS 2008

Theoretical Informatics Seminar

Title of module: Theoretical Informatics Seminar
Degree programme: Master of Science in Applied Informatics
Code: PIM-STI
Learning and teaching methods: 4V (4 hours per week)
ECTS credits: 6
Semester: 8
Mandatory course: yes
Language of instruction: German
Assessment: Written assignment: 50 %, presentation: 50 %
Degree prog. incorporating this module: KI848 Master of Computer Science and Communication Systems, semester 8, optional course PIM-STI Master of Science in Applied Informatics, semester 8, mandatory course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 180 hours (equivalent to 6 ECTS credits). There are therefore 120 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: PIM-TI Theoretical Informatics
Recommended as prerequisite for:
Module convenor: Prof. Dr. Thomas Kretschmer
Teaching staff: Prof. Dr. Thomas Kretschmer

Learning outcomes/skills:
In this module, students will be expected to study a challenging academic topic in the field of theoretical informatics, document their results in suitable form and present these results in comprehensible fashion to a seminar audience.

The topics covered will deepen the knowledge acquired in the lecture course Theoretical Informatics and will extend the methods and techniques introduced in that earlier module. Students will be expected to address the key ideas and principles that underlie their chosen seminar topics, and to work on their own, but under the close supervision of a member of academic staff, to develop their ideas in a manner suitable for subsequent presentation. The written documentation is expected to comply with applicable scientific standards and should demonstrate that the student has worked with and understood both the details and the broader relationships relevant to the chosen topic.
[*updated 08.05.2008*]

Outline content:
Current topics from the fields of automata and languages, computability theory, complexity and information theory, e.g. probabilistic algorithms, alternating automata, zero-knowledge proofs, rewriting systems.
[*updated 08.05.2008*]

Reading list:
HOPCROFT John E.; ULLMANN Jeffrey D.; MOTWANI Rajeev: Einführung in die Automatentheorie - Formale Sprachen und Komplexitätstheorie, Pearson Studium, München, 2. Auflage 2002
SIPSER Michael: Introduction to the theory of computation, Course Technology, Boston 1997

See also specialist advanced literature.
[*updated 08.05.2008*]

Module offered in:
SS 2008

Security and Cryptography

Title of module: Security and Cryptography

Degree programme: Master of Science in Applied Informatics

Code: PIM-SK

Learning and teaching methods: 3V+1U (4 hours per week)

ECTS credits: 6

Semester: 9

Mandatory course: yes

Language of instruction:
German

Assessment:
Written examination

Degree prog. incorporating this module:
KI725 Master of Computer Science and Communication Systems, semester 7, mandatory course
PIM-SK Master of Science in Applied Informatics, semester 9, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Damian Weber

Teaching staff:
Prof. Dr. Damian Weber

Learning outcomes/skills:
After completing this course, students will be able to analyse cryptographically relevant processes, identify and exploit errors, and develop cryptographically secure systems based on standard procedures.
[*updated 08.05.2008*]

Outline content:
1. Basics, terminology, definitions
2. Algebraic structures
3. RSA
4. The Diffie-Hellman key exchange system
5. The ElGamal cryptosystem
6. Secure hash functions
7. Digital signatures
8. Cryptosystems with elliptic curves

[*updated 08.05.2008*]

Reading list:
SCHNEIER, Bruce; FERGUSON, Niels: Practical Cryptography, Wiley 2003
KOBLITZ, N.: Algebraic Aspects of Cryptography, Springer, 2. Auflage 2004
[*updated 08.05.2008*]

Module offered in:
WS 2008/09

Software Architecture

Title of module: Software Architecture

Degree programme: Master of Science in Applied Informatics

Code: PIM-SAR

Learning and teaching methods: 4V (4 hours per week)

ECTS credits: 6

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
Written examination: 60 %, presentation: 40 %

Degree prog. incorporating this module:
KI747 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-SAR Master of Science in Applied Informatics, semester 7, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Reiner Güttler

Teaching staff:
Prof. Dr. Reiner Güttler

Learning outcomes/skills:
Software architects function as the interface between the various aspects of software projects: analysis, design, implementation and management. They need a sound and comprehensive knowledge of software planning and design that goes beyond pure programming skills and specialist areas of expertise.

This course of lectures aims to teach students the fundamental knowledge that a successful software architect requires. Students will learn about how large systems can be broken down into components and about the relationships between these components (internal interfaces) and the outside world (external interfaces). The course will also cover different ways of looking at software architecture. Students will also acquire an understanding of the importance and scope of platform-independent and platform-dependent architectural decisions.

The lecture course will also deal in detail with new innovative approaches to architecture and how they relate to industry standards (Model Driven Architecture MDA, Service Oriented Architecture SOA, The Open Group Architectural Framework TOGAF).

The lectures will also provide answers to essential questions in the field of software architecture, such as:
- What are the different attributes associated with the design process?
- How can the flexibility and extensibility of a software system be guaranteed (design-for-change strategies)?
- How does architecture influence quality?
- What are the most suitable methods and descriptive techniques?
- Which established solutions exist for technical aspects such as transaction management or persistence?
- What are the relevant standards in the field of software architecture?

[*updated 08.05.2008*]

Outline content:
1. Introduction and overview: What is software architecture?
2. Objectives and results of architecture design, the tasks of the software architect
3. Designing and documenting software architecture, description techniques and views (conceptual view, module view, execution view, etc.)
4. Design principles (heuristics, architecture patterns), attributes and reuse
5. Testing and evaluating software architectures (prototyping, simulation, verification, etc.)
6. Catalogue of technical aspects (safety, security, persistence, ergonomics, etc.)
7. Innovative architectural concepts and their relationship to industry standards
   a. MDA of the OMG consortium
   b. Service-Oriented Architecture SOA
   c. Reference Model Open Distributed Computing RM-ODP (ISO/IEC 10746-x)
   d. The Open Group Architectural Framework TOGAF

[*updated 08.05.2008*]

Reading list:
BASS, Len; CLEMENTS, Paul; KAZMAN, Rick: Software Architecture in Practice, Addison-Wesley 2003
CLEMENTS, Paul; KAZMAN, Rick; KLEIN, Mark: Evaluating Software Architectures Methods and Case Studies, Addison-Wesley 2002
STARKE, Gernot: Effektive Softwarearchitekturen, Hanser 2. Auflage 2005
Websites of relevant organizations (www.opengroup.org, www.service-architecture.com, www.iso.org, www.omg.org/mda)
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Software Development Processes

Title of module: Software Development Processes

Degree programme: Master of Science in Applied Informatics

Code: PIM-SEP

Learning and teaching methods: 3V+1P (4 hours per week)

ECTS credits: 6

Semester: 8

Mandatory course: yes

Language of instruction:
German

Assessment:
Oral examination: 40 %, written assignment: 30 %, presentation: 30 %

Degree prog. incorporating this module:
KI841 Master of Computer Science and Communication Systems, semester 8, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-SEP Master of Science in Applied Informatics, semester 8, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Helmut Folz

Teaching staff:
Prof. Dr. Helmut Folz

Learning outcomes/skills:
Part 1 of this module is concerned with current software engineering methodologies. Students will gain an overview of the key components of software development processes in major software projects and will be able to deepen and consolidate this knowledge in a presentation.

Part 2 teaches students the main methods used in requirements engineering and software estimation. Students will consolidate what they have learned in a written paper.

This module teaches students the skills that are needed in subsequent management positions (e.g. when working as a project leader).
[*updated 08.05.2008*]

Outline content:
Part 1: Software development models
1. Introduction to and overview of software development models
2. An overview of the Rational Unified Process
3. V-Model XT
- Structure of model
- Tailoring: Modular development and project implementation strategies
- Roles, products and activities
- Project management and quality assurance
- Meta models
4. Agile modelling
- Extreme programming
- Agile processes

Part 2: Advanced topics
1. Requirements engineering
- Requirements analysis
- Stakeholders and system context
- Requirements documentation
- Quality assurance
- Requirements management
2. Software estimation
- Fundamentals of software estimation
- Software estimation methods
- Software metrics
- The function point method

Experts from external companies will be invited to discuss some of these topics.
[*updated 08.05.2008*]

Reading list:
RUPP, CHRIS: Requirements-Engineering und -Management, Hanser Verlag 2004
BALZERT, HELMUT: Lehrbuch der Softwaretechnik, Spektrum Akademischer Verlag, Band 1 Software-Entwicklung 2. Auflage 2000
BALZERT, HELMUT: Lehrbuch der Softwaretechnik, Spektrum Akademischer Verlag, Band 2 Software-Management, 1998
BUNDSCHUH, MANFRED; FABRY, AXEL: Aufwandschätzung von IT-Projekten, verlag moderne industrie Buch AG & Co. KG, Bonn, 2. Auflage 2004
V-MODELL XT: http://www.v-modell-xt.de
[*updated 08.05.2008*]

Module offered in:
SS 2008

Theoretical Informatics

Title of module: Theoretical Informatics

Degree programme: Master of Science in Applied Informatics

Code: PIM-TI

Learning and teaching methods: 4V (4 hours per week)

ECTS credits: 6

Semester: 7

Mandatory course: yes

Language of instruction:
German

Assessment:
180-minute written exam

Degree prog. incorporating this module:
KI710 Master of Computer Science and Communication Systems, semester 7, mandatory course
PIM-TI Master of Science in Applied Informatics, semester 7, mandatory course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 180 hours (equivalent to 6 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:
PIM-STI Theoretical Informatics Seminar

Module convenor:
Prof. Dr. Thomas Kretschmer

Teaching staff:
Prof. Dr. Thomas Kretschmer

Learning outcomes/skills:
Students will learn the traditional areas of theoretical informatics: automata and languages, computability and complexity theory. Students will acquire an understanding of the fundamental mathematical properties of hardware and software systems. After completing this course, students will understand and be able to apply the theoretical concepts that are used to solve problems of practical relevance. This will allow them to generate theoretically well-grounded and properly conceived solutions. Students will also appreciate the fundamental limitations that apply to certain types of problems. They will also know how to classify problems into complexity classes with respect to runtime and memory requirements.
[*updated 08.05.2008*]

Outline content:
1. Automata and languages
- Regular languages
- Context-free languages

2. Computability theory
- The Church-Turing thesis
- Decidability
- Reducibility
- Defining information

3. Complexity theory
- Time complexity with NP-completeness
- Spatial complexity

[*updated 08.05.2008*]

Reading list:
HOPCROFT John E.; ULLMANN Jeffrey D.; MOTWANI Rajeev: Einführung in die Automatentheorie - Formale Sprachen und Komplexitätstheorie, Pearson Studium, München, 2. Auflage 2002
SIPSER Michael: Introduction to the theory of computation, Course Technology, Boston 1997
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Master of Science in Applied Informatics - optional courses

Algorithms and Complexity

Title of module: Algorithms and Complexity
Degree programme: Master of Science in Applied Informatics
Code: PIM-WI10
Learning and teaching methods: 4V (4 hours per week)
ECTS credits: 5
Semester: 7
Mandatory course: no
Language of instruction: English
Assessment: Written examination
Degree prog. incorporating this module: KI745 Master of Computer Science and Communication Systems, semester 7, optional course PIM-WI10 Master of Science in Applied Informatics, semester 7, optional course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 150 hours (equivalent to 5 ECTS credits). There are therefore 90 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dave Swayne
Teaching staff: Prof. Dave Swayne

Learning outcomes/skills:
The students are capable of classifying algorithmic problems with respect to time and space complexity. The algorithmic tools of this course enable the student to find effective approaches to many problems. Consequently, they are able to propose efficient solutions these may be approximate if the problem is NP-hard.
[*updated 08.05.2008*]

Outline content:
. Mathematical tools
- order calculus
- difference equations
- logarithms

2. Brute force

3. Divide and conquer
- large integers and the Strassen algorithm
- fundamental theorem of divide and conquer
- convex hull and closest pair case studies

4. Decrease and conquer, transform and conquer

5. Auxiliary techniques
- Precomputation
- Time and space tradeoffs
- String processing algorithms

6. Hierarchies of computational complexity
7. Approximation algorithms

8. Case studies in approximation algorithms
- branch and bound
- routing
- pipe flow and its applications
[*updated 08.05.2008*]

Reading list:
To be announced
[*updated 08.05.2008*]

Module offered in:
WS 2007/08

[?]

Title of module: [?]

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI53

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 3

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:

Degree prog. incorporating this module:
KI748 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-WI53 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Dr. Jean Schweitzer

Teaching staff: Dr. Jean Schweitzer

Learning outcomes/skills:
[*still undocumented*]

Outline content:
[*still undocumented*]

Reading list:
[*still undocumented*]

Module offered in:
WS 2008/09

Business English

Title of module: Business English
Degree programme: Master of Science in Applied Informatics
Code: PIM-WN10
Learning and teaching methods: 2V (2 hours per week)
ECTS credits: 2
Semester: 8
Mandatory course: no
Language of instruction: English
Assessment: Written examination
Degree prog. incorporating this module: [PI-D] Diploma of Practical Computer Science, semester 6, optional course PIM-WN10 Master of Science in Applied Informatics, semester 8, optional course
Total student study time: 30 class contact hours over a 15-week period. The total student study time is 60 hours (equivalent to 2 ECTS credits). There are therefore 30 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Christine Sick
Teaching staff: Prof. Dr. Christine Sick Stefanie Krächan-Lashbrook, M.A. Marina Hefti, M.A.

Learning outcomes/skills:
In this course students will extend their existing skills in occupational English (level B2 of the Common European Framework) by continuing to develop their general verbal skills in English as well as acquainting themselves with practically relevant aspects of business.

Students will begin by using relevant English-language materials to become acquainted with the way in which businesses and companies are structured and organized in English-speaking countries. They will also be introduced to specific, career-relevant problems and will have the chance to practice company and project presentations in English. Students will also acquire an insight into culturally relevant issues that will enable them to take part in international meetings and negotiations.
[*updated 08.05.2008*]

Outline content:
I. Types and organizational structures of companies
II. Basic financial terminology (bookkeeping, financial reporting, etc.)
III. Presentations based on specific case studies
IV. Intercultural awareness and its implications for negotiations and meetings
V. Grammar revision (as necessary)
[*updated 08.05.2008*]

Reading list:
A list of recommended reading materials will be distributed.
[*updated 08.05.2008*]

Module offered in:
SS 2008

Content Management Systems

Title of module: Content Management Systems

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI15

Learning and teaching methods: 2V+2PA (4 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Project work

Degree prog. incorporating this module:
KI743 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-WI15 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Dipl.-Inform. Roman Jansen-Winkeln

Teaching staff:
Dipl.-Inform. Roman Jansen-Winkeln

Learning outcomes/skills:
Students taking this course will acquire a detailed understanding of the deployment and operation of content management systems (CMSs) in information distribution and as portals for web applications.

Students will use the PLONE open source CMS, the ZOPE web application server and the Python programming language to learn about the structure and function of a complex CMS. Project work sessions will be used to become acquainted with and implement individual components, such as: Staging/Live servers, wikis/blogs, Flickr/YouTube integration, CMS server farms (ZEO), workflows/security.
[*updated 08.05.2008*]

Outline content:
Content management systems (CMSs) are programs used to collaboratively create, manage, organize and publish the content of text and multimedia documents. Particular importance is attached to media-independent data storage. CMSs are highly adaptable, permitting modification of their appearance, the way they handle content and the way in which workflows are implemented. They can therefore be used to cover a very broad spectrum of applications, ranging from simple dynamic websites to enterprise content management systems.

CMSs form the technical foundation for numerous applications in the field of social software and Web 2.0, e.g. wikis, blogs and file-sharing networks.

1. Overview and classification of CMSs
2. Structure and function of ZOPE/PLONE
3. Templates and customizing content appearance
4. Adding content types using the Archetypes framework
5. Performance tuning, search engine optimization
6. Web 2.0 and social software: Flickr, YouTube

[*updated 08.05.2008*]

Reading list:
McKay, Andy: PLONE, Addison-Wesley 2005
Walerowski, Peter: ZOPE, Galileo Press 2004
Erlhofer, Sebastian: Suchmaschinen-Optimierung, Galileo Press 2005
Pilgrim, Mark: Dive into Python, www.diveintopython.org (online) and Apress (paper) 2004
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Distribution Logistics

Title of module: Distribution Logistics

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN50

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 3

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Written examination: (50 %) + problem-solving exercises: (50 %)

Degree prog. incorporating this module:
KI847 Master of Computer Science and Communication Systems, semester 7, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-WN50 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Klaus-Jürgen Schmidt

Teaching staff:
P. Zeilinger

Learning outcomes/skills:
After completing this module students will understand the objectives, tasks and methods of logistics systems and their use in the distribution of end products and spare parts. They will be able to systematically assess the structure and economic feasibility of current logistics systems and will be in a position to develop new concepts and solutions for industrial and commercial applications.

During this module students will work in small teams to develop concepts for solving typical small self-contained logistics problems and will then present their results to decision makers.
[*updated 08.05.2008*]

Outline content:
1 Distribution logistics and full-service logistics
1.1 Company logistics
1.2 Objectives and tasks of distribution logistics
1.3 Practical goal and task systems in logistics for the automotive industry

2 Core processes and distribution logistics
2.1 Planning and control processes
2.2 Inbound processes and structures
2.3 Warehouse processes and structures
2.4 Outbound processes and structures
2.5 Projects to design core processes

3 Distribution logistics systems
3.1 System design concepts
3.2 Practical IT systems
3.3 Projects to design IT processes

4 Designing distribution infrastructures
4.1 Example projects from industry
4.2 Student projects
[*updated 08.05.2008*]

Reading list:
HOPPE, Niklas; CONZEN, Friedrich: Europäische Distributionsnetzwerke, Wiesbaden 2002
SCHMIDT, K.-J.: Logistik, Wiesbaden 1996
ZEILINGER, Peter: Distributionslogistik, in: Logistik, hrsg. Von K.-J. Schmidt, Wiesbaden 1996
[*updated 08.05.2008*]

Introduction to Robotics

Title of module: Introduction to Robotics

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI20

Learning and teaching methods: 2V+2P (4 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Project work

Degree prog. incorporating this module:
KI842 Master of Computer Science and Communication Systems, semester 8, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-WI20 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Dipl.-Ing. Dirk Ammon

Teaching staff:
Dipl.-Ing. Dirk Ammon

Learning outcomes/skills:
The theoretical part of this course aims to acquaint students with the basic tasks and problems in the field of mobile robotics (self-localization, navigation, map building and route planning) and to provide them with the skills necessary to develop appropriate solutions. This knowledge is then applied to a project carried out in the practical part of the module. The focus of the practical task is less on the pure construction of a robot and more on the programming requirements. Students will learn to interpret sensor data intelligently and to make efficient use of these data by integrating them into multiple processes.
[*updated 08.05.2008*]

Outline content:
I. Theoretical part: Lecture course
1. Introduction
History and development of robotics
Fundamentals and definitions
Control paradigms
2. Hardware
Sensors used in robotics
Actuators used in robotics
Mechanics and robot kinematics
3. Navigation
Mathematical basics
Coupled navigation
Navigation using landmarks
Examples from biology
4. Map building and route planning

II. Practical part: Project
Creation of a mobile robot (students work in groups of two)
- Group-specific definition of task and project discussions
- Development, realization and testing
- Documentation
- Formal presentation of results

[*updated 08.05.2008*]

Reading list:
NEHMZOW, Ulrich: Mobile Robotik: Eine praktische Einführung, Springer Verlag Berlin-Heidelberg 2002
GOCKEL, DILLMANN: Embedded Robotics: Das Praxisbuch, Elektor-Verlag, Aachen 2005
[*updated 08.05.2008*]

Module offered in:
SS 2008, WS 2007/08

Embedded Systems

Title of module: Embedded Systems

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI25

Learning and teaching methods: 2V+2P (4 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Graded project work and presentation

Degree prog. incorporating this module:
[PI-D] Diploma of Practical Computer Science, semester 5, optional course
KI880 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-WI25 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Martina Lehser

Teaching staff:
Prof. Dr. Martina Lehser

Learning outcomes/skills:
This module aims to provide students with a detailed understanding of how microcontrollers and real-time operating systems are used in embedded systems. By using appropriate development environments, students will learn and understand the relationships between the hardware used, the chosen software design and the final software running under real-time conditions. Students will carry out project work in which they apply the knowledge acquired to an embedded system.
[*updated 08.05.2008*]

Outline content:
1. Structure of embedded systems
2. Special security requirements
3. Time response requirements, determinism
4. Reliability and fault tolerance
5. Design of embedded systems
6. Real-time operating systems and scheduling techniques

[*updated 08.05.2008*]

Reading list:
P. Marwedel: Embedded System Design, Springer 2007
G. Buttazzo: Hard Real-Time Computing Systems, Springer 2004
P. Pop et al.: Analysis and Synthesis of Distributed Real-Time Embedded Systems, Springer 2004
F. Vahid, T.Givargis: Embedded System Design, John Wiley 2003
[*updated 08.05.2008*]

Formal Methods in Telecommunications

Title of module: Formal Methods in Telecommunications

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN15

Learning and teaching methods: 2V+2U (4 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Written examination

Degree prog. incorporating this module:
KI715 Master of Computer Science and Communication Systems, semester 7, mandatory course
PIM-WN15 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Reinhard Brocks

Teaching staff:
Prof. Dr. Reinhard Brocks

Learning outcomes/skills:
Students will acquire an understanding of how communication protocols function. They will be able to specify services and protocols using formal descriptive languages and will be able to deploy protocol development tools.
[*updated 08.05.2008*]

Outline content:
The principles of communication protocols, communication instances and how they function
Message Sequence Charts (MSCs):

- Basic language constructs (Frame, Instance, Message, Condition, Action, Timer, Create)
- Structural language constructs (Coregion, Decomposition, References, Inline expressions, High-level MSC)

Specification and Description Language (SDL):

- Agents
- Process specification
- Transmitting and receiving signals
- Timers
- Procedures

Abstract Syntax Notation One (ASN.1):

- Abstract, concrete and transfer syntax
- Presentation context
- Object identifiers
- Module structure
- Simple and compound types
- Tagging
- BER encoding rules

Testing and Test Control Notation (TTCN-3):

- Protocol development
- Protocol testing

[*updated 08.05.2008*]

Reading list:
Textbooks
- König, Hartmut: Protocol Engineering, Teubner 2003, ISBN 3-519-00454-2

Specialist literature
- Dubuisson, Olivier: ASN.1, Communication between heterogeneous systems, Morgan Kaufmann, 2001, ISBN 0-12-633361-0, http://asn1.elibel.tm.fr/en/book/
- Ellsberger, Hogrefe, Sarmen: SDL: Formal Object-Oriented Language for Communicating Systems, 1997
- Mitschele-Thiel: Systems Engineering with SDL, John Wiley & Sons, 2001

Specifications
- ITU-T Recommendation Z.120 : Message Sequence Charts (MSC), 2004
- ITU-T Recommendation Z.100: Specification and Description Language SDL, 2002
- ITU-T Recommendation Z.140: Testing and test control notation version 3 (TTCN-3): Core language, 2003

Lecture notes
- Brocks, R.: Lecture notes

Websites
- http://www.itu.int : International Telecommunication Union
- http://asn1.elibel.tm.fr/ : ASN.1 Information Site
- http://www.sdl-forum.org/ : SDL-Forum Society
- http://www.iec.org/ : International Engineering Consortium
- http://www.oss.com/ : OSS Nokalva

[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Human/Computer Interaction

Title of module: Human/Computer Interaction

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI30

Learning and teaching methods: 4V (4 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Written examination

Degree prog. incorporating this module:
PIM-WI30 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Ralf Denzer

Teaching staff:
Prof. Steven Frysinger

Learning outcomes/skills:
This course will: (a) make the system developer aware of the human aspects of the system, including the peculiar cognitive and perceptual attributes of the human being; (b) provide the developer with design criteria and guidelines which will help to produce effective interactive computer systems; and (c) teach the developer how to quantitatively test the human/computer interface in a rigorous way, as part of the testing of the rest of the system.
[*updated 08.05.2008*]

Outline content:
Computer systems are embedded in virtually every aspect of our modern life, from the database systems that help us run our businesses down to the cellular/mobile telephones on which we have come to depend for daily personal communication. But developers of these tools frequently forget that the human being is part of the computer system, because essentially all of these systems depend on human interaction of some sort to produce the desired end result. In order to overcome this we must educate computer system developers about the nature of the human/computer interface (HCI) and give them tools with which to design and test effective interfaces in the systems which they develop.
[*updated 08.05.2008*]

Reading list:
Price, Jennifer / Rogers, Yvonne /Sharp, Helen: Interaction Design. John Wiley and Sons 2002
[*updated 08.05.2008*]

IT Governance

Title of module: IT Governance
Degree programme: Master of Science in Applied Informatics
Code: PIM-WN35
Learning and teaching methods: 2V (2 hours per week)
ECTS credits: 2
Semester: 9
Mandatory course: no
Language of instruction: German
Assessment: Written examination
Degree prog. incorporating this module: PIM-WN35 Master of Science in Applied Informatics, semester 9, optional course
Total student study time: 30 class contact hours over a 15-week period. The total student study time is 60 hours (equivalent to 2 ECTS credits). There are therefore 30 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Klaus Huckert
Teaching staff: Dr. Jean Schweitzer

Learning outcomes/skills:
The term IT governance refers to the organization, management and control of a companys information technology by corporate management in order to align the IT processes with the companys stated business strategy. Students will learn that IT governance is a cyclical process in which the IT organization and IT processes are continuously improved so as to reduce costs and improve benefits. Case studies will be analysed in order to highlight the potential benefits that can be achieved by the application of internationally recognized IT governance tools (COBIT, ITIL). Students will also learn how to identify and manage IT risks.
[*updated 08.05.2008*]

Outline content:
1. Enterprise architecture and IT architecture
2. Corporate governance
3. IT governance
4. Architectures in IT management frameworks
5. IT efficiency potentials
7. Recording and analysing the as-is state of enterprise architectures
8. Planning enterprise architectures
9. Implementing enterprise architectures
10. Control

[*updated 08.05.2008*]

Reading list:
BLOEM, Jaap; VANDOORN, Menno; MITTAL, Piyush: IT-Governance, Wiles & Sons 2005
NIEMANN, Klaus D.: Von der Unternehmensarchitektur zur IT-Governance, Vieweg 2005
NILSSON, Ragnar: IT-Konsolidierung erfolgreich managen, Vieweg 2006
RÜTER, Andreas; SCHRÖDER, Jürgen (Hrsg.): IT-Governance in der Praxis, Springer 2006
[*updated 08.05.2008*]

IT, Telecommunications and the Law

Title of module: IT, Telecommunications and the Law

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN40

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 2

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:
120-minute written exam

Degree prog. incorporating this module:
KI830 Master of Computer Science and Communication Systems, semester 8, mandatory course
PIM-WN40 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 30 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
RA Cordula Hildebrandt

Teaching staff:
RA Cordula Hildebrandt

Learning outcomes/skills:
After completing this module students will be able to apply the fundamental legal terminology and legal standards in an everyday IT and telecommunications environment. In addition to general areas such as copyright and patent law, contract law, data protection and customer privacy regulations, students will also be introduced to telecommunications law, software law and internet law that are more specific to the IT and telecommunications fields. Students will be able to analyse the relationships between and the applicability of the different regulations and laws in the field of information technology and by studying relevant examples will learn how to apply them to typical situations.
[*updated 08.05.2008*]

Outline content:
1. Internet law
1.1 Websites
1.2 Internet domains
1.3 Formal requirements
1.4 Website content: legal considerations
1.5 Example: Online shops
1.6 Copyright laws
1.7 Competition law: Marketing
1.8 Entering into a contract: offer / acceptance
1.9 Links
1.10 Data protection and privacy
1.11 Security: Watermarks, electronic signatures

2. Telecommunications law
2.1 The Telecommunications Act
2.2 Blanket coverage
2.3 Encouraging competition through regulation
2.4 Frequency regulation
2.5 Licence and frequency allocation
[*updated 08.05.2008*]

Reading list:
http://bundesrecht.juris.de/aktuell.html (legal texts, BGB)
http://www.jurawelt.de/ go to: "Studentenwelt" (lecture notes, civil law)
http://www.uni-muenster.de/Jura.itm/hoeren/ click on: Lehre, Materialien, Skriptum Internet-Recht
[*updated 08.05.2008*]

Module offered in:
SS 2008

Industrial Ecology

Title of module: Industrial Ecology

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN30

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 2

Semester: 7

Mandatory course: no

Language of instruction:
English

Assessment:
Written examination

Degree prog. incorporating this module:
PIM-WN30 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 30 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Ralf Denzer

Teaching staff:
Prof. Steven Frysinger

Learning outcomes/skills:
Industrial Ecology (IE), sometimes called the science of sustainability, seeks to embrace and focus efforts to re-engineer our industrial society in a way which de-emphasizes material and energy consumption and which recognizes the value of natural capital in economic calculations. The name of this field suggests that efforts toward sustainable development can be usefully informed by examination of biological ecosystems and the lessons they have for us. This course will introduce and examine this relatively new field of inquiry and practice.
[*updated 08.05.2008*]

Outline content:
We will study the theoretical underpinnings of IE, examining briefly the biological metaphor for industrial ecosystems. We will also address various elements of practice which are associated with IE, especially Life Cycle Assessment and Design for Environment. Our goal is to better understand how industrial ecology can help us to evolve into a sustainable industrial society.
[*updated 08.05.2008*]

Reading list:
GRAEDEL, T. E./ B. R. ALLENBY, B.R.: Industrial Ecology, Prentice Hall 2003
[*updated 08.05.2008*]

Presenting Information

Title of module: Presenting Information

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI35

Learning and teaching methods: 2V+2U (4 hours per week)

ECTS credits: 5

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:
Project work

Degree prog. incorporating this module:
KI846 Master of Computer Science and Communication Systems, semester 8, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-WI35 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Thomas Kretschmer

Teaching staff:
Prof. Dr. Thomas Kretschmer

Learning outcomes/skills:
After completing this module students will
- understand and be able to use platform-independent document formats
- be able to design multimedia content based on open standards
- understand and be able to take into account different target groups and target media.

[*updated 08.05.2008*]

Outline content:
- Basics (psychology of perception, accessibility (input and representational aids), internationalization)
- Target-oriented design of user interfaces, device- and platform-independent representation
- Structure and display of complex multimedia documents
- Automated document generation

[*updated 08.05.2008*]

Reading list:

http://www.w3.org

COOPER, Alan; REIMANN, Robert: About Face 2.0: The Essentials of Interaction Design, Wiley 2003

BULTERMAN, Dick; RUTLEDGE, Lloyd: SMIL 2.0 : Interactive Multimedia for Web and Mobile Devices, Springer 2004

MEYER, Eric: Cascading Style Sheets: The Definitive Guide, 2nd Edition, OReilly 2004

[*updated 08.05.2008*]

Module offered in:

SS 2008

[?]

Title of module: [?]

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI54

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 5

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:

Degree prog. incorporating this module:
KI749 Master of Computer Science and Communication Systems, semester 7, optional course
PIM-WI54 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 120 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Martina Lehser

Teaching staff: Prof. Dr. Martina Lehser

Learning outcomes/skills:
[*still undocumented*]

Outline content:
[*still undocumented*]

Reading list:
[*still undocumented*]

Intelligent Networks

Title of module: Intelligent Networks
Degree programme: Master of Science in Applied Informatics
Code: PIM-WN20
Learning and teaching methods: 2V (2 hours per week)
ECTS credits: 3
Semester: 8
Mandatory course: no
Language of instruction: German
Assessment: 180-minute written exam
Degree prog. incorporating this module: KI875 Master of Computer Science and Communication Systems, semester 7, optional course PIM-WN20 Master of Science in Applied Informatics, semester 8, optional course
Total student study time: 30 class contact hours over a 15-week period. The total student study time is 90 hours (equivalent to 3 ECTS credits). There are therefore 60 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Horst Wieker
Teaching staff: Prof. Dr. Horst Wieker

Learning outcomes/skills:
Modern telecommunications has become a strategic factor for modern companies and is one of the fastest growing markets today. Modern call-centre applications exploit the full range of options offered by telecom networks. The telecommunications applications are supported by so-called intelligent networks (INs). IN platforms are used to incorporate new complex services into the telecom network. IN platforms are now being used not only in mobile and fixed network applications, but also in the internet. IN applications are network-independent. A major benefit of intelligent networks is that they have been completely specified by the ITU. Students will be taught about the architecture and operation of intelligent networks. This will involve redefining the term service and learning how to describe service implementation in terms of processes.
[*updated 08.05.2008*]

Outline content:
1. What is an intelligent network?
2. The IN concept
3. User interfaces
4. Architecture model
5. Signalling protocols in INs
6. Platforms and tools
7. SSP, SCP, SMP, SRP, Service Node
8. IN services
9. Number translation, routing, VPN, mass calling, calling card

[*updated 08.05.2008*]

Reading list:
SIGMUND G., Intelligente Netze
[*updated 02.07.2007*]

Medical Informatics

Title of module: Medical Informatics

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI40

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 3

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:

Degree prog. incorporating this module:
KI781 Master of Computer Science and Communication Systems, semester 7, optional course
[PI-D] Diploma of Practical Computer Science, semester 5, optional course
PIM-WI40 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Dr. Helmut Jäger

Teaching staff:
Dr. Helmut Jäger

Learning outcomes/skills:
This course is designed to show students the power and potential of medical informatics and establishes the necessary foundation for design-related decisions and for system development in medically relevant areas.
[*updated 08.05.2008*]

Outline content:
1) Basic medical terminology:
This section introduces students to the basics of anatomy and physiology. It provides an overview of the structure and function of an individual cell through to the complex organ systems found in the human body. The areas covered have been selected to be of relevance to medical informatics.

2) Basic terminology in the field of informatics:
A number of the basic terms and concepts needed to understand the field of medical informatics will be reviewed. Examples include data structure (lists, graphs, trees, hash tables, etc.), algorithms (sorting, greedy algorithms, dynamic programming) and database models.

3) Medical informatics:
Fundamentals of medical informatics: medical classification systems, IT systems in medical practices, hospital information systems, electronic medical records, medical image processing, lab systems, invoicing modules, etc. As personal data will be processed, data protection and privacy requirements must be met.
[*updated 08.05.2008*]

Reading list:
To be announced during the course.
[*updated 02.07.2007*]

Module offered in: WS 2008/09, WS 2007/08

Project Management

Title of module: Project Management
Degree programme: Master of Science in Applied Informatics
Code: PIM-WN12
Learning and teaching methods: 2V (2 hours per week)
ECTS credits: 3
Semester: 9
Mandatory course: no
Language of instruction: German
Assessment: Project work with student presentations
Degree prog. incorporating this module: KI840 Master of Computer Science and Communication Systems, semester 8, mandatory course PIM-WN12 Master of Science in Applied Informatics, semester 9, optional course
Total student study time: 30 class contact hours over a 15-week period. The total student study time is 90 hours (equivalent to 3 ECTS credits). There are therefore 60 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Dipl.-Ing. Michael Sauer
Teaching staff: Dipl.-Ing. Michael Sauer

Learning outcomes/skills:
This module aims to teach students the particular challenges associated with the planning, management and financial control of projects. A key focus of the course is on explaining and applying established project management methods. Students should acquire the skills to be able to actively participate in a project team.
[*updated 29.06.2007*]

Outline content:
The importance of projects in industry and commerce
Definition of project and project management
Methods of project management
Special features of software projects

Joint project work with the modules Software Development for Communication Networks and Business English.
[*updated 29.06.2007*]

Reading list:
BURGHARDT M., Projektmanagement, Publics MCD Verlag, 2000
WESTERMANN R.: Projektmanagement mit System. Gabler Verlag 2001
HIRZEL M., Multiprojektmanagement. FAZ-Verlag 2002
[*updated 29.06.2007*]

Module offered in:
WS 2008/09

Project Management

Title of module: Project Management

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN45

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 2

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:
Project work, oral examination

Degree prog. incorporating this module:
PIM-WN45 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 30 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Klaus-Jürgen Schmidt

Teaching staff:
Dipl.-Ing. Michael Sauer

Learning outcomes/skills:
This module aims to teach students the particular challenges associated with the planning, management and financial control of projects. A key focus of the course is on explaining and applying established project management methods and instruments, particularly with respect to software projects. After completing this course students will have acquired the skills needed to execute and actively manage projects.
[*updated 08.05.2008*]

Outline content:
1. The importance of projects in industry and commerce
2. Project definition
3. The phases of a project
4. Quality assurance in projects
5. Quality assurance in project workflow
6. Multi-project management
7. Project management tools
8. Special features of software projects

[*updated 08.05.2008*]

Reading list:
BURGHARDT, Manfred: Projektmanagement, Publics MCD Verlag 2000
WESTERMANN, Reinhold: Projektmanagement mit System. Gabler Verlag 2001
HIRZEL, Matthias; KÜHN, Frank; WOLLMANN, Peter (Hrsg.): Multiprojektmanagement. FAZ-Verlag 2002
[*updated 08.05.2008*]

Protocols in Public and Private Networks

Title of module: Protocols in Public and Private Networks
Degree programme: Master of Science in Applied Informatics
Code: PIM-WN25
Learning and teaching methods: 4V (4 hours per week)
ECTS credits: 5
Semester: 7
Mandatory course: no
Language of instruction: German
Assessment: 180-minute written exam
Degree prog. incorporating this module: KI720 Master of Computer Science and Communication Systems, semester 7, mandatory course PIM-WN25 Master of Science in Applied Informatics, semester 7, optional course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 150 hours (equivalent to 5 ECTS credits). There are therefore 90 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for:
Module convenor: Prof. Dr. Horst Wieker
Teaching staff: Prof. Dr. Horst Wieker
Learning outcomes/skills: Students will learn how the most important protocols in public networks function and how they are used. Based on the knowledge acquired, students will be able to analyse and develop relationships and interactions between individual network protocols. [*updated 08.05.2008*]

Outline content:
Protocols traditionally play a key role in communications technology. They are regarded as central components of the software used in communications devices. Protocols are standardized procedures and rules for exchanging data between communications systems. They include descriptions of the interfaces, data formats, timing and error-correction procedures.

The following protocol standards will be dealt with in detail:
1. Routing protocols
2. SNMP
3. SIP
4. RADIUS
5. H.323
6. SS7
7. SCCP, ISUP, TCAP, INAP
8. SS7 in mobile networks

[*updated 08.05.2008*]

Reading list:
SUGMUND G., Technik der der Netze
HALSALL F, DataCommunications, Computer Networks and Open Systems
EBERSPÄCHER J., et al, GSM, Global System for Mobile Communication
WALKE B, Mobilfunknetze und ihre Protokolle Band 1 + 2
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

[?]

Title of module: [?]

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI52

Learning and teaching methods: 2V+2P (4 hours per week)

ECTS credits: 5

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:

Degree prog. incorporating this module: KI844 Master of Computer Science and Communication Systems, semester 8, optional course PIM-WI52 Master of Science in Applied Informatics, semester 8, optional course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 150 hours (equivalent to 5 ECTS credits). There are therefore 90 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: PIM-WI55 Virtual Machines and Program Analysis
Recommended as prerequisite for:
Module convenor: M.Sc. Jörg Herter
Teaching staff: M.Sc. Jörg Herter
Learning outcomes/skills: [*still undocumented*]
Outline content: [*still undocumented*]
Reading list: [*still undocumented*]
Module offered in: SS 2008

Software Quality Management

Title of module: Software Quality Management
Degree programme: Master of Science in Applied Informatics
Code: PIM-WI45
Learning and teaching methods: 2V (2 hours per week)
ECTS credits: 3
Semester: 8
Mandatory course: no

Language of instruction:
German

Assessment:
Case study and oral examination

Degree prog. incorporating this module:
KI890 Master of Computer Science and Communication Systems, semester 8, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-WI45 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Helmut Folz

Teaching staff:
Prof. Dr. Helmut Folz

Learning outcomes/skills:
This course addresses those subjects that in addition to the core activities of analysis, design and programming are of key importance in IT projects.

Particular emphasis will be given to the quality management procedures typically used in industrial software development processes. The course is suitable for students of informatics and engineers interested in working in IT project management and IT management.
[*updated 08.05.2008*]

Outline content:
1. Software quality management: An overview
2. IT risk management
3. Constructive quality assurance techniques
4. Analytical quality assurance techniques
5. Planning software tests and test stages
6. Quality performance indices
7. Quality function deployment
8. Quality models (ISO 15504, CMMI, etc.)
9. Achieving quality through organization and communication
10. European Foundation for Quality Management (EFQM)

[*updated 08.05.2008*]

Reading list:
BALZERT, HELMUT: Lehrbuch der Softwaretechnik, Spektrum Akademischer Verlag, Band 2 Software-Management, 1998
WALLMÜLLER, ERNEST: Softwarequalitätsmanagement in der Praxis, Carl Hansen Verlag, 2. Auflage, München/Wien 2001
[*updated 08.05.2008*]

Module offered in:
SS 2008

Stochastics 1

Title of module: Stochastics 1

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI50

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 3

Semester: 7

Mandatory course: no

Language of instruction:
German

Assessment:
Written examination

Degree prog. incorporating this module:
PIM-WI50 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Barbara Grabowski

Teaching staff:
Prof. Dr. Barbara Grabowski

Learning outcomes/skills:
Mathematical, and especially stochastic methods, play a major role in informatics. They are used for example in the description, coding and transmission of signals, or when simulating or optimizing the behaviour of complex systems. This course teaches the fundamentals of probability theory necessary for such applications. After completing this module, students will be acquainted with the basic terminology of probability theory and will understand its significance in the field of informatics.
[*updated 08.05.2008*]

Outline content:
1. Fundamentals of probability theory

2. Markov chains and their applications
2.1 Discreet random variables
2.2 Markov chains
2.3 Applications of Markov chains in source coding
2.4 The use of Markov chains in simulating discreet systems

3. Random variables and their distributions
3.1 Discreet and continuous random variables
3.2 Special probability distributions
3.3 Limiting value theorems
3.4 Generating random numbers
3.5 The use of statistical methods in the simulation of discreet information systems
[*updated 08.05.2008*]

Reading list:
MATHAR, Rudolf; PFEIFER, Dietmar: Stochastik für Informatiker, B.G.Teubner Stuttgart 1990
GRABOWSKI, Barbara: Stochastik für Informatiker, e-Learning-Buch in ACTIVEMATH
[*updated 08.05.2008*]

Module offered in:
WS 2008/09

Stochastics 2

Title of module: Stochastics 2

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI51

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 3

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:
Written examination

Degree prog. incorporating this module:
PIM-WI51 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 90 hours (equivalent to 3 ECTS credits).
There are therefore 60 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Barbara Grabowski

Teaching staff:
Prof. Dr. Barbara Grabowski

Learning outcomes/skills:
Mathematical, and especially stochastic methods, play a major role in many areas of information and communications engineering, such as the description, coding and transmission of signals or information, performance analyses and optimizing the behaviour of communications systems. Building on the knowledge acquired in the module Stochastics 1, this course will focus on the those stochastic methods that are applied to problems in informatics. Central topics dealt with in this lecture course are performance analysis methods for discrete systems (traffic theory) and the optimal coding of information.
[*updated 08.05.2008*]

Outline content:
1. Mathematical methods in traffic theory
1.1 Introduction to the basic principles
1.2 Birth and death processes
1.3 Queues
1.4 Applications in traffic measurement

2. Mathematical methods in information and coding theory
2.1 Entropy
2.2 Information sources, optimal source coding
2.3 Channels and optimized channel coding
2.4 Mathematical methods in pattern recognition
2.4.1 Pattern recognition methods
2.4.2 Image coding and the efficient transmission of images
[*updated 08.05.2008*]

Reading list:
KLIMANT, Herbert; PIOTRASCHKE, Rudi; SCHÖNFELD, Dagmar: Informations- und Kodierungstheorie, B.G.Teubner, Leipzig 1996
WARMUTH, Elke: Mathematische Modelle in der Simulation diskreter Systeme, ZFH Koblenz 2002
GRABOWSKI, Barbara: Stochastik für Informatiker, e-Learning-Buch in ACTIVEMATH
[*updated 08.05.2008*]

Module offered in:
SS 2008

English for Technical Purposes

Title of module: English for Technical Purposes

Degree programme: Master of Science in Applied Informatics

Code: PIM-WN11

Learning and teaching methods: 2V (2 hours per week)

ECTS credits: 2

Semester: 7

Mandatory course: no

Language of instruction:
English

Assessment:
120-minute written exam

Degree prog. incorporating this module:
KI770 Master of Computer Science and Communication Systems, semester 7, optional course
[PI-D] Diploma of Practical Computer Science, semester 5, optional course
PIM-WN11 Master of Science in Applied Informatics, semester 7, optional course

Total student study time:
30 class contact hours over a 15-week period.
The total student study time is 60 hours (equivalent to 2 ECTS credits).
There are therefore 30 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Christine Sick

Teaching staff:
Prof. Dr. Christine Sick

Learning outcomes/skills:
In this course students will extend their existing skills in occupational English (level B2 of the Common European Framework) by broadening their vocabulary and their knowledge of phrases and expressions, and by learning advanced sentence structures that will enable them to understand, discuss and report on technical subjects in English. Students will acquire the fundamental techniques that will allow them to comprehend, summarize and present complex scientific materials in their subsequent project work.
[*updated 08.05.2008*]

Outline content:
1. Fundamentals of technical English
(mathematical formulae, geometrical shapes, describing position and movement, materials, instructions, etc.)
2. Technical texts, audio and video recordings
3. Reports and presentations on technical subjects
4. Grammar revision (as necessary)
[*updated 08.05.2008*]

Teaching methods/Media:
A selection of language teaching and learning materials appropriate to the target group (print, visual aids, audio, video and software)
[*updated 08.05.2008*]

Reading list:
A list of recommended reading materials will be distributed. Students are strongly encouraged to read English journals and technical literature and to visit appropriate English-language websites.
[*updated 08.05.2008*]

Module offered in: WS 2008/09, WS 2007/08

Virtual Machines and Program Analysis

Title of module: Virtual Machines and Program Analysis
Degree programme: Master of Science in Applied Informatics
Code: PIM-WI55
Learning and teaching methods: 2V+2P (4 hours per week)
ECTS credits: 5
Semester: 7
Mandatory course: no
Language of instruction: German
Assessment: Written exam, project work
Degree prog. incorporating this module: KI744 Master of Computer Science and Communication Systems, semester 7, optional course PIM-WI55 Master of Science in Applied Informatics, semester 7, optional course
Total student study time: 60 class contact hours over a 15-week period. The total student study time is 150 hours (equivalent to 5 ECTS credits). There are therefore 90 hours available for class preparation and follow-up work and exam preparation.
Recommended prerequisite skills/modules: None.
Recommended as prerequisite for: PIM-WI52
Module convenor: M.Sc. Jörg Herter
Teaching staff: M.Sc. Jörg Herter

Learning outcomes/skills:
- Conceptual principles and motivation underlying virtual machines, as illustrated by the CMa interpretation of C code to CMa code.
- Introduction to the most important techniques in program analyses (available expressions, interval analyses, constant propagation, dead variables, etc.)
- Development and discussion of the (fixpoint) algorithms used in program analysis: naive fixpoint iteration, round-robin, worklist, recursive iteration
- Understanding the mathematics underlying the analytical methods used, in particular the concept of a complete lattice.

[*updated 08.05.2008*]

Outline content:
1. Introduction to higher-level programming languages and their implementation
2. The architecture of CMa
3. Interpreting simple C language elements
4. Interpreting structs
5. Interpreting functions
6. Introduction to program analyses and transformations
7. Operational semantics/CFGs
8. Available and unavailable expressions
9. Fixpoint iteration: naïve, round-robin, worklist and recursive iteration
10. Mathematical background (How can we be prove that our analysis provides the best result and/or terminates at some stage?)
11. Live variables, dead variables and truly-live variables
12. Equality of variables
13. Constant propagation and interval analysis

[*updated 08.05.2008*]

Reading list:
R. WILHELM, H. SEIDL: Übersetzerbau. Virtuelle Maschinen
R. WILHELM, H. SEIDL: Übersetzerbau. Programmanalyse und Optimierung
F. NIELSON, H. NIELSON, C. HANKIN: Principles of Program Analysis
P. COUSOT, R. COUSOT: Abstract interpretation: a unified lattice model for static analysis of programs by construction or approximation of fixpoints
[*updated 08.05.2008*]

Module offered in:
WS 2008/09, WS 2007/08

Web Services

Title of module: Web Services

Degree programme: Master of Science in Applied Informatics

Code: PIM-WI60

Learning and teaching methods: 2V+2P (4 hours per week)

ECTS credits: 5

Semester: 8

Mandatory course: no

Language of instruction:
German

Assessment:
Graded project work and presentation

Degree prog. incorporating this module:
KI775 Master of Computer Science and Communication Systems, semester 8, optional course
[PI-D] Diploma of Practical Computer Science, semester 6, optional course
PIM-WI60 Master of Science in Applied Informatics, semester 8, optional course

Total student study time:
60 class contact hours over a 15-week period.
The total student study time is 150 hours (equivalent to 5 ECTS credits).
There are therefore 90 hours available for class preparation and follow-up work and exam preparation.

Recommended prerequisite skills/modules:
None.

Recommended as prerequisite for:

Module convenor:
Prof. Dr. Martina Lehser

Teaching staff:
Prof. Dr. Martina Lehser

Learning outcomes/skills:
Students will acquire a deeper understanding of the concepts, architectures and technologies used in the field of internet-based applications. Conceptual design and realization of internet applications. Review of security concepts and development of a web server (client and server applications using AXIS2).
[*updated 08.05.2008*]

Outline content:
1. Basics
2. XML schemas and XML namespace
3. SOAP
4. WSDL
5. UDDI
5. Security
6. Tools (AXIS2, Java Web Services)
[*updated 08.05.2008*]

Reading list:
T. Frotscher, M. Teufel, D.Wang et al.: Java Web Services mit Apache Axis2, Software & Support Verlag. 2007
A. Eberhart, S. Fischer: Web Services, Hanser 2003
T. Langner: Web Services mit Java, M&T Verlag 2003
D. Chappell, T. Jewell: Java Web Services, O´Reilly 2003
J. Snell et al.: Webservice-Programmierung mit SOAP, O´Reilly 2002
G. Alonso et al.: Web Services, Springer 2004
[*updated 08.05.2008*]

Module offered in:
SS 2008