HEILBRONN UNIVERSITY
OF APPLIED SCIENCES

List of English lectures – Faculty of Informatics

Bachelor degree programmes: Applied Computer Science (AIB), Software Engineering (SEB), Medical Informatic (MIB)

Study Programme	Lecturer	Course Code	Course Title	Semester	ECTS	Content	Start
Software Engineering, B.Sc. **SEB**	Sperrfechter	262005	Fundamentals of SW Engineering 1	1	5	• Software Develerament Life Cycle • Software process models (sequential, incremental, iterative, agile) • Techniques & important issues in software engineering (reuse, • metrics, tools, cost estimation, reviews, configuration • management…) • Requirements engineering • Prototyping (UI) • System modeling/Object-oriented analysis and design - basics of • UML • Basic concepts of software design (architectural patterns, software • patterns, basic principles (coupling, cohesion...))	winter term + summer term
Applied Informatics B.Sc. (can also be applied to Software Engineering, B.Sc.) **AIB/SEB**	Sperrfechter	173402	Design Thinking	2	4	This course introduces students to Design Thinking as a structured, user-centered approach to innovation and problem solving. Using game development as a practical context, students apply Design Thinking methods across the full design process. Students will: • Learn and apply core Design Thinking phases: empathy, problem definition, ideation, prototyping, and testing • Develop user-centered concepts informed by research and persona creation • Explore creative methods for idea generation and concept development • Design, prototype, and iteratively refine games • Conduct and evaluate user testing to inform design decisions The course emphasizes hands-on, iterative work and the integration of creativity	

						with systematic design methods.	
Software Engineering, B.Sc. **SEB**	Yogedran	262018	Digital Media	1	3	• Introduction • Digital graphics • Digital audio • Digital video • Further types of digital media • Motivation for compression algorithms, both technical and perception-based • Basic algorithms and processes from digital signal processing • Loss-less and lossy compression • Coding theory • Media systems and the World Wide Web • Processes, standards, tools • Digital media in daily use	winter term + summer term
Software Engineering, B.Sc. **SEB**	Winckler	262002	Computer Networks	1	3	How do computer networks work? • Introduction • Application Layer • Transport Layer • Network Layer	winter term
Software Engineering, B.Sc. **SEB**	Winckler	262051	Developer Tools for SW Engineering	3	3	The toolbox of software engineers: • version control with git • build management with gradle • Coding Conventions with checkstyle • Unit tests with JUnit 5 • statical code analysis with findbugs • UI programming with JavaFX	winter term + summer term

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Software Engineering / Applied Computer Sciences, B.Sc **SEB** **AIB**	Heil	262063/ 173271	Project Management and Software Engineering Tools	3	4	•	defining requirements as user stories • setting up a product backlog • estimating user stories • domain modeling [with Visual Paradigm] • code and database generation [with Visual Paradigm] • designing mock-ups • developing prototypes [in Java FX] • agile release planning • choosing and using appropriate tools for the activities above	winter term + summer term
Software Engineering, B.Sc **SEB**	Heil/Marsden	262081	Software Project & Skills Lab	4	12	•	working with requirements given as estimated user stories • keeping a product backlog [in Atlassian JIRA] • planning sprints using planning velocity • performing sprints, keeping track of progress and velocity • managing the project with a task board [in Atlassian JIRA] • developing a mobile/responsive web app with the above methods • shipping intermediate releases • presenting releases to customer(s) • managing feedback, bug reports [in Atlassian JIRA] • integration testing and system testing of a release • automated testing with Selenium • reviewing and documenting a product developed incrementally	winter term + summer term
Software Engineering, B.Sc. **SEB**	Mayer	262024	Data Security and Cryptography	3	3	•	Historical ciphers and their security • Modular arithmetic, groups, integer rings and galois fields • Symmetric cryptography (block and stream ciphers, and modes of operation) • Random number generators • Advanced Encryption Standard (AES) • Public-key cryptography • Essential number theory • Important public key algorithms (e. g. RSA, DHKE) • Key lengths and security levels • Padding schemes • Digital signatures • Hash functions • Message Authentication Codes	winter term + summer term

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Software Engineering, B.Sc. **SEB**	Marczinkowsky	262026	Further Programming Languages	4-7	4	**C++ for students acquainted with Java:** • Header and Implementation files • Precompiler • Compiler and Linker • String handling • Pointers and Objects • Copying Objects • Initialising Attributes, Initialisation lists • Call/Return by value / reference / pointer • default parameters • Smart Pointers • operator overloading • multiple inheritance, interfaces • Abstract classes, Polymorphism • generic types • standard template library • Iterators, Sequences • Containers • Algorithms, Predicates **C# and MS VS .NET:** • Runtime and development environments • NET Framework • Properties, Accessors • Indexers • Assemblies • Delegates, Events • Operator Overloading • GUI in WPF • Connecting to an RDBMS • Parallel Programming	winter term + summer term
Software Engineering, B.Sc. **SEB**	Reichert	262193	Games Laboratory	7	9	• Work on a complex team-based project • Unity Game Engine • Virtual Reality • Augmented Reality	winter term + summer term

						• Scripting with C# • Graphics Programming (2D/3D) • Game Physics • Particle Effects • GUIs in Games • Multiplayer Networking • User Interfaces (Touchscreen, Gamepad, VR, AR)	
Medical Informatics, B.Sc. **MIB**	Kalthoff	171269	Signal Processing	5	2	• Introduction to Signal Reconstruction • Introduction to Systems Theory • Stationary linear systems and the convolution integral • The Fourier transform • Sampling and periodicity • Localisation and filtering • Finite discrete signal processing • Integral transform methods, in particularconvolution • Determining signal quality in the limit case where noise is negligible • Simple filtering methods (frequency and spatial domain) • Filter design	winter term
Medical Informatics, B.Sc. **MIB**	Fegeler	171248	Fundamentals of SW Project Management	3	2	Basic principles of project management: • Project management methods and tools • Social issues in projects • Specific aspects of software development projects	winter term
Medical Informatics, B.Sc. **MIB**	Fegeler	171267	Tactical Management of Information Systems in Health	5	2	• Overview of information systems in health care • System integration, communication standards • System architecture • Administrative and medical functions in HIS (Hospital Information Systems) • Laboratory systems, RIS - PACS, intensive care system • Archiving, health telematics, electronic records • Information systems management	winter term

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Applied Computer Sciences / Software Engineering, B.Sc. **AIB** **SEB**	Reichenbach	173351	Usability Testing Lab	6/7 (B.Sc.) or M.Sc.	6	The students know the psychological concepts that are important for user-centered design and testing. They know the rationale behind usability testing and have expanded their knowledge of empirical methods. The students have trained the design and analysis of questionnaires. The students have trained the design, management, analysis and report of usability tests. • User-centered design process. • Usability testing in theory and practice (i.e. hands-on project). • Design and analysis of questionnaires in theory and practice (i.e. hands-on project).	winter term

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Applied Computer Sciences / Software Engineering, B.Sc. **AIB, SEB**	Ondrusch	262183	Innovation Lab	4-7	6	• Innovation Cycles and Design Thinking • Ideation and Creativity • Fast Prototypes • Empathy and User Centric Innovation • Foundations of Entrepreneurship	winter term + summer term
Applied Computer Sciences / Software Engineering, B.Sc. **SIB** **SEB**	Reck	262125	Data Analysis in Enterprises	6-7	6	• Introduction to Business Intelligence and Data Analysis • Principles of Data Warehouses • Snowflake-Schema • Star-Schema • Introduction to SAP BW/4 HANA • Hands-on exercises in SAP BW/4 HANA (Data modeling with SAP BW/4 HANA Data Structures, e.g. InfoObjects, ADSO and Composite Provider), ETL-Process, Reporting and Visualization) • Project in the Data Analysis field, e.g. Data Mining algorithms, Deep Learning, Machine Learning, Artificial Intelligence, Jupyter Notebook, Python, Big Data etc. or • Project in collaboration with an enterprise in the field Data Analysis or Business Intelligence	winter term + summer term

Applied Computer Sciences / Software Engineering, B.Sc.
 	
AIB
SEB
	Reck	262124	Data Science in an Enterprise Context	6-7	6	• Introduction to Data Science and Artificial Intelligence
						• Introduction to SAP HANA as an example of an in-memory database allowing
						  • efficient data storage and processing
						  • usage of machine learning algorithms and artificial intelligence
						  • developement of apps to visualize data analysis results
						• Projects on different topics in the data science field
						  • Deep Learning with Tensorflow and Keras
						  • Jupyter Notebook and Python
						  • Smart Home with Philips Hue
						  • AWS Analytics
						  • SAP Analytics Cloud (SAC) etc.	

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Master degree programme: Medical informatics (MIM)

Study Programme	Lecturer	Course Code	Course Title	Semester	ECTS	Content	Start
Medical Informatics, M.Sc. / Software Engineering, M.Sc. **MIM**	Schramm	172256	Health Economics	Elective	6	• Definition of Health Economics • Health Economic Evaluation • Methods in Health Economics • Outcomes measurement • Costs and their measurement • Building HE models with regard to chronic diseases	winter term
Medical Informatics, M.Sc. / Software Engineering, M.Sc. **MIM, SEM**	Pobiruchin	172383	Information Visualization	Elective	3	After completing the course, students will know target group-specific (scientific & visual) communication channels creation of scientific posters Data Visualization Principles basic elements of visual language for flipchart visualization Software solutions for visualizations, e.g. R/ggplot2, LaTeX/TikZ	winter term
Medical Informatics, M.Sc. / Software Engineering, M.Sc. **MIM, SEM**	Schramm	172382	Health Technology Assessment	Elective	6	• Technology Assessment in European health care systems • Added value appraisal • Cost evaluation • regulative requirements	summer term
Medical Informatics, M.Sc. / Software Engineering, M.Sc.	Haag	172374	Educational Technologies	All	6	• Introduction • Learning in the context of technologies • Linking Learning Objectives, Pedagogies, and Technologies • Users Perspective of Educational Technology • E-Assessment • Designing Learning Activitities and Instructional Systems • Standards and Tools • Emerging Issues in Educational Technology	summer term
Medical Informatics, M.Sc. / Software Engineering, M.Sc.	Reichenbach	173351	Usability Testing Lab	Elective	6	The students know the psychological concepts that are important for usercentered design and testing. They know the rationale behind usability testing and have expanded their knowledge of empirical methods. The students have trained the design and analysis of questionnaires.	winter term

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Medical Informatics, M.Sc. / Software Engineering, M.Sc.	Nuredini	172371	Deep Learning	Elective	6	• Artificial Neural Networks • Introduction to Deep Learning • Deep Learning for Computer Vision • Recurrent Neural Networks • Language Models • Generative Models • Deep Reinforcement Learning
MIM SEM						The students have trained the design, management, analysis and report of usability tests. • User-centered design process. • Usability testing in theory and practice (i.e. hands-on project). Design and analysis of questionnaires in theory and practice (i.e. hands-on project

Master degree programmes: Software Engineering (SEM) – International Master Programm

The Master in Software Engineering is an international Master program taught entirely in English. You can obtain a Master degree in 3 semesters or attend our courses as an exchange student. The course of study depends on your individual choice of courses and study profile:

- ASE Advanced Software Engineering and Data Science
- HCI Human-Computer Interaction
- ITM IT Management

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Nr.	Profile	Course name	Lecturer	Language	SWS	ECTS	Semester[1]
172360	ASE	Advanced Software Architecture	Prof. Heil	English	2	3	WS
172492	ASE	Advanced Approaches for AI-based Image Processing	Prof. Windberger	English	2	3	WS
262310	ASE	Algorithm Theory	Prof. Heinz	English	4	6	WS
262350	ITM, ASE	Business Models for IT Innovation	Prof. Benz	English	2	3	WS
262351	ITM, ASE	Change and Innovation Management	Prof. Ondrusch	English	2	3	SS
172369	ASE	Cloud Computing	Prof. Fankhauser	English	2	3	SS
262330	HCI, ITM	Computer Mediated Communication	Prof. Marsden	English	2	3	SS
262357	ITM, ASE	Cybersecurity	Dr. Spreitzenbarth	English	4	6	SS
172371	ASE	Deep Learning	Dr. Nuredini	English	4	6	SS
262331	HCI	Designing User Interfaces	Mr. Belzner	English	2	3	WS
172372	ASE	DevOps and SecOps	Mr. Byl	English	2	3	WS
262352	ITM, ASE	Digital Transformation – Case Studies	Prof. Reck	English	2	3	SS
262353	ITM, ASE	Digital Transformation – Strategies and Technologies	Prof. Reck	English	4	6	SS
172374	HCI	Educational Technologies	Prof. Haag	English	4	6	SS
172378	HCI	Foundations in Human-Computer Interaction	Dr. Zahedani	English	2	3	WS
172381	ITM	Health Economics	Prof. Schramm	English	4	6	WS
172382	ITM, ASE	Health Technology Assessment	Prof. Schramm	English	4	6	SS
172383	ASE, HCI	Information Visualization	Dr. Pobiruchin	English	2	3	WS
262311	ASE, ITM	Intelligent Systems	Dr. Nuredini	English	2	3	WS
262354	ITM	Intercultural and Diversity Management	Mr. Ma	English	4	4	SS
262355	ITM	Management Methods/Leadership	Prof. Marsden	English	3	3	WS
172336	ASE	Machine Learning	Prof. Windberger	English	2	3	WS
172493	ASE	Milestones of AI-based Imaging Research	Prof. Windberger	English	2	3	SS

[1] WS = winter semester; SS = summer semester

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262333	HCI	Mixed Reality Lab	Prof. Meixner	English	4	6	SS
262356	ITM, HCI	Product and Quality Management	Prof. Permantier	English	2	4	WS
262334	HCI	Realtime 3D-Engines	Prof. Reichert	English	2	3	SS
262312	ASE	Realtime Systems	Prof. Doneit	English	4	6	WS
262335	HCI, ITM	Remote Collaboration in Virtual Teams	Prof. Marsden	English	2	3	SS
172395	HCI	Task Analysis & User Requirements Engineering	Mr. Schwarz	English	2	3	SS
172397	HCI	Usability Evaluation and Testing	Prof. Reichenbach	English	4	6	WS
262451		Scientific Writing	Dr. Pobiruchin	English	2	3	SS / WS
262452		German as a foreign language	Different lecturers	German	4	6	SS / WS
262453		Advised Studying (for non-native German speakers)	Prof. Winckler	English	2	3	SS / WS
262454		Advised Studying (for native German speakers)	Prof. Winckler	English	2	9	SS / WS
172393		Research Project		English	0	12	SS / WS

You can find more information about this Master in Software Engineering program (SEM) and a complete course catalog on:
https://www.hs-heilbronn.de/en/sem

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Internship / Thesis opportunity

With specialized research institutes and our close ties to industry, we can offer you praxis oriented projects, tailor to your internship /Thesis Semester:

- School of Applied Artificial Intelligence (HHN-SAAI)
- UniTy Lab (Expert in Human-Technology Interactions)
- GECKO Institute for Medicine, Informatics and Economic
- Laboratory for Social Informatics
- Interdisciplinary Center for Machine Learning
- Lab:D – Didactic research

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