

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	ECT S	Content	Start
Software Engineering, B.Sc. SEB	Sperrfechter	262005	Fundamentals of SW Engineering 1	1	5	<ul style="list-style-type: none"> • Software Development 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: <ul style="list-style-type: none"> • Learn and apply core Design Thinking phases: empathy, problem definition, ideation, prototyping, and testing • Develop user-centered concepts informed by research and 	

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Applied Computer science, B.Sc. AI	Haag	173424	Digital Media	1	2	persona creation <ul style="list-style-type: none"> • 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.	winter term
	Winckler	262002	Computer Networks	1	3	How do computer networks work? <ul style="list-style-type: none"> • Introduction • Application Layer • Transport Layer • Network Layer 	winter term
	Winckler	262051	Developer Tools for SW	3	3	The toolbox of software engineers: <ul style="list-style-type: none"> • version control with git 	winter term +

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B.Sc. SEB			Engineering			<ul style="list-style-type: none"> • build management with gradle • Coding Conventions with checkstyle • Unit tests with JUnit 5 • statical code analysis with findbugs • UI programming with JavaFX 	summer term
Software Engineering / Applied Computer Sciences, B.Sc SEB AIB	Heil	262063/ 173271	Project Management and Software Engineering Tools	3	4	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.	Mayer	262024	Data Security and Cryptography	3	3	<ul style="list-style-type: none"> • Historical ciphers and their security • Modular arithmetic, groups, integer rings and galois fields • Symmetric cryptography (block and stream ciphers, and modes of operation) 	winter term + summer term

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SEB						<ul style="list-style-type: none"> • 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 	
Software Engineering, B.Sc.	Marczinkowsky	262026	Further Programming Languages	4-7	4	<p>C++ for students acquainted with Java:</p> <ul style="list-style-type: none"> • 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 <p>C# and MS VS .NET:</p> <ul style="list-style-type: none"> • Runtime and development environments • NET Framework • Properties, Accessors • Indexers 	winter term + summer term
SEB							

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						<ul style="list-style-type: none"> • Assemblies • Delegates, Events • Operator Overloading • GUI in WPF • Connecting to an RDBMS • Parallel Programming 	
Software Engineering, B.Sc. SEB	Reichert	262193	Games Laboratory	7	9	<ul style="list-style-type: none"> • Work on a complex team-based project • Unity Game Engine • Virtual Reality • Augmented Reality • Scripting with C# • Graphics Programming (2D/3D) • Game Physics • Particle Effects • GUIs in Games • Multiplayer Networking • User Interfaces (Touchscreen, Gamepad, VR, AR) 	winter term + summer term
Software Engineering, B.Sc. SEB	Straus	262142	Embedded Systems	6	12	<ul style="list-style-type: none"> • Team based project work • Design and implementation of a system on embedded hardware • Hardware oriented programming in Assembler and C • Process sensor data • Control actuators 	winter term + summer term
Software Engineering, B.Sc. SEB	Heß/ Straus	262143	Integrated sensors	7	6	<ul style="list-style-type: none"> • Laboratory work with integrated exercises • Sensor characteristics • Physical detection and operating principles • Sensor architecture, performance, and energy efficiency • Terms and types of sensors • Sensor fundamentals, techniques, classes, and communication protocols • Value ranges and processing of sensor data 	winter term + summer term

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						<ul style="list-style-type: none"> • Concepts and fundamentals of sensor programming <p>Software project work in the fields of:</p> <ul style="list-style-type: none"> • Sensor technology (individual sensors, distributed sensors, smart dust) and their operating principles • Distributed systems and client-server structures • Mobile communication • Optimizing HCI and the usability of mobile devices • Using the Raspberry-Pi single-board computer • Implementing tasks in C, C#, C++, Java, Python, Kotlin 	
Medical Informatics, B.Sc. MIB	Kalthoff	171269	Signal Processing	5	2	<ul style="list-style-type: none"> • 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 particular convolution • 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	<p>Basic principles of project management:</p> <ul style="list-style-type: none"> • Project management methods and tools • Social issues in projects • Specific aspects of software development projects 	winter term
Medical Informatics, B.Sc.	Fegeler	171267	Tactical Management of	5	2	<ul style="list-style-type: none"> • Overview of information systems in health care • System integration, communication standards • System architecture 	winter term

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MIB					Information Systems in Health	<ul style="list-style-type: none"> • Administrative and medical functions in HIS (Hospital Information Systems) • Laboratory systems, RIS - PACS, intensive care system • Archiving, health telematics, electronic records • Information systems management 	
Applied Computer Sciences / Software Engineering, B.Sc. AIB SEB	Reichenbach	173351	Usability Testing Lab	6/7 (B.Sc.) or M.Sc.	6	<p>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.</p> <p>The students have trained the design and analysis of questionnaires. The students have trained the design, management, analysis and report of usability tests.</p> <ul style="list-style-type: none"> • 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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<p>Applied Computer Sciences / Software Engineering, B.Sc.</p> <p>AIB, SEB</p>	<p>Ondrusch</p>	<p>262183</p>	<p>Innovation Lab</p>	<p>4-7</p>	<p>6</p>	<ul style="list-style-type: none"> • Innovation Cycles and Design Thinking • Ideation and Creativity • Fast Prototypes • Empathy and User Centric Innovation • Foundations of Entrepreneurship 	<p>winter term + summer term</p>
<p>Applied Computer Sciences / Software Engineering, B.Sc.</p> <p>SIB SEB</p>	<p>Reck</p>	<p>262125</p>	<p>Data Analysis in Enterprises</p>	<p>6-7</p>	<p>6</p>	<ul style="list-style-type: none"> • 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 	<p>winter term + summer term</p>
<p>Applied Computer Sciences / Software Engineering, B.Sc.</p> <p>AIB SEB</p>	<p>Reck</p>	<p>262124</p>	<p>Data Science in an Enterprise Context</p>	<p>6-7</p>	<p>6</p>	<ul style="list-style-type: none"> • Introduction to Data Science and Artificial Intelligence • Introduction to SAP HANA as an example of an in-memory database allowing <ul style="list-style-type: none"> • efficient data storage and processing • usage of machine learning algorithms and Artificial Intelligence • development of apps to visualize data analysis results • Projects on different topics in the data science field <ul style="list-style-type: none"> • Deep Learning with Tensorflow and Keras • Jupyter Notebook and Python • Smart Home with Philips Hue • AWS Analytics 	

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- SAP Analytics Cloud (SAC) etc.

Master degree programme: Medical informatics (MIM)

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Medical Informatics, M.Sc. / Software Engineering, M.Sc. MIM	Schramm	172256	Health Economics	Elective	6	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Introduction • Learning in the context of technologies • Linking Learning Objectives, Pedagogies, and Technologies • Users Perspective of Educational Technology • E-Assessment 	summer term

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						<ul style="list-style-type: none"> • Designing Learning Activities and Instructional Systems • Standards and Tools • Emerging Issues in Educational Technology 	
Medical Informatics, M.Sc. / Software Engineering, M.Sc.	Reichenbach	173351	Usability Testing Lab	Elective	6	<p>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.</p> <p>The students have trained the design and analysis of questionnaires.</p>	winter term
Medical Informatics, M.Sc. / Software Engineering, M.Sc.	Nuredini	172371	Deep Learning	Elective	6	<ul style="list-style-type: none"> • Artificial Neural Networks • Introduction to Deep Learning • Deep Learning for Computer Vision • Recurrent Neural Networks • Language Models • Generative Models • Deep Reinforcement Learning 	
MIM SEM						<p>The students have trained the design, management, analysis and report of usability tests.</p> <ul style="list-style-type: none"> • User-centered design process. • Usability testing in theory and practice (i.e. hands-on project). <p>Design and analysis of questionnaires in theory and practice (i.e. hands-on project)</p>	

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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

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

¹ WS = winter semester; SS = summer semester

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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
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. Schildt	English	4	6	WS/SS
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

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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>

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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