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| Module Name | | | **Distributed Systems Verteilte Systeme** | | | | | | |
| Module Responsibility | | | *Prof. Dr. Erwin Neuhardt* | | | | | | |
|  | Qualification Targets |  | *Students learn about important architectures which are relied on in the*  *development of distributed systems. They know about the properties of different architectures. They learn about the different technologies for communication and cooperation in distributed systems and are able to apply these technologies in real world projects.* | | | | | | |
|  | **Contents** | **Know** | |  | **Apply** | **Analyse** | **Assess** | **Synthesize** |  |
|  | Architecture | x | | x | x |  |  |  |  |
|  | Sockets | x | | x | x | x | x |  |  |
|  | RPC / RMI | x | | x | x | x | x |  |  |
|  | JEE | x | | x | x | x | x |  |  |
|  | JMS | x | | x | x | x | x |  |  |
|  | Threads | x | | x | x | x | x |  |  |
| Module Contents | | | *Concepts and technologies for the development of distributed Systems:* - *architectures and properties of distributed systems: client server-* *architectures, transparency*  - *Programming concepts for the communication in distributed systems:*  *sockets, remote procedure call, remote method invocation, component*  *based distributed systems, message based distributed systems* - *Concurrent programming: java thread, synchronization and*  *coordination, concurrent data structures, java executor framework* | | | | | | |
| Teaching Methods | | | *Lecture (2 hours/week), tutorial (2 hours/week)* | | | | | | |
| Requirements for Participation | | | *Skills and knowledge in Java programming and software engineering (at least 10 ECTS)* | | | | | | |
| Literature / Multimedia-based Teaching Material | | | *Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems, Published by*  *Maarten* von Steen, 2017  *Jendrock, E. et al.: The Java EE Tutorial, Enterprise Java Beans, online on*  *docs.oracle.com*  *w/o author: Sockets, Java Remote Method Invocation, Concurrency, online on*  *docs.oracle.com*  *Brian Goetz, Joshua Bloch, Joseph Bowbeer, Doug Lea, David Holmes, Tim*  *Peierls, Java Concurrency in Practice, Addison-Wesley, 2006*  *David A. Chappell, Richard Monson-Haefel, Java Message Service, O’Reilly*  *2009* | | | | | | |
| Applicability | | | *Master of Applied Computer Science, Master Angewandte Medieninformatik* | | | | | | |
| Effort / Total Workload | | | *Total 150 hours. Attendance: 60 hours, Self-Study: 60 hours, Exam Preparation 30 hours* | | | | | | |
| ECTS / Emphasis of the Grade for the final Grade | | | *5 ECTS (Emphasis of the Grade for the final Grade 5/120)* | | | | | | |
| Performance Record | | | *Written examination on PC* | | | | | | |
| Semester | | | *1st semester* | | | | | | |
| Frequency of Occurrence | | | *Once during the academic year* | | | | | | |
| Duration | | | *One semester* | | | | | | |

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| Module Name | **IT Security** |
| Module Responsibility | *Prof. Ralf C. Staudemeyer, Ph.D.* |

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| Qualification Targets | *In this course students will learn how to determine the level of security of a computer system or service, specify vulnerabilities, and to estimate the potential damage resulting from a successful attack. It covers the basic principles and key concepts for the operation of secure and (mostly) distributed systems, which includes partial components from operating systems and computer networks. The focus of this course is to deepen the understanding of network attacks and the cryptographic techniques to ensure integrity and confidentiality of*  *information. Topics include various sub-components like cryptographic key management, biometrics, authentication in distributed systems, and basic security protocols and standards.* |
| Module Contents | *The course starts with a general introduction into IT-Security, Cryptography and Privacy-Enhancing Technologies. The main focus of this course is on*  *cryptographic algorithms and security protocols. Principally this module treats a selection of the following topics:*   • *Selected Attacks (attacks analysis, protection mechanisms)*   • *Cryptographic Algorithms (AES, RSA, ECC, MACs, signatures)*   • *Cryptographic Key Management (Diffie-Hellman key exchange,*   *certificates, public-key infrastructure)*   • *Digital Identity (multi-factor authentication, challenge-response*   *protocols, authentication in distributed systems)*   • *Mobile Security (mobile networks, Internet-of-Things, SmartCities)*  • *Network Security (security protocols, virtual private networks, secure*  *Internet services)*   • *User-tools for IT-Security and Privacy in daily practise (email, web, chat,*  *filesystems)*  *This module is under constant development to reflect the most recent*  *developments.* |
| Teaching Methods | *Lecture (2 hours/week), Exercise (2 hours/week)* |
| Requirements for Participation | *Decent programming skills and basic knowledge in IT-security* |
| Literature / Multimedia-based Teaching Material | |  |  | | --- | --- | | • •  •  • •  • | *Eckert, C. (2018). IT-Sicherheit. Berlin, München, Boston. De Gruyter.*  *Stallings, W. (2016). Cryptography and network security, principles and practices (7th edition). Prentice Hall.*  *Paar, C., & Pelzl, J. (2010). Understanding Cryptography. Berlin, Heidelberg: Springer Berlin Heidelberg.*  *Schneier, B. (1996), Applied Cryptography, John Wiley & Sons.*  *Hoglund, G, & McGraw , G. (2004). Exploiting Software, how to break code, Addison Wesley.*  *Selected sources announced in the lecture.* | |
| Applicability | *Master of Applied Computer Science* |
| Effort/  Total Workload | *Total 150 hours. Attendance: 60 hours, Self-Study incl. exam preparation: 90h.* |
| ECTS/ Emphasis of the Grade for the final Grade | *5 CP (Emphasis of the Grade for the final Grade 5/120)* |
| Performance Record | |  |  | | --- | --- | | • • | *successfully completed exercises*  *oral exam or written exam (>14 participants)* | |
| Semester | *1st semester* |
| Frequency of Occurrence | *annually (WS)* |
| Duration | *one semester* |
| Type of Course | *Obligatory course from the area IT-Security* |