Module title: Cloud Computing

Module ID	Workload	Credits	Semester	Frequency of Offering	Duration
MI10	150 h	5	1	yearly	1 semester

Workload	Attendance	Preparation and Follow-Up	Private Study	Preparation for Exam and Exam	Total
S	30 h / 2 SWS	15 h	35 h	10 h	
P	30 h / 2 SWS	30 h			
Total	60 h / 4 SWS	45 h	35 h	10 h	**150 h**

1	**Scheduled group size:** *S: 15 students, P: 15 students*
2	**Subject Knowledge / Skills** *Knowledge:* Cloud Computing has led to a variety of new usage and operation strategies for IT services over the last couple of years. The participants will learn the basic techniques of cloud-based services, underlying virtualization solutions and deployment models. *Skills:* Students joining this course will be able to use and implement cloud services. They will get to know the difference between public and private as well as hybrid cloud environments. Current state-of-the-art and ongoing research projects in the area of cloud computing are presented and discussed. Based on these building blocks, successful participants will be instructed to review scientific papers and current business projects. Moreover, they will be able to carry out applied research projects based on cloud services. *Competence:* Cloud-based services can be evaluated and improved by the students regarding their scalability, security and privacy. Additionally, the students can analyze cost and benefit of cloud services for companies and individual projects using different IT sourcing models.
3	**Content / Syllabus** • *Introduction: History of Cloud Computing, Virtualization* • *Cloud Computing: Taxonomy, Evolution, Characteristics* • *Service Models: IaaS, PaaS, SaaS* • *Deployment Models: Public Cloud, Private Cloud* • *Reference Architectures: Reference Models and Layers, Methodology, Protocols* • *Use cases and Implementation: Compute/Storage/Network Cloud, Apps* • *Migration and Integration Strategies: Cloud Federation, Hybrid & Enterprise Cloud* • *Cloud Computing from Users' and Operators' Point of View: IT-Sourcing, Cost/Benefit* • *Limits and Drawbacks of Cloud Computing: Risk Management, Lock-In, Security, Privacy* • *Outlook: Future Development, Upcoming and Evolving Techniques*
4	**Teaching Format** *Seminar with integrated exercises and practical work in a laboratory environment*

5	**Prerequisites**
	None
6	**Recommended Qualifications for the Participation**
	Decent knowledge of programming, computer networks and distributed systems. Profound understanding of virtualization techniques and operating systems.
7	**Assessment**
	Written assignments which are presented orally
8	**Prerequisites for Granting ECTS Credits**
	Exam passed
9	**Usage of this Module in Other Degree Courses**
	Master Angewandte Informatik
10	**Contribution to Final Score**
	5,56 %
11	**Convenor**
	Professor of Multimedia Communication Networks
12	**Language of Instruction**
	English
13	**Reading List**
	Mell, Grance: The NIST definition of cloud computing (draft), NIST special publication 800, NIST, 2011
	Armbrust et al.: A view of cloud computing, Communications of the ACM 53.4, ACM, 2010
	Baun et al.: Cloud Computing, Springer, 2011
	Marinesco, Dan C.: Cloud Computing: Theory and Practice, Morgan Kaufmann, 2013
	Erl et al.: Cloud Computing: Concepts, Technology & Architecture, Prentice Hall, 2013