ADVANCED TECHNOLOGIES IN THE INTERNET OF THINGS (EMaCS-02-07)				
DEGREE PROGRAM:		Master in Computer Science for the Human-Centric and Sustainable Industry		
SEMESTER: Second	**TYPE:** Elective	**CREDITS:** 5 ECTS	**WORKLOAD:** 125 hours	**MENTORING:** 1 hours/week
LANGUAGE: English				

OBJECTIVES	
General	The students are familiar with the current challenges and concepts of internet development and have specialized in selected protocol areas of the internet and the Internet of Things (IoT).
Specific	• Design principles of the internet and their protocol implementations: Past and present. • From Smart Dust to Data Centre and IXP: Challenges and issues for an 'Internet of Everything' today and tomorrow. • Concepts and protocols for the Internet of Things (IoT). • Algorithms and protocol concepts for a future internet. • Case studies: Current protocol examples for selected use cases - design, functionality, and performance evaluation. • Additional topics based on current relevance.

SUSTAINABILITY

The Advanced Technologies in the Internet of Things (IoT) course significantly contributes to sustainability by immersing students in the principles, challenges, and protocols shaping the development of the internet and IoT. Through a focus on current challenges across various layers of the internet, including network access, networking, transport, and application, the course equips students with the knowledge to address sustainability concerns in the digital ecosystem. By emphasizing the latest protocol developments and standards, students gain insights into the technical implications of these advancements on the internet ecosystem and society. The cultivation of a curious and analytical attitude encourages students to explore sustainable solutions within the evolving landscape of internet technologies and IoT, aligning with responsible and ethical practices.

RESILIENCE AND HUMAN-CENTRIC DEVELOPMENT

The course on Advanced Technologies in the Internet of Things is instrumental in fostering resilience and human-centric development by focusing on the design principles of the internet, protocol implementations, and the challenges for an 'Internet of Everything.' By exploring concepts and protocols for IoT and algorithms for a future internet, students develop the skills to implement, evaluate, and analyse components of internet architecture. Case studies on current protocol examples provide practical insights into the design, functionality, and performance evaluation for selected use cases. This approach empowers students to contribute to the resilience of the internet ecosystem and align technological developments with human-centric values. The emphasis on ethical considerations further ensures that students are mindful of the societal impact of internet technologies, promoting responsible innovation.

SUBJECT MATTER

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COMPETENCES

C2. BROWSING, SEARCHING AND FILTERING DATA, INFORMATION AND DIGITAL CONTENT
C3. MANAGING AND EVALUATING DATA, INFORMATION AND DIGITAL CONTENT
C5. PROGRAMMING
C7. PROTECTING PERSONAL DATA AND PRIVACY
C10. EXPLORATORY AND CRITICAL THINKING
C13. CREATIVELY USING DIGITAL TECHNOLOGIES
C17. COMMUNICATING EFFECTIVELY
C18. COLLABORATING THROUGH DIGITAL TECHNOLOGIES

LEARNING OUTCOMES

Knowledge	• Know about the principles and design concepts underlying the development of the internet and its distributed system architecture. • Know about current challenges in various layers of the internet, including network access, networking, transport, and application, and understand their topological occurrences. • Know about the latest protocol developments, standards, and the challenges involved in their dissemination within the internet ecosystem.
Skills	• Develop the skills to implement and evaluate internet architecture components, gaining hands-on experience with relevant methods and practical applications. • Be capable of analysing and evaluating current internet developments, protocols, and standards, and assess their technical implications on the internet ecosystem and society. • Acquire the ability to differentiate and critically assess the performance, functionality, and design aspects of selected protocol examples for specific use cases.
Attitudes/values	• Cultivate a curious and analytical attitude towards understanding the complex and evolving nature of the internet and IoT ecosystem. • Value continuous learning and staying updated with emerging developments and trends in internet technologies and protocols. • Recognize the societal impact of internet technologies and their responsibility to address ethical and security considerations in the internet ecosystem.
TEACHING METHODS	
• Seminar-style teaching methods: Work in small groups, board work, multimedia presentations, voluntary exercise tasks, academic work with publications, application-oriented work using online materials and current tools. • Practical work: Task processing in small groups with a concluding acceptance discussion, presentations, and written assignments.	
EVALUATION	
• Regular examination format: Graded written exam. • Alternative examination formats: Graded oral examination or graded presentation. In cases where multiple examination formats are possible for the module, the responsible lecturer will announce the required format at the beginning of the course. Prerequisite (PVL): Successful completion of the exercise tasks.	
PRECONDITIONS	
None	
DEPARTMENT	Computer Science
LECTURERS	Martin Schultz Thomas C. Schmidt: https://inet.haw-hamburg.de/members/schmidt
LITERATURE	State of the art scientific papers