

## UCM - Ubiquitous Computing & Media

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<b>General information</b>	
<b>Module Code</b>	UCM
<b>Unique Identifier</b>	UbiqCompMed-01-MA-M
<b>Module Leader(s)</b>	Prof. Dr. Manzke, Robert (robert.manzke@haw-kiel.de)
<b>Lecturer(s)</b>	Prof. Dr. Manzke, Robert (robert.manzke@haw-kiel.de)
<b>Offered in Semester</b>	Sommersemester 2026
<b>Module duration</b>	1 Semester
<b>Occurrence frequency</b>	Regular
<b>Module occurrence</b>	In der Regel im Sommersemester
<b>Language</b>	Englisch
<b>Recommended for international students</b>	Yes
<b>Can be attended with different study programme</b>	No

<b>Curricular relevance (according to examination regulations)</b>
Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1) Study Focus: Computer Science for Media Module type: Verpfl. Wahlmodul, PVO §3 Semester: 1, 2
Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1) Module type: Wahlmodul Semester: 1, 2
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Module type: Wahlmodul Semester: 1, 2, 3

<b>Qualification outcome</b>
<i>Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.</i>
Students who successfully complete this course will have a general understanding of "Ubiquitous and Pervasive Computing" and its relation to multi-media applications. The course will cover relevant areas of hardware and software development, with a special focus on distributed multi-media computing, wireless sensor networks, mobile computing and real-time applications. Embedded systems development capabilities will be obtained. Application knowledge in the domain of Internet-of-Things, wearable computing and mobile computing will be deepened. Server- and cloud back ends will be used for sensor data processing.
Students will learn to realize embedded systems applications, wireless connectivity and distributed media applications.
Students will carry out projects, which will require team work of 3-4 people. Project management will be applied.
Students will be able to deepen their general scientific competencies (including formulation, presentation etc.).

<b>Content information</b>	
<b>Content</b>	<ul style="list-style-type: none"> <li>- Ubiquitous Computing and trends</li> <li>- Distributed multi-media computing (audio and video)</li> <li>- Real-time media networking and synchronization of distributed systems (PTP, gPTP, QoS, AES67/Ravenna, AVB)</li> <li>- Context Aware Applications</li> <li>- Location Sensing</li> <li>- Multi-Sensor Systems, Sensor networks</li> <li>- Computer-Augmented Environments</li> <li>- Project-based learning</li> <li>- Internet-of-Things</li> <li>- Deepening embedded systems skills</li> <li>- Wireless sensor technologies</li> </ul> <p>Projects will encompass:</p> <ul style="list-style-type: none"> <li>- Work with embedded platforms such as ESP32, BeagleBone and Raspberry Pi as well as server back-ends and cloud end points</li> <li>- Real-time low latency applications</li> <li>- Real-time media networking using protocols such as AVB, AES-Ravenna, Ableton Link</li> <li>- Wireless technology such as WiFi, Bluetooth LE and LoRa / LoRaWAN</li> <li>- Protocols such as MQTT, OSC</li> <li>- Mesh networks (ESP32 Mesh)</li> <li>- Distributed media applications (audio and video)</li> <li>- Cloud backends for sensor data processing (e.g. AWS, Azure, ...)</li> </ul>
<b>Literature</b>	<ul style="list-style-type: none"> <li>- Stefan Poslad: Ubiquitous Computing: Smart Devices, Environments and Interactions, 2009, Wiley, ISBN 0470035609</li> <li>- Amber Case, Calm Technology: Principles and Patterns for Non-Intrusive Design, 2015, O'Reilly Media, ISBN-13: 978-1491925881</li> <li>- <a href="https://www.ravenna-network.com/what-is-aes67/">https://www.ravenna-network.com/what-is-aes67/</a></li> <li>- <a href="https://www.ieee802.org/1/pages/802.1ba.html">https://www.ieee802.org/1/pages/802.1ba.html</a></li> </ul>

<b>Teaching formats of the courses</b>	
<b>Teaching format</b>	<b>SWS</b>
Labor	2
Lehrvortrag	2

<b>Workload</b>	
<b>Number of SWS</b>	4 SWS
<b>Credits</b>	5,00 Credits
<b>Contact hours</b>	48 Hours
<b>Self study</b>	102 Hours

<b>Module Examination</b>	
<b>Examination prerequisites according to exam regulations</b>	None
<b>UCM - Portfolioprüfung</b>	<p>Method of Examination: Portfolioprüfung</p> <p>Weighting: 100%</p> <p>wird angerechnet gem. § 11 Absatz 2 PVO: No</p> <p>Graded: Yes</p> <p>Remark: Mid-term test and project related work. Details will be presented in the lecture.</p>