# UCM - Ubiquitous Computing & Media

## General information

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| **Module Code** | UCM |
| **Unique Identifier** | UbiqCompMed-01-MA-M |
| **Module Leader(s)** | Prof. Dr. Manzke, Robert (robert.manzke@haw-kiel.de) |
| **Lecturer(s)** | Prof. Dr. Manzke, Robert (robert.manzke@haw-kiel.de) |
| **Offered in Semester** | Sommersemester 2025 |
| **Module duration** | 1 Semester |
| **Occurrence frequency** | Regular |
| **Module occurrence** | In der Regel im Sommersemester |
| **Language** | Englisch |
| **Recommended for international students** | Yes |
| **Can be attended with different study programme** | No |

## Curricular relevance (according to examination regulations)

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| Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1)<br>Study Focus: Computer Science for Media<br>Module type: Verpfl. Wahlmodul, PVO §3<br>Semester: 1, 2 |
| Study Subject: M.Sc. - MCS - Computer Science (PO 2023, V1)<br>Module type: Wahlmodul<br>Semester: 1, 2 |
| Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3)<br>Module type: Wahlmodul<br>Semester: 1, 2, 3 |

## Qualification outcome

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| *Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.* |
| 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.). |

## Content information

| Content | - Ubiquitous Computing and trends<br>- Distributed multi-media computing (audio and video)<br>- Real-time media networking and synchronization of distributed systems (PTP, gPTP, QoS, AES67/Ravenna, AVB)<br>- Context Aware Applications<br>- Location Sensing<br>- Multi-Sensor Systems, Sensor networks<br>- Computer-Augmented Environments<br>- Project-based learning<br>- Internet-of-Things<br>- Deepening embedded systems skills<br>- Wireless sensor technologies<br><br>Projects will encompass:<br>- Work with embedded platforms such as ESP32, BeagleBone and Raspberry Pi as well as server back-ends and cloud end points<br>- Real-time low latency applications<br>- Real-time media networking using protocols such as AVB, AES-Ravenna, Ableton Link<br>- Wireless technology such as WiFi, Bluetooth LE and LoRa / LoRaWAN<br>- Protocols such as MQTT, OSC<br>- Mesh networks (ESP32 Mesh)<br>- Distributed media applications (audio and video)<br>- Cloud backends for sensor data processing (e.g. AWS, Azure, ...) |
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| Literature | - Stefan Poslad: Ubiquitous Computing: Smart Devices, Environments and Interactions, 2009, Wiley, ISBN 0470035609<br>- Amber Case, Calm Technology: Principles and Patterns for Non-Intrusive Design, 2015, O'Reilly Media, ISBN-13: 978-1491925881<br>- https://www.ravenna-network.com/what-is-aes67/<br>- https://www.ieee802.org/1/pages/802.1ba.html |

## Teaching formats of the courses

| Teaching format | SWS |
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| Labor | 2 |
| Lehrvortrag | 2 |

## Workload

| Number of SWS | 4 SWS |
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| Credits | 5,00 Credits |
| Contact hours | 48 Hours |
| Self study | 102 Hours |

## Module Examination

| Examination prerequisites according to exam regulations | None |
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| UCM - Projektbezogene Arbeiten | Method of Examination: Projektbezogene Arbeiten<br>Weighting: 50%<br>wird angerechnet gem. § 11 Satz 2 PVO: No<br>Graded: Yes |
| UCM - Klausur | Method of Examination: Klausur<br>Duration: 60 Minutes<br>Weighting: 50%<br>wird angerechnet gem. § 11 Satz 2 PVO: No<br>Graded: Yes |