

MK119 - Unterwasser Techniken

MK119 - Underwater Techniques

| General information | |
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| Module Code | MK119 |
| Unique Identifier | UnderwTechn-01-MA-M |
| Module Leader(s) | Prof. Dr. Badri-Höher, Sabah (sabah.badri-hoeher@haw-kiel.de) |
| Lecturer(s) | Prof. Dr. Badri-Höher, Sabah (sabah.badri-hoeher@haw-kiel.de) |
| Offered in Semester | Sommersemester 2026 |
| 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 | Yes |

| Curricular relevance (according to examination regulations) |
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| Study Subject: M.Eng. - MET - Elektrische Technologien (PO 2017, V3) Module type: Wahlmodul Semester: 1, 2 |
| Study Subject: M.Eng. - MET - Elektrische Technologien (PO 2017, V3) Study Specialization: Kommunikationstechnik und Embedded Systems Module type: Wahlmodul Semester: 1, 2 |
| Study Subject: M.Eng. - MET - Elektrische Technologien (PO 2025, V20261) Module type: Wahlmodul 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 |

| Qualification outcome |
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| <i>Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.</i> |
| Technical skills (Expertise) The main subjects of this course are: <ul style="list-style-type: none"> - Underwater sound propagation - Underwater acoustical data transmission - Underwater navigation and localization techniques - Sonar signal processing algorithms and their implementation in software. |

The students

- obtain specialized knowledge in the field of underwater sound transmission and detection matched to the master level in the area of electrical and information engineering
- acquire skills to understand modern navigation and localization techniques. Sonar signal processing, underwater acoustical data transmission.

The course covers elements of a classical interactive online lecture/exercise, as well as team-working based on the handling of scientific papers and lab work. Therefore the students learn to solve problems both independently as well as team-oriented.

The students

- learn to communicate in teams about scientific contents
- learn to express and justify their opinion about suitable problem solutions in projects of underwater techniques.

Content information

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| Content | <p>Properties of sound in water: Absorption, scattering, multipath propagation, natural and artificial noise sources.</p> <p>Underwater acoustic positioning systems: Long-baseline (LBL), short-baseline (SBL), ultra-short-baseline (USBL), GPS intelligent buoys (GIB).</p> <p>Sonar principles: Sonar equation, single-beam and multi-beam sonar systems, beamforming</p> <p>Sonar signal processing: Localization and tracking of objects by means of 1D and 2D sonar signals. Sonar-based navigation, simultaneous localization and mapping (SLAM).</p> |
| Literature | <p>L. Brekhovskikh, Y Lysanov, Fundamentals of Ocean Acoustics. Springer, 2003.</p> <p>W. S. Burdic, Underwater acoustic system analysis. Prentice Hall, 1991.</p> <p>X. Lurton, An Introduction to Underwater Acoustics: Principles and Applications. Springer Praxis Publishing, London, 2010.</p> <p>D. Ribas, P. Ridao, J. Neira, Underwater SLAM for Structured Environments Using an Imaging Sonar. Springer, 2010.</p> |

Teaching formats of the courses

| Teaching format | SWS |
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| Lehrvortrag | 2 |
| Übung | 1 |
| Labor | 1 |

Workload

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

Module Examination

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| Examination prerequisites according to exam regulations | None |
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| MK119 - Übung | Method of Examination: Übung Weighting: 30% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes |
| MK119 - Klausur | Method of Examination: Klausur Duration: 90 Minutes Weighting: 70% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes |

| Miscellaneous | |
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| Miscellaneous | Students are asked to bring their own laptops to the laboratory classes. Laboratory assignments are encouraged to be solved in teams of two or three students. This module takes place in the technical faculty of the university of Kiel (CAU) |