

Lehrform (*teaching format*) / **SWS** (*hours per week*): 2SE

Kreditpunkte (*credit points*): 3

Turnus (*frequency*): usually, each summer term

Inhaltliche Voraussetzungen (*content-related prior knowledge/skills*): NONE (Basic knowledge of computer vision is an advantage)

Sprache (*language*): English

Lehrende (*teaching staff*): AG Marine Umwelttechnologien/Tiefsee Ingenieurwissenschaften (Dr.-Ing. Daniel Gregorek, u.a.)

| Studiengang (<i>degree program</i>) | Module | Semester |
|---------------------------------------|---------|---------------|
| Informatik (Master) | IMS | ab 1.Sem. |
| AI and Intelligent Systems (Master) | AI-R-MS | from 2nd sem. |

Lernergebnisse / *Learning Outcome*:

- General understanding of the specific challenges, approaches and solutions for the visual perception of underwater robotic systems
- Knowledge of the particular applications of computer science and underwater robotic vision in fields like marine science and engineering
- Deepening of a selectable topic by means of a research article or textbook and own literature research
- Gaining writing skills in compliance with the rules of scientific work
- Advance presentation and discussion skills in the context of seminar lectures

Inhalte / *Contents*:

The seminar provides a systematic introduction to the specific aspects of visual perception for underwater robotic systems. It has an application-oriented focus on computer vision and deep learning in the fields of marine science and engineering. Starting from a description of visual sensing in the underwater environment, approaches ranging from image enhancement to complex 3D reconstruction methods will be presented. Possible topics for further in-depth study by the seminar participants include:

- Image enhancement and restoration
- Object recognition and tracking
- Photo mosaicing and 3D reconstruction
- Visual SLAM
- Multi-modal data fusion
- Simulation, datasets and modeling
- Structured light and LIDAR
- On-board / real-time processing

Hinweise (*remarks*): The table lists only the primary / most specific modules to which this course is assigned.