03-IMS-VPUR	Visual Perception for Underwater Robotic Systems

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 Ingenieurswissenschaften (Dr.-Ing. Daniel Gregorek, u.a.)

Studiengang *(degree program)*	Module	Semester
Informatik (Master)	IMS	ab 1.Sem.
AI and Intelligent Systems (Master)	AI-R-MS	from 2nd sem.
Informatik (Bachelor VF)	(nur *Freie Wahl*)	ab 4.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

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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.