

Module Handbook

TUK MODHB Homepage

Module INF-73-54-M-7

Advanced Topics in Computer Vision and Deep Learning (M, 4.0 LP)

Module Identification

| Module Number | Module Name | CP (Effort) |
|---------------|---|----------------|
| INF-73-54-M-7 | <i>Advanced Topics in Computer Vision and Deep Learning</i> | 4.0 CP (120 h) |

Basedata

| | |
|---------------------------|--|
| CP, Effort | 4.0 CP = 120 h |
| Position of the semester | 1 Sem. in WiSe |
| Level | [7] Master (Advanced) |
| Language | [EN] English |
| Module Manager | Stricker, Didier, Prof. Dr. (PROF DEPT: INF) |
| Lecturers | Stricker, Didier, Prof. Dr. (PROF DEPT: INF) |
| Area of study | [INF-KI] Intelligent Systems |
| Reference course of study | [INF-88.79-SG] M.Sc. Computer Science |
| Lifecycle-State | [NORM] Active |

Courses

| Type/SWS | Course Number | Choice in Module-Part | SL | PL | CP | Sem. |
|----------|---------------|-----------------------|----------|-----|-----|------|
| 2V+1U | INF-73-54-K-7 | P | U-Schein | PL1 | 4.0 | WiSe |

- About [INF-73-54-K-7]: Title: "Advanced Topics in Computer Vision and Deep Learning"; Presence-Time: 42 h; Self-Study: 78 h
- About [INF-73-54-K-7]: The study achievement "[U-Schein] proof of successful participation in the exercise classes (ungraded)" must be obtained.
 - It is a prerequisite for the examination for PL1.

Examination achievement PL1

- Form of examination: **written or oral examination**
- Examination Frequency: each winter semester
- Examination number: 67354 ("Advanced Topics in Computer Vision and Deep Learning")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [INF-73-54-K-7] **Advanced Topics in Computer Vision and Deep Learning:**

The lecture is based on the contents of [INF-73-51-M-5] *"3D Computer Vision"* and [INF-71-57-M-6] *"Very Deep Learning - Recent Methods and Technologies"*. For this purpose, the functional principles of visual sensors, suitable representations for data, and issues of machine vision are linked with groundbreaking network architectures and modern concepts of deep machine learning. This results in a holistic understanding that qualifies students for demanding, current challenges in this subject area.

- Visual sensors
- Data representations
- (Sensor) Fusion
- Knowledge in learning procedures
- Advanced building blocks in deep neural networks
- Domain Adaptation and Transfer
- Self-supervised learning
- Reducing the model size of neural networks
- Various advanced applications of machine vision

Competencies / intended learning achievements

Upon successful completion of the module, students will be able to,

- explain physical concepts of visual sensors,
- select appropriate representations of data as input to neural networks,
- discuss advantages and disadvantages of fusing multiple sensors,
- describe modern building blocks of neural networks and their applications,
- classify application-oriented problems in the context of machine vision,
- increase the efficiency of neural networks,
- apply special training methods for neural networks.

Literature

From [INF-73-54-K-7] **Advanced Topics in Computer Vision and Deep Learning:**

Will be announced during the course.

Requirements for attendance of the module (informal)

None

- Notice: Some [Courses](#) have informal requirements for attendance:
 - #A: [INF-73-54-K-7] Advanced Topics in Computer Vision and Deep Learning (2V+1U, 4.0 LP) (P: Obligatory)

Requirements for attendance of the module (formal)

None

References to Module / Module Number [INF-73-54-M-7]

| Course of Study | Section | Choice/Obligation |
|---------------------------------------|-----------------------------------|-----------------------------|
| [INF-88.79-SG] M.Sc. Computer Science | [Specialisation] Specialization 1 | [WP] Compulsory Elective |