

Course

DBT - Digital Imaging

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General information

|                      |                                                    |
|----------------------|----------------------------------------------------|
| Long name            | Digital Imaging                                    |
| Approving CModule    | <a href="#">DBT MaMT</a>                           |
| Responsible          | Prof. Dr. Gregor Fischer<br>Professor Fakultät IME |
| Level                | Master                                             |
| Semester in the year | winter semester                                    |
| Duration             | Semester                                           |
| Hours in self-study  | 78                                                 |
| ECTS                 | 5                                                  |
| Professors           | Prof. Dr. Gregor Fischer<br>Professor Fakultät IME |
| Requirements         | none                                               |
| Language             | German                                             |
| Separate final exam  | Yes                                                |

Final exam

Details

Short project with final oral exam

Minimum standard

- Working Matlab program
- Oral presentation of the project objectives and the project results

Exam Type

## ^ Lecture / Exercises

### Learning goals

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#### Knowledge

Color Imaging

Color capturing with electronic sensors

Color detectors

Demosaicking

Optical antialiasing filters

Color management for DSCs

ICC profiles computing with least squares fit

Testing color accuracy

Color appearance models

Multispectral Imaging

Spectral sensitivities estimation by means of a general method to stabilize an instable set of linear equations

Statistics of natural spectra (Principal Components Analysis)

Spectral stimulus estimation

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HDR Imaging

HDR capturing technology

Contrast management

photo receptor model

unsharp masking

retinex algorithm

Automatic control

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Imaging Methods

Automatic white balancing

Grey world approach

Color-by-Correlation

Dichromatic reflection model

MTF management

MTF measurement

filter design for MTF optimization and sharpening

Adaptive sharpening

Denoising

Modelling of sensor noise

Locally adaptive smoothing filter

Wiener filtering

Bilateral filtering

Non-Local-Means filtering

Defect pixel / cluster correction

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Skills

Describe the function and effects of different imaging methods

derive correction models for the image processing from the optical and electronic mechanisms

explain the application of basic mathematical tools for modelling and optimization of imaging methods

Expenditure classroom teaching

| Type                      | Attendance (h/Wk.) |
|---------------------------|--------------------|
| Lecture                   | 2                  |
| Exercises (whole course)  | 0                  |
| Exercises (shared course) | 0                  |
| Tutorial (voluntary)      | 0                  |

Separate exam

none

^ Practical training

Learning goals

Skills

analyse optical and electronic imaging characteristics

recognize and assess imaging defects

realize imaging methods by software programmin according to a given specification or scientific paper

measure optical and electronic imaging characteristics or defects

implement new imaging methods according to a given specification or scientific paper

optimize imaging methods by basic mathematical optimization methods

compare image quality of different imaging methods

Expenditure classroom teaching

| Type                 | Attendance (h/Wk.) |
|----------------------|--------------------|
| Practical training   | 2                  |
| Tutorial (voluntary) | 0                  |

Separate exam

Exam Type

working on practical scenarion (e.g. in a lab)

Details

Protocol reports about lab exercises

Minimum standard

Reports for all lab excercises must be delivered in correct form with correct results