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| Modul Name | **Image Processing 1** |
| Modul Responsibility | *Prof. Dr. Klaus Chantelau* |
| Qualification Targets | *Students should be able*  *to analyse typical problems of the development of audio-visual digital formats to understand the foundations of the compression of audio-visual signals to understand the methods and the structure of audio-visual digital standards*  *(G7xx, mp3, GIF/PNG, JPEG, H26x, MPEG1 / 2 / 4 )*  *to apply the most important mathematical and algorithmical methods for the*  *development of compression software moduls* |
| Module Contents | *Color Spaces, filtering processes, Fourier, DCT, and wavelet transform, image segmentation, motion estimation and image recognition. A method for data compression (entropy coding, transform coding, predictive coding), quantization, signal processing of the human visual system, motion prediction* |
| Teaching Methods | *Blackboard lectures, PowerPoint slides, computer exercises.* |
| Requirements for Participation | *Fundamentals of Linear Algebra and Programming, the scope of the Bachelor Module Multimedia and Communications Systems.* |
| Literature / Multimedia based Teaching Material | *„Digitale Bildcodierung“ - Jens Rainer Ohm Springer 1995, ISBN 3-540-58579-6*  *“A Wavelet Tour of Signal Processing” - Stephane Mallat Academic Press 1999, ISBN 0-12-466606-X*  *„Bildverarbeitung für die Medizin“ - Lehmann et al. Springer 1997, ISBN3-540-61458-3*  *“Coding and Information Theory” - Steven Roman Springer 1992*  *„Digitale Fernsehtechnik: Datenkompression und Übertragung für DVB“ 2.Auflage - Ulrich Reimers*  *Springer 1997, ISBN 3-540-60945-8* |
| Applicability | *Master Applied Computer Science, Master Angewandte Medieninformatik* |
| Effort/ Total Workload | *Total 150 hours. Attendance: 60 hours, Self-Study: 45 hours, Exam Preparation 45 hours* |
| ECTS / Emphasis of the Grade for the final Grade | *5 CP (Emphasis of the Grade for the final Grade 5/120)* |
| Performance Record | *Written examination* |
| Semester | *1st semester* |
| Frequency of Occurence | *Once during the academic year (winter semester)* |
| Duration | *One semester* |
| Type of Course | *Elective course* |

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| Module Name | **Image Processing 2** |
| Module Responsibility | *Prof. Dr. Klaus Chantelau* |

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| Qualification Targets | *The students should be able to*  *analyze typical problems of the processing of digital audio-visual signals to understand the most important mathematical and algorithmic methods for*  *feature extraction, classification and 3D analysis of audio-visual signals. The student should be able to apply mathematical and algorithmic methods for*  *the development of audio and image analysis software modules.* |
| Module Contents | *Image acquisition and illumination, image conversion (front-background separation, transformations, ...), image enhancement (filtering, segmentation, labeling, ...), feature extraction, (geometry / contour descriptors, texture descriptors, ...), 3D scene analysis, classification and measurement* |
| Teaching Methods | *Blackboard lectures, PowerPoint slides, computer exercises.* |
| Requirements for Participation | *Modul Image Processing 1* |
| Literature / Multimedia based Teaching Material | *„Handbuch zur Industriellen Bildverarbeitung“, FhG IRB Verlag, 2007 ISBN 978-3-8167-7386-3*  *“Introduction to MPEG 7” - Manjunath, Salembier, Sikora Wiley 2003, ISBN 0-471-48678-7*  *“Stereoanalyse und Bildsynthese”, O. Schreer, Springer 2005, ISBN 3-540-23439-X* |
| Applicability | *Master Medieninformatik, Master Applied Computer Science* |
| Effort/ Total Workload | *Total 90 hours. Attendance: 30 hours, Self-Study: 45 hours, Exam Preparation 15 hours* |
| ECTS / Emphasis of the Grade for the final Grade | *3 CP* |
| Performance Record | *Written exam* |
| Semester | *3rd semester* |
| Frequency of Occurence | *Once during the academic year (winter semester)* |
| Duration | *One semester* |
| Type of Course | *Elective Course* |