Program of Studies:	**Master Program Bioinformatics**
Name of the module:	**Image Processing and Computer Vision**
Abbreviation:	**I-M-9**
Subtitle:	Core lecture
Modules:	Lecture 4 h (weekly) Tutorial 2 h (weekly)
Responsible lecturer:	1st -3rd Semester / At least once every two years
Lecturer:	Prof. Dr. Joachim Weickert
Language:	Prof. Dr. Joachim Weickert
Sprache:	English
Level of the unit/ Mandatory or not :	Graduate course / mandatory elective
Course type/weekly hours:	Lecture 4 h (weekly) Tutorial 2 h (weekly) Tutorials in groups of up to 20 students
Total workload:	270 h = 90 h of classes and 180 h private study
Credits:	9
Entrance requirements:	For graduate students: none
Aims/Competences to be developed:	Broad introduction to mathematical methods in image processing and computer vision. The lecture qualifies students for a bachelor thesis in this field. Together with the completion of advanced or specialised lectures (9 credits at least) it is the basis for a master thesis in this field.

Content:	*1. Basics* 1.1 Image Types and Discretisation 1.2 Degradations in Digital Images *2. Image Transformations* 2.1 Fourier Transform 2.2 Image Pyramids 2.3 Wavelet Transform *3. Colour Perception and Colour Spaces* *4. Image Enhancement* 4.1 Point Operations 4.2 Linear Filtering 4.3 Wavelet Shrinkage, Median Filtering, M-Smoothers 4.4 Mathematical Morphology 4.5 Diffusion Filtering 4.6 Variational Methods 4.7 Deblurring *5. Feature Extraction* 5.1 Edges 5.2 Corners 5.3 Lines and Circles *6. Texture Analysis* *7. Segmentation* 7.1 Classical Methods 7.2 Variational Methods *8. Image Sequence Analysis* 8.1 Local Methods 8.2 Variational Methods *9. 3-D Reconstruction* 9.1 Camera Geometry 9.2 Stereo 9.3 Shape-from-Shading *10. Object Recognition* 10.1 Eigenspace Methods 10.2 Moment Invariances
Assessment/Exams:	• Regular attendance of classes and tutorials. • At least 50% of all possible points from the weekly assignments have to be gained to qualify fort he final exam. • Passing the final exam A re-exam takes place during the last two weeks before the start of lectures in the following semester
Literature:	Will be announced on the course website