

Study Regulations for the Master Course Visual Computing

As of January 26th, 2006

Pursuant to § 54 of Act No. 1556 on Saarland University (University Act – UG) from June 23rd, 2004 (Official Gazette p. 1782) the University of Saarland Faculty of Natural Sciences and Technology I has issued the following study regulations for the Master course Visual Computing, which after consent of the Senate of the University of the Saarland are hereby promulgated:

Central Idea

As visual impressions represent men's most important sensory perceptions, there is an increasing tendency also in the field of computer-based information processing to replace textual content by visual representation. Computer-based visual information processing is of central importance for communication networks, multimedia PCs, industrial quality control, medical engineering, advanced driver assistance systems, solving pattern recognition problems in bio-informatics, for scientific computing, the field of augmented reality, media design and robotics.

It is the objective of the Master course Visual Computing to impart principles, operations and applications of computer-based visual information processing. Although anchored in the field of informatics Visual Computing is a study course with interdisciplinary relations, in particular to mathematics, physics and electrical engineering, but also to medical engineering, biology, computer linguistics and cognitive science. Admission to the course requires a Bachelor's degree in Visual Computing/Computational Visualistics or a related subject (in particular information technology, mathematics, physics, electrical engineering and mechatronics). The course is intended to be a research-oriented international study course, therefore the command of the English terminology belongs to the objective of formation, too. The study course can also be attended in English.

§ 1

Basic Principles

- (1) These study regulations specify the contents and structure of the Master course Visual Computing on the basis of the examination regulations for these courses of studies.
- (2) The course of study consists of courses belonging to the category lectures with or without tutorials or seminars. Writing a final thesis – Master's thesis is obligatory for each graduate of the course. Credits ("Credit Points") are assigned to each course, representing the course's scope, whereby one credit point equals 30 hours of study (in course or self-study). At the end of each course there is a – mostly graded – exam. Each passed exam during the course of study is part of the final Master's exam. Information as to form and duration of the exams for each course can be taken from the course of study handbook. The complete Master course of study comprises a study effort of 120 credits. In the case of the recommended four semesters as a student, 30 credits are to be earned each semester.

§ 2 Courses of Studies

(1) The Master course of study comprises courses in the scope of 90 credits as well as a scientific final thesis, the Master's thesis with a scope of 30 credits. The term "course" corresponds to the term "module" as defined by the examination regulations framework of the University of Saarland for Bachelor and Master courses of study. The offer of study courses incorporates at least the following study courses (V = Vorlesung (Lecture), Ü = Übung (Tutorial), S = Seminar); each of the numbers behind such an abbreviation indicates the number of semester hours per week (SWS):

1. In the Core of Visual Computing:

a) In the category of image acquisition and geometrical foundations:

- Introduction to Image Acquisition Methods, 4 CP (V2)
- Medical Imaging, 9 CP, (V4 Ü2, mathematics)
- Image Acquisition: Ultrasonic, X-ray, 4 CP (V2, medical technology, yearly)
- Imaging Methods: MRI, 5 CP (V2 Ü1, medical technology, yearly)
- Geometric Modelling, 9 CP (V4 Ü2) (at least every second year)
- Effective Computational Geometry for Curves and Surfaces, 6 CP (V4)

b) In the category of image analysis:

- Image Processing and Computer Vision, 9 CP (V4 Ü2) (at least every second year)
- Pattern and Speech Recognition, 6 CP (V2 Ü2) (at least every second year, mechatronics)
- Pattern Recognition, 5 CP (V2 Ü1)
- Differential Equations in Image Processing and Computer Vision, 9 CP (V4 Ü2)
- Differential Geometric Aspects of Image Processing, 4 CP (V2)
- Probabilistic Methods in Image Processing, 4 CP (V2)
- Mathematical Morphology in Image Analysis, 4 CP (V2)
- 3D Image Analysis and Synthesis, 6 CP (V2 Ü2)

c) In the category of image synthesis:

- Computer Graphics, 9 CP (V4 Ü2) (at least every second year)
- Computer Graphics 2, 9 CP (V4 Ü2)
- Scientific Visualisation, 9 CP (V4 Ü2) (at least every second year)
- Multimedia, 6 CP (V2 Ü2)
- 3D Image Analysis and Synthesis, 6 CP (V2 Ü2)

d) Seminars with changing subjects from Visual Computing, 8 CP

Seminars will be on offer every semester.

2. Image related fields from information technology and other subjects:
 - Information Retrieval and Data Mining, 9 CP (V4 Ü2)
 - Artificial Intelligence, 9 CP (V4 Ü2)
 - Telecommunications I / Digital Transmission and Signal Processing, 9 CP (V4 Ü2)
 - Telecommunications II / Audio/Visual Communication & Networks, 9 CP (V4 Ü2)

These lectures are on offer at least every second year.

Additional study courses, as

- in-depth and special study courses for the courses mentioned above
- if necessary courses in automatic learning and from robotics
- courses from speech recognition and computer linguistics
- courses from medical technology

3. Complementary courses and basic principles:
They serve to fill in individual gaps resulting from preparatory training and incorporate in particular courses from the following fields of learning:
 - mathematics (amongst others practical mathematics, theory and numerics of ordinary differential equations, stochastics, numerics of partial differential equations, integral equations, calculus of variations, differential geometry of curves and surfaces, partial differential equations, inverse problems, integral transformations)
 - information technology (amongst others programming 1 and 2, software practical, software technology, algorithms and data structures, optimisation)
 - mechatronics (amongst others basics of signal processing, digital signal processing)
 - physics (amongst others introduction to physics I and II or physics for engineers I and II)

These courses will be offered at least every second year.

4. Extra credits can be gained by participating in additional courses (besides the above mentioned also courses as languages, visual studies of the arts, media design, cognitive science, psychology and so on) or by supervising a class as tutor.
- (2) The offer of courses in different study course categories can be extended for one or several semesters by additional study courses, which have to be approved of by the examination board. These courses, their credit scope and affiliation to one or several of the scheduled study courses will be announced respectively before the semester start.
 - (3) The study courses in the core of Visual Computing and image related fields of information technology will be held in the English language in general. In the other categories there will also be courses in the English language in order to guarantee that studies can be taken in English.

§ 3
Plan of Studies

- (1) The curriculum, which contains details about form and scope of the study courses as well as recommendations on how to structure your studies is worked out by the dean of the Faculty of Natural Sciences I on the basis of these study regulations. It will be announced in an adequate form. The respective current offer on study courses in the different study categories will be announced in the manual of study courses of the respective semester.
- (2) Amendment B contains examples of study plans for the Master course.

§ 4
Enactment

These regulations shall enter in effect one day after their announcement in the Official Gazette of Saarland University.

Saarbrücken, May 19th, 2006

By proxy
Univ.-Prof. Dr. Rolf W. Hartmann
(Vice President for Research and Technology Transfer)

Supplement B

Subsequent three sample plans of study, which respond to different career interest, are pointed out.

Wide-ranging Master

(for students wanting to move on to a career in industry after graduation)

1	Com Gr I (9)	Im Pr Com Vis (9)	Image Acq (4)	Erg V (9)	31
2	Geo Mod (9)	Diff Equ in IPCV (9)	Pattern Rec (6)	Erg V (9)	33
3	Sci Vis (9)	Bildverw Geb. (9)	Seminar (8)		26
4	Final Thesis (30)				30
Total Amount of Credit Points					120

Master with Emphasis on Image Synthesis

(for students wanting to obtain a PhD in image synthesis)

1	Com Gr I (9)	Im Pr Com Vis (9)	Multimedia (6)	Erg V (9)	33
2	Com Gr II (9)	Geo Mod (9)	MT (4)	Erg V (9)	31
3	Sci Vis (9)	Bildverw Geb (9)	Seminar (8)		26
4	Final Thesis (30)				30
Total Amount of Credit Points					120

Master with Emphasis on Image Analysis

(for students wanting to obtain a PhD in image analysis)

1	Com Gr I (9)	Im Pr Com Vis (9)	Image Acq (4)	Erg V (9)	31
2	3D Image A and S (6)	Diff Equ in IPCV (9)	Pattern Rec (6)	Seminar (8)	29
3	DiffgeoIP (4)	Bildverw Geb (9)	Seminar (8)	Erg V (9)	30
4	Final Thesis (30)				30
Total Amount of Credit Points					120

Explanation of Abbreviations

Com Gr	= Computer Graphics
Im Pr Com Vis	= Image Processing and Computer Vision
Image Acq	= Introduction to Image Acquisition Methods
Sci Vis	= Scientific Visualisation
DiffgeoIP	= Differential Geometric Aspects of Image Processing
Geo Mod	= Geometric Modelling
Pattern Rec	= Pattern Recognition
3D Image A and S	= 3D Image Analysis and Synthesis
Diff Equ in IPCV	= Differential Equations in Image Processing and Computer Vision
MT	= Medizintechnik (Medical Technology)
Bildverw Geb	= Bildverwandte Gebiete (Image Related Fields)
Erg V	= Ergänzungsveranstaltung (Additional course)