

CURRICULUM
for the Master's Degree course in
INFORMATION TECHNOLOGY

at the Faculty of Business Administration and Informatics at the Alps-
Adriatic University of Klagenfurt

<p>Board of Studies "Informatics, Technical Mathematics" pursuant to the Ruling dated 14.04.2006</p>
--

Pursuant to the provisions of the Federal Act concerning the Organisation of Universities and Studies (Universities Act 2002) and the Articles of the Alps-Adriatic University of Klagenfurt, Part B: Study Regulations, the Senate of the Alps-Adriatic University of Klagenfurt adopted the curriculum for the Bachelor's Degree in "Information Technology" at its Session on 28.06.2006.

TABLE OF CONTENTS

CURRICULUM	1
for the Master's Degree course in	1
I. General provisions	3
Sec. 1 General objectives of the degree course and qualifications profile.....	3
Table 1: Overview of the specialisations	5
Sec. 2 International focus.....	5
Sec. 3 Course types	6
II. Curriculum for the Masters Degree in "Information Technology"	6
Sec. 4 Personal requirements for the Masters Degree	6
Sec. 5 Structure of the degree course.....	7
Sec. 6 Subject (1) courses – "Technical specialisation"	10
Sec. 7 Subject (2) courses – "Technical supplementary subject I"	10
Sec.8 Subject (3) courses – "Technical supplementary subject II"	10
Sec.9 Subject (4) courses – "Methodological specialisation"	11
Sec. 10 Courses from Subject (5) – "Skills extension".....	13
Sec. 11 Courses from subject (6) – Options.....	13
Sec. 12 Master's thesis.....	13
III. Examination regulations and conclusion of the degree course	13
Sec. 13 Aims of examinations.....	13
Sec. 14 Holding and repeating examinations.....	13
Sec. 15 Completion of the degree course.....	13
Sec. 16 Master's examination	14
Sec. 17 Subject grades and overall assessment.....	14
Sec. 18 Academic title	15
Sec. 19 Entry into effect.....	15

I. General provisions

Sec. 1 General objectives of the degree course and qualifications profile

The field of information technology is one of the major drivers of technical and economic progress not only in Europe but throughout the world. Information technology systems determine our daily professional and private life. We work with notebooks and PCs, listen to music with MP3 players and are integrated in global networks by means of the internet and mobile phones. When we are travelling, we are helped along by driver assistance systems in the car or automatic passenger information in public transport. In medicine, high tech equipment is available to diagnose and assist the treatment of illnesses and injuries. In the industrial sector, robots assemble complex equipment and networked sensors monitor chemical processes.

Information technology is always mentioned when information is generated, processed, transported, stored and output using technical means. Information is created in various forms, such as language data, pictures, videos or measurement data.

Information technology systems are also being literally embedded increasingly frequently in everyday objects, transforming them into “intelligent objects” that assist humans in their activities without being noticed. In this context, other terms used are “ambient intelligence”, “pervasive computing and communications” and the “internet of things”. This is also reflected in the transformation of information technology into a cross-section discipline for other key technologies such as medical technology, nanotechnology and biotechnology.

In order to be able to create information technology innovations, there is a need for excellently trained and creative engineers. Their function is to develop new concepts and products and to offer services that make use of modern information and communications technology to make life easier and more efficient, and – not least of all – to make the world a little smaller. However, the field of information technology is also characterised by permanent and rapid change. New knowledge and the latest products soon become outdated, and for this reason there is in particular a need for engineers who have undergone a broad and well-founded training and who are capable of thinking analytically and understanding complex relationships.

The **courses in information technology** at the Alps-Adriatic University of Klagenfurt communicate this knowledge and these skills. The courses available comprise two technical courses of study: a Bachelor’s Degree in “Information Technology” and a Master’s Degree in “Information Technology”. The latter leads to the award of the title **Diplom-Ingenieur/in** (Graduate Engineer). Studying the two courses one after the other will provide a basis in mathematics and technology and enable the student to acquire the skills, knowledge and methods needed by engineers. Alongside a broad basic knowledge, students will be able to acquire in-depth knowledge in a specialisation within the field of Information Technology. The range of courses, laboratory classes, team projects and work experience in industry emphasises the practical focus of the courses. The technical content can be supplemented by non-technical subjects to broaden the student’s skills and to strengthen soft skills.

The **Master’s Degree in “Information Technology”** follows on from the skills acquired during the Bachelor’s Degree course in “Information Technology”. It serves to provide

academic professional training and qualification for occupations in the field of the development and operation of modern information and communication technologies. There are six topical subject specialisations in the field of information and communication technology to choose from:

- (a) Mobile and wireless systems
- (b) Intelligent transportation systems
- (c) Pervasive computing
- (d) Media engineering
- (e) Embedded systems
- (f) Applied mechatronics

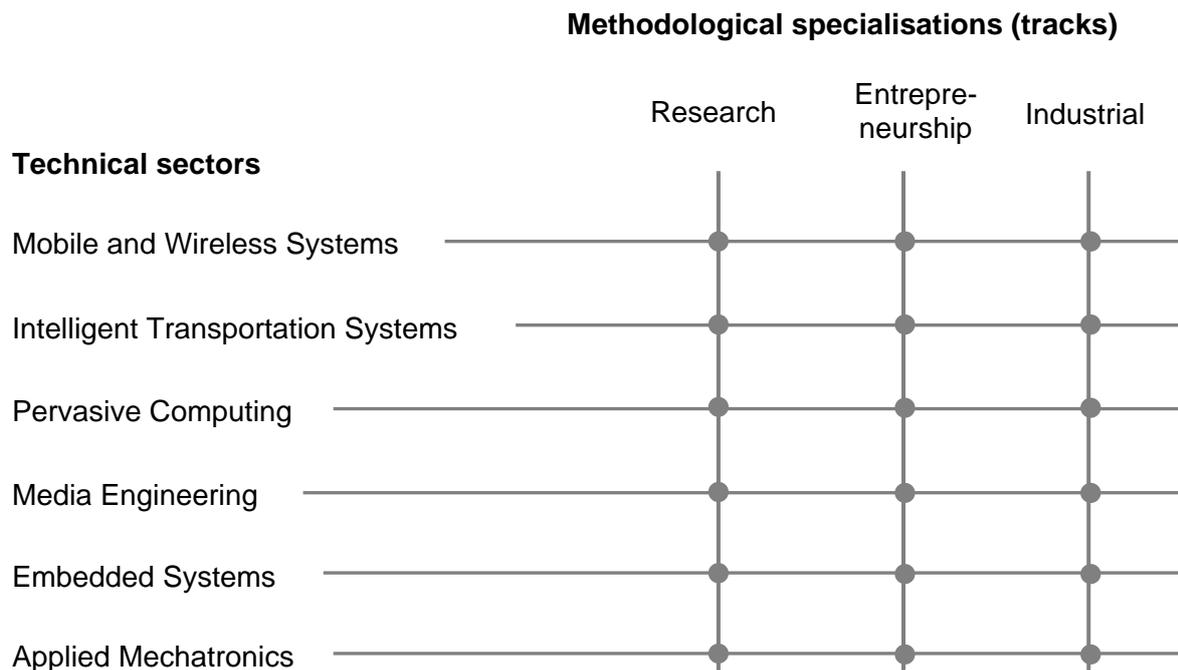
Alongside subject specialisation, the course of studies also permits methodological specialisation. Depending on the student's interests, a *Research*, *Entrepreneurship* or *Industrial Track* can be selected. Thus, with the target field of activity in mind, individual specialisations can be chosen systematically and flexibly. This matrix structure is shown in Table 1.

Graduates of the Master's Degree course will act as experts in their specialist fields while at the same time having a broad subject and methodological knowledge in the field of information and communication technology. They will identify and understand new kinds of problems and develop problem solutions systematically and independently. They will also be able to further develop the concepts and methods of information technology and to recognise technical paradigm changes. As managerial staff, they will be able to lead development teams and manage complex projects. Particular attention is placed on graduates' ability to contribute to the solution of technical projects independently and responsibly without neglecting the holistic point of view, i.e. by including disciplines from outside the field of information technology (e.g. informatics, mechanical engineering, environment issues, business management, gender issues) in their solutions.

As examples, graduates will find demanding employment opportunities as specialists and managerial staff in the following fields:

- Research and development
- Project management
- Concept and production
- Activation
- Patents
- Technical consulting and management consulting

Table 1: Overview of the specialisations



The following job descriptions are merely examples:

- *Research engineers for wireless transmission systems.* Developing new methods and algorithms for transmitting measurement data between environment sensors. Testing the methods in prototype implementations. Project management within international projects with partners from the field of sensor systems, informatics and biology.
- *Systems architects for controlling traffic systems.* Developing and testing algorithms for the evaluation of data from toll systems for the purpose of real time traffic data recording. Coordinating the design of the resulting traffic control systems. Collaboration with project teams from the traffic routes department and central traffic offices.
- *Development engineers for medical electronics.* Responsible for specifying, developing and implementing analogue and digital circuits for computer tomography. Part-responsibility for a successful production start. Collaboration with project teams from mechatronics and software development.

Sec. 2 International focus

The language of information technology is English. For this reason, many courses for the Masters Degree are offered in English. The curriculum is therefore intended to ensure that the course of studies can also be taken by students without a detailed knowledge of German.

Sec. 3 Course types

Lectures (Vorlesungen - VO) are classes in which knowledge is communicated by means of a lecture. The examination takes place in a single event, which may be oral or written or both written and oral.

Courses (Kurse - KU) are classes in which the students work through the contents together with the teacher, the focus being on experience and application.

Introductory seminars (Proseminare - PS) are a preliminary stage to seminars. They communicate the basic knowledge for scientific work, introduce students to the specialist literature and deal with examples of problems in the subject by means of papers, discussions and case studies.

Seminars (Seminare - SE) serve academic discussion. The participants make contributions of their own. As a rule, seminars are concluded by a written paper.

Lectures with course (Vorlesungen mit Kurs - VK) comprise a lecture element and a course element, the two being closely linked didactically and graded together.

The **workload** associated with a class is defined by ECTS. Pursuant to Sec. 51, Para. 2, No. 26 of the Universities Act 2002, the allocation of ECTS must be based on the student's workload. The teachers must arrange the workload for the course including the examination accordingly

The **examination and assessment methods** are defined by the teacher at the start of the course (Sec. 28, Para. 2, Part B of the Articles). The course types KU, PS, SE and VK involve continuous assessment, and attendance is therefore compulsory. In addition, the students are expected to participate actively in the discussion and reflection process and in examinations, written work and/or oral presentations.

If courses from **other curricula** correspond with the courses required by this curriculum in terms of content and the demands made, such courses can also be treated as equivalent to these courses under this curriculum even if the course type is different. Sec. 78 of the Universities Act 2002 applies with respect to the recognition of examinations.

Maximum class sizes. The following maximum number of participants applies to the following course types:

- Course (KU) or lecture with course (VK): 30 students
- Introductory seminar (PS) or seminar (SE): 20 persons
- Course (KU) in the form of a laboratory class: 15 students

When allocating course places, account must be taken of the fact that students whose application is not accepted should not have to extend the time needed to complete their degree (Sec. 54, Para. 8, Universities Act 2002).

II. Curriculum for the Masters Degree in “Information Technology”

Sec. 4 Personal requirements for the Masters Degree

In addition to a Bachelor's Degree in a technical or natural science, the personal preconditions for the course of study include in particular an interest in technical questions and an analytical and systematic mind. In addition, the students should enjoy

understanding and analysing complex problems. As in every technical course of study, basic mathematical knowledge is necessary. Creativity in solving new kinds of problems is just as important as the ability to deal with things carefully and systematically. Also desirable are a basic knowledge of English and an openness towards other cultures.

In formal terms, admission to the Master's Degree course is subject to the completion of a Bachelor's Degree in a relevant subject at a university or at a university of technology or another equivalent course of study at a recognised Austrian or foreign post-secondary educational institution (pursuant to Sec. 64 Para. 5 of the Universities Act 2002).

Sec. 5 Structure of the degree course

The Master's Degree course in "Information Technology" comprises **4 semesters** with a total of **120 ECTS**¹ (Sec. 54, Para. 3, Universities Act 2002).

The course of study comprises six subjects:

- (1) Technical specialisation (24 ECTS)
- (2) Technical supplementary subject I (12 ECTS)
- (3) Technical supplementary subject II (18 ECTS)
- (4) Methodological specialisation (18 ECTS)
- (5) Skills extension (6 ECTS)
- (6) Electives (12 ECTS)
- (7) Master's thesis and corresponding research seminar (Privatissimum) (30 ECTS)

Table 2: **Curriculum for the Master's Degree course in Information Technology – overview of subjects**

Subject/course		Course type	Hours per week	ECTS
(1)	Technical specialisation		12	24
(1.1)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4
(1.2)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4
(1.3)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4
(1.4)	Course	KU	2	3
(1.5)	Course			
	<i>or</i> Laboratory class			

¹ The European Credit Transfer System (ECTS) is a European student-centred system for the crediting, transfer and accumulation of learning outcomes. The basis is the workload that the students must complete in order to achieve the objectives of a learning programme. The ECTS system is based on the principle that the workload for full-time students during one academic year amounts to 60 ECTS credits. According to the rules, one ECTS credit corresponds to a total workload of 25 working hours within or outside the course. ECTS is used in the following as a synonym for ECTS credits.

(1.6)	Research seminar	SE	2	6	
(2)	Technical supplementary subject I		6	12	
(2.1)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4	
(2.2)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4	
(2.3)	Lecture with Course <i>or</i> Seminar	VK/SE	2	4	
(3)	Technical supplementary subject II		10	18	
(3.1)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4	
(3.2)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4	
(3.3)	Lecture with Course <i>or</i> Lecture with Seminar	VK/VS	2	4	
(3.4)	Course	<i>or</i> Laboratory class	KU	2	3
(3.5)	Course		KU	2	3
		<i>or</i>			
(3')	Information technology basics²		12	18	
(3.1')	Lecture <i>and</i> Course	VO	2	6	
		KU	2		
(3.2')	Lecture <i>and</i> Course	VO	2	6	
		KU	2		
(3.3')	Lecture <i>and</i> Course	VO	2	6	
		KU	2		
(4)	Methodological specialisation			18	
(4')	Research Track			18	
(4.1')	Research project	KU		12	
(4.2')	Theoretical and methodological course I	VO/VK/VS		6	
		/KU/PS			
(4.3')	Theoretical and methodological course II	VO/VK/VS		6	
		/KU/PS			
		<i>or</i>			
(4'')	Entrepreneurship Track			18	
(4.1'')	Entrepreneurship and Innovation Management		8	12	
(4.1.1'')	Lecture	VO	2	3	
(4.1.2'')	Lecture <i>or</i> Introductory Seminar	VO/PS	2	3	

² This subject replaces, but optionally, Subject (3) – “Technical supplementary subject II” for graduates of bachelor courses in other subjects.

(4.1.3'')	Lecture <i>or</i> Introductory Seminar	VO/PS	2	3
(4.1.4'')	Lecture <i>or</i> Seminar	VO/SE	2	3
(4.2'')	Module from the entrepreneurship certificate			6
(4.2.1'')	Lecture <i>or</i> Seminar <i>or</i> Course	VO/SE/KU		3
(4.2.2'')	Lecture <i>or</i> Seminar <i>or</i> Course	VO/SE/KU		3

or

(4''')	Industrial Track			18
	Work experience (12 weeks)			18
	Research seminar on work experience	KU	1	

(5)	Skills extension			6
	Various courses	VO/VK/VS /KU/PS		6

(6)	Options		12
	Various courses	VO/VK/VS /KU/PS	12
(7)	Master's thesis		30
(7.1)	Master's thesis		24
(7.2)	Research seminar on Master's thesis	2	6

Sec. 6 Subject (1) courses – “Technical specialisation”

The subject “Technical specialisation” serves the subject specialisation in a specific field of informational technology. Courses to a total of 24 ECTS must be followed within the specialisation selected. These courses communicate in-depth knowledge and methods.

The following specialisations are available to choose from:

- (a) Mobile and wireless systems
- (b) Intelligent transportation systems
- (c) Pervasive computing
- (d) Media engineering
- (e) Embedded systems
- (f) Applied mechatronics

24 ECTS must be obtained in the course types listed in Table 2 (1) from the selected specialisation.

Sec. 7 Subject (2) courses – “Technical supplementary subject I”

The “Technical supplementary subject” serves to broaden the information technology horizon beyond the field selected as technical specialisation. 12 ECTS must be obtained in additional technical courses. The courses are to be selected from one or more of the information technology specialisations listed in Subject (1) - “Technical specialisation”.

Sec.8 Subject (3) courses – “Technical supplementary subject II”

18 ECTS must be obtained in additional technical courses. The courses can be selected both from the information technology specialisation subjects listed in Subject (1) – “Technical specialisation”, and from the following informatics specialisation subjects (see the curriculum for the informatics degree course):

- (a) Application Engineering
- (b) Computational Linguistics
- (c) Computer and Network Architecture
- (d) Data and Knowledge Engineering
- (e) Distributed Systems

- (f) Information and System Security
- (g) Intelligent Information Systems in Production, Operations, and Management
- (h) Interactive Systems
- (i) Software Engineering

The courses chosen must not have been attended and credited in the Bachelor's degree course.

Provisions for graduates of bachelor degree courses in other subjects

The following special provisions apply to students who do not have a university bachelor's degree in the field of information technology, electrical engineering, communication technology or telematics. Courses from Subject (3) can, upon application to the vice-rector for academic affairs, be replaced by a compilation of courses to an extent of up to 18 ECTS from the subjects from the Bachelor's Degree course in Information Technology that communicate a basic knowledge of information technology. The subject amended in this way is referred to as Subject (3') - "Substitute subject, information technology basics"):

- (1) Circuits and electronics
- (2) Signals and systems
- (3) Computer, network and control technology

Sec.9 Subject (4) courses – “Methodological specialisation”

During the degree course, the student must select a methodological specialisation (“track”). This serves as methodological profile. 18 ECTS in accordance with Table 2 (4') must be attended in the selected track.

The following methodological specialisations are available to choose from:

(A) Research track

This methodological specialisation serves to communicate the skills and methodological tools necessary for an activity in the field of research, whether in industry, non-university research facilities or universities.

As part of this research-based specialisation/track, students must carry out a research project to the extent of 12 ECTS and attend a maximum of two theoretical and methodological courses to the extent of at least 6 ECTS (see Table 2 (4'')).

Theoretical and methodological courses to the extent of 6 ECTS must be selected from one or two of the following fields:

- (a) Theoretical information technology and informatics
- (b) Modelling and simulation in information technology
- (c) Mathematical methods in information technology³
- (d) Physical and theoretical aspects of information technology.

³ Courses from the following fields can be chosen: Algebra and Geometry, Analysis, Discrete Mathematics, Operations Research, Stochastics, System Security.

The results of the research project are to be reviewed and appraised scientifically in a research report and presented in a lecture. The supervising professor must consent to the topic of the research project and accept the review of the research results.

(B) Entrepreneurship Track

This methodological specialisation serves to communicate basic knowledge, skills and methodological tools needed for a career in enterprise. Use is made of the courses offered in applied business management at the Alps-Adriatic University of Klagenfurt. The courses available for this track (see Table 2 (4'')) are defined in the section on "Innovation management and formation of a company".

(C) Industrial Track

This track focuses particularly on practical experience in the relevant industry. It therefore offers students the opportunity to acquire both subject-related and social and other skills and soft skills by means of active participation in specific projects and/or other measures either in industry or in other subject-relevant businesses. This amounts to 18 ECTS (see Table 2 (4'')).

The work experience and practical course must take into account the following guidelines.

Guidelines for work experience.

The work experience can be in a business, a public institution, a non-profit organisation or a non-university research institution. Its purpose is to try out and apply in practice the knowledge and skills acquired. This is a guided project in which activities related to information technology activities are carried out. The work experience shall be for a period of at least **12 weeks**, as a rule completed within one semester. The review of the work experience is submitted to the supervising professor.

Students in employment can also carry out the work experience at their place of work, provided that it involves a relevant self-contained project and that there is no relationship between the provider of the work experience and the supervisor on the one hand and the student on the other hand that might lead to partiality. For instance, practical activities in a business belonging to a close family member are not recognised. In cases of doubt, the vice-rector for academic affairs shall decide.

If there is no possibility of obtaining work experience in a business, a public institution, a non-profit organisation or a non-university research institution, the work experience can also be carried out as part of an in-university project with the approval of the supervising professor.

Students are entitled to propose the field of their work experience or to select from a number of proposals.

Following the work experience, the experience obtained is to be presented in an experience report, reviewed from an academic point of view and presented in a lecture. The report and a confirmation issued by the business shall be submitted to the supervising professor. This should be done at the latest in the second semester after the work experience. The confirmation must contain the following details in German or in English: details about the person, details about the business (including location and department), work carried out and duration thereof, and an assessment of the activity.

Sec. 10 Courses from Subject (5) – “Skills extension”

Courses shall be taken from the following fields to an extent of at least 6 ECTS in order to broaden the student’s cross-subject qualifications, in particular to improve linguistic and social skills and team and management abilities:

- (a) German communication and linguistic skills
- (b) English communication and linguistic skills
- (c) Entrepreneurship and innovation management
- (d) Feminist science/ Gender studies: Gender and technology
- (e) Interdisciplinary technology and scientific research
- (f) Basic principles of law
- (g) Team and management skills

Sec. 11 Courses from subject (6) – Options

Options shall be taken to the extent of 12 ECTS in order to round off and delve more deeply into the subject of the degree course. All courses offered by a recognised Austrian or foreign university can be chosen.

Sec. 12 Master’s thesis

A final Master’s thesis is to be written in the Master’s degree course, as a rule in the last semester. This is to be accompanied by attendance at the corresponding research seminar (Privatissimum).

The topic of the Master’s thesis must be within one of the specialisations listed under Subject (1). Students are advised to select the Master’s thesis from the specialisation selected in Subject (1). Students are entitled to propose their own topic or to select from a number of proposals.

By arrangement with the supervisor, the Master’s thesis can also be written in collaboration with non-university businesses and research facilities.

III. Examination regulations and conclusion of the degree course

Sec. 13 Aims of examinations

During the degree course, course examinations are taken in parallel with the studies. They serve to determine the success of the student’s participation in the course and as evidence that they have mastered the knowledge and methods communicated.

Sec. 14 Holding and repeating examinations

The holding and repeating of examinations is subject to the provisions of the Articles of the Alps-Adriatic University of Klagenfurt, Part B: Study Regulations, and of the Universities Act as amended from time to time.

Sec. 15 Completion of the degree course

The Master’s degree course is completed by

- The completion and positive grading of the subjects (1) to (6)
- The positive grading of the Master's thesis and attendance and positive grading of the corresponding research seminar (Privatissimum)
- The positive grading of the Master's examination before a board of examiners.

For students to whom the "Exception provisions for graduates of other Bachelor's degree courses" apply, the positive grading of examinations in subject (3') replaces subject (3).

Sec. 16 Master's examination

The Master's examination consists of two parts:

1. Part-examinations

The first part of the Master's examination consists of examinations on the courses listed in the subjects (1) to (7). These are taken in the form of examinations on the individual courses.

2. Examination before the board of examiners

Registration to take the examination before the board of examiners requires that all part-examinations have been taken successfully and that the Master's thesis has been awarded a positive grade by the supervisor.

The examination before the board of examiners is held in the presence of a board consisting of three persons. It comprises

- the presentation and defence of the Master's thesis
- an examination in the technical specialisation subject (1) selected
- an examination on one of the fields selected (as Technical supplementary subject I and II) within subjects (2) and (3)

Sec. 17 Subject grades and overall assessment

For each of the subjects (1) to (10), a subject grade is calculated, to be determined according to the following procedure:

- The grade for each part-examination belonging to the subject is multiplied by the ECTS credits for the course in question,
- the figures obtained by (i.) are added,
- the result of the addition is divided by the total ECTS credits of the courses, and
- the result of the division is if necessary rounded to the nearest whole figure, with results greater than .5 being rounded up.

The **assessment of the degree course as a whole** is calculated on the basis of the subject grades of the subjects (1) to (7) and the grade for the examination board examination pursuant to Sec. 73 Para. 3 of the Universities Act 2002.

Sec. 18 Academic title

The graduates of the Master's Degree course in "Information Technology" are awarded the academic title of "Diplom-Ingenieurin" (for female students) or "Diplom-Ingenieur" (for male students), both abbreviated to DI.

Sec. 19 Entry into effect

This curriculum enters into effect on 1 October 2006.