Curriculum of the Master's Programme

Electrical Engineering and Audio Engineering

Curriculum 2007

This curriculum was approved by the Curricular Committee of Graz University of Technology in the meeting of 17 April 2007 and by the Senate of the University of Music and Performing Arts, Graz, in the meeting of 19 June 2007.

On the basis of the University Studies and Organisation Act 2002 (UG 2002), Austrian Federal Law Gazette I No. 120/2002 in the valid version, the Senate of Graz University of Technology and the Senate of the University of Music and Performing Arts, Graz, enact the present curriculum for the Electrical Engineering and Audio Engineering master's programme.

§ 1 General Provisions

The engineering sciences master's programme in Electrical Engineering and Audio Engineering has been set up as an inter-university course of study at Graz University of Technology (TU GRAZ) and the University of Music and Performing Arts, Graz (KUG), and amounts to four semesters. The whole programme comprises 120 ECTS credits. Graduates of this programme are awarded the academic degree of "*Diplom-Ingenieurin*" or "*Diplom-Ingenieur*", abbreviated to Dipl.-Ing. or DI. This academic degree is internationally equivalent to a Master of Science (MSc).

The content of the programme builds on the content of a bachelor of science programme in a suitable specialised field according to § 64, para. 5, University Studies Act 2002, for instance on the inter-university Electrical Engineering and Audio Engineering bachelor's programme at TU GRAZ and KUG. This bachelor's programme must have at least 180 ECTS credits. In order to achieve an overall amount of 300 ECTS credits usual for postgraduate programmes, one and the same course cannot be counted in both the bachelor's programme entitling to admission and in the master's programme in question.

Depending on the previous training of the applicant, up to 25 ECTS credits from the courses of the Electrical Engineering and Audio Engineering bachelor's programme can be stipulated in the framework of this Master's Programme. The stipulated

courses reduce the amount of time for optional subjects as laid down in the curriculum accordingly. Additionally, a restriction of available choices can be stipulated. The programme is completed with a master's thesis and an oral examination according to § 7a.

§ 1a Admission to the Course of Studies

The prerequisite for admission to the master's programme in Electrical Engineering and Audio Engineering is the completion of a scientific bachelor's programme in a suitable subject or a similar academic qualification which is at least equivalent to a bachelor of science degree.
The artistic aptitude for the master's programme in Electrical Engineering and Audio Engineering according to § 63, para. 1, clause 4 of the University Studies and Organisation Act (UG 2002) can be demonstrated through completion of the bachelor's programme in Electrical Engineering and Audio Engineering at the TU GRAZ and KUG or by passing an admission interview at KUG.
In the course of the interview, the following can be decided on if applicable:

- how many courses from the bachelor's programme in Electrical Engineering and Audio Engineering the applicant has to complete;
- which optional subjects will be thus reduced;
- any restrictions on optional subjects.

§ 2 Qualification Profile

The master's programme Electrical Engineering and Audio Engineering aims to provide training according to the job description of a graduate engineer in the field of electrical engineering and audio engineering. It also contains areas of special concentration while at the same time maintaining breadth and interdisciplinarity. The following description is results-oriented and specifies concrete activities and skills which a person with average talent and motivation is in the position to carry out or apply after completing the programme.

Techno-scientific and musico-artistic knowledge and skills

Graduates of the master's programme have considerably increased and deepened their subject-specific knowledge in the areas of audio engineering, acoustics, recording techniques, signal processing and language communication, as well as computer music and multimedia. In this way, they are in the position to apply and further develop complex scientific methods in order to find innovative solutions in the field of IT applications and services in the above-mentioned core subjects.

After completing the master's programme, graduates are in the position to define and interpret special features, limits, terminologies and doctrines in the subject area. They can come to scientifically well-founded decisions even on the basis of incomplete or limited information. In the artistic field, graduates are intermediaries in the field of tension between technology and art, and able and competent to judge and act in both of these spheres.

Developing knowledge

Graduates of the master's programme can analyse and model not only scientific and technical tasks and problems in the field of IT with focus on audio engineering, signal processing and acoustics, but also apply their abilities in new and unfamiliar problem areas and to deal with complex situations.

By acquiring the abilities for self-regulated acquisition of knowledge, graduates of the master's programme are able to adjust themselves to the changing conditions and demands of science, technology and art and to constantly broaden their own fields of expertise in terms of life-long learning.

Key qualifications and social and communicative areas of expertise

Graduates of the master's programme have learnt to move confidently in various social contexts such as art and technology. As a prerequisite they have the ability to exercise critical and analytic thought in various systems. Moulded by rich experience in interdisciplinary groups, graduates are distinguished by the ability to work in teams and an aptitude for target-group oriented communication at the interface between science and art. Out of an awareness of the variety of possible viewpoints, graduates are able to evaluate their own actions in various social contexts.

§ 3 ECTS Credits

ECTS credits (European Credit Transfer and Accumulation System), which describe the relative share of the workload, are awarded to individual performances. The workload of one academic year is equivalent to 60 ECTS credits.

§ 4 Structure of the Course of Studies

The master's programme in Electrical Engineering and Audio Engineering consists of:

1. a catalogue of compulsory subjects (37 ECTS credits),
2. and four catalogues of optional subjects (from which a total of 33 ECTS credits according to § 4a are to be chosen),
3. a project which is to be completed from the chosen catalogue of optional subjects (main catalogue) (10 ECTS credits),
4. Free optional courses (8 ECTS credits),
5. A diploma-student seminar (2 ECTS-Credits) and the
6. Master's thesis (30 ECTS credits). The master's thesis is to be related to a compulsory subject or one of the chosen catalogues of optional subjects.
7. In the framework of the master's programme, a total of 65 semester hours are to be completed, eight of which in the free optional courses (see § 5).

The following table contains the breakdown of ECTS credits of the compulsory-subject catalogue, optional-subject catalogues and free optional courses.

Duration of Master's Programme in Electrical Engineering and Audio Engineering		4 semesters
Workload of courses to be completed		65 semester hours (SHs)
Total workload without master's thesis		**90 ECTS credits**
Compulsory-subject catalogue	37 ECTS credits	
Optional subjects	33 ECTS credits	
Project	10 ECTS credits	
Free optional courses (8 SHs)	8 ECTS credits	
Seminar for diploma students	2 ECTS credits	
Master's thesis		**30 ECTS credits**
Amount: master's programme Electrical Engineering and Audio Engineering		**120 ECTS credits**

§ 4a Structured choices

Every student has to choose an optional-subject catalogue as a main catalogue from which 22-24 ECTS credits are to be chosen. The remaining 9-11 ECTS credits are to be chosen from other optional-subject catalogues and represent the respective complementary subject.

If one of the following optional-subject catalogues is chosen as the main catalogue, the minimum amount of ECTS credits must be completed in each of the subjects allocated to this catalogue:

Embedded audio as main catalogue	
Subject: Audio engineering	at least 2 ECTS credits
Subject: Communications engineering and electronics	at least 7 ECTS credits
Subject: Computer science	at least 6 ECTS credits
Recording engineering and acoustics as main catalogue	
Subject: Acoustics	at least 9 ECTS credits
Subject: Recording engineering and sound reproduction	at least 6 ECTS credits
Computer music and multimedia as main catalogue	
Subject: Computer music	at least 8 ECTS credits
Subject: Multimedia	at least 3 ECTS credits
Subject: Music theory and musical skills	at least 4 ECTS credits.

The project (§ 4, clause 3) is to be taken from the chosen main catalogue. In the list of optional-subject catalogues according to § 5a, for each main catalogue it is stated at which university and at which institute the project can be taken.
Courses which counted towards the completion of the bachelor's programme entitling to admission to this programme are not part of this master's programme. If compulsory courses scheduled in this curriculum have already been used in the framework of the previously described bachelor's programme, these courses are to be replaced by additional optional courses to the same amount (ECTS credits).

§ 5 Content of Programme and Semester Plan

Electrical Engineering and Audio Engineering

Subject Course	Course SHs	Course Type	ECTS	Semester with ECTS I	II	III	IV
Compulsory Subjects							
Electrical and information engineering (TU GRAZ)							
Control engineering	3.0	VO	4.0		4.0		
Control engineering	1.0	UE	1.0		1.0		
Adaptive systems	2.0	VO	3.0	3.0			
Adaptive systems	1.0	UE	2.0	2.0			
Principles of digital communications	2.0	VO	2.5	2.5			
Principles of digital communications	1.0	UE	1.5	1.5			
Communications engineering, laboratory	2.0	LU	3.0		3.0		
Acoustics, audio engineering and computer music							
Electrical acoustics, laboratory (TU GRAZ)	2.0	LU	3.0		3.0		
Theoretical acoustics (TU GRAZ)	2.0	VU	3.0	3.0			
Signal processing engineering (TU GRAZ)	1.0	VO	1.5	1.5			
Speech communication 1 (TU GRAZ)	2.0	VO	3.0	3.0			
Digital audio engineering, laboratory (TU GRAZ)	2.0	LU	3.0	3.0			
Sound reinforcement (KUG)	1.0	VO	1.5		1.5		
Computer music and multimedia 03 (KUG)	2.0	SE	3.0		3.0		
Sound synthesis 02 (KUG)	2.0	VU	2.0		2.0		
Project							
Audio-engineering project (TU GRAZ, KUG) The audio-engineering project is to be taken from the chosen main catalogue.	6.0	PR	10.0			10.0	
The following seminar is to be taken at the university where the master's thesis is to be carried out. Seminar of diploma (KUG) Selected topics in communications, seminar (TU GRAZ)	2.0	SE	2.0			2.0	
Total compulsory subjects	34		49	19.5	17.5	12	
Total optional subject catalogues acc. to. §5a	23		33	7.5	10.5	15	
Master's thesis			30				30
Free optional courses acc. to § 5b	8		8	3	2	3	
Total amount	65		120	30	30	30	30

§ 5a Catalogues of Optional Subjects

Electrical Engineering and Audio Engineering

Subject	Course	Course			Semester with ECTS			
		SHs	Type	ECTS	I	II	III	IV
Optional-Subject Catalogue: Embedded Audio								
Project institutes:								
Institute of Broadband Communication (TU GRAZ)								
Institute of Computer Engineering (TU GRAZ)								
Signal Processing and Speech Communication Laboratory (TU GRAZ)								
Institute of Electronics (TU GRAZ)								
	Audio engineering							
	Digital audio engineering 2 (TU GRAZ)	2.0	VO	3.0				
	Sound reinforcement and supervision 01 (KUG)	1.0	LU	1.0				
	Recording and postproduction 2, laboratory (TU GRAZ)	2.0	LU	2.0				
	Broadcast systems (TU GRAZ)	2.0	VO	3.0				
	Electronics and communications engineering (TU GRAZ)							
	Measurement technology 2	2.0	VO	3.0				
	Measuring technology, laboratory	2.0	LU	2.5				
	Application of microprocessors 1	2.0	VO	3.0				
	Application of microprocessors 1, laboratory	1.0	LU	2.0				
	Integrated circuits	2.0	VO	3.0				
	Integrated circuits	2.0	UE	3.0				
	Electronic circuit technology 3	2.0	VO	3.0				
	Electronic circuit technology	2.0	UE	3.0				
	Analogue circuit technology, laboratory	3.0	LU	3.0				
	Digital circuit technology, laboratory	3.0	LU	3.0				
	Audio electronics, seminar	2.0	SE	3.0				
	Principles of microelectronics	2.0	VO	2.5				
	Communication networks	2.0	VO	3.0				
	Information theory and coding	2.0	VO	3.0				
	Information theory and coding	1.0	UE	2.0				
	Optical communications engineering	3.0	VO	4.5				
	Optical communications engineering	1.0	UE	2.0				
	Computer engineering (TU GRAZ)							
	Mixed-signal processing systems design	2.0	VU	3.5				
	Computer engineering; laboratory	2.0	LU	2.0				
	Hardware-description languages	2.0	VO	3.0				
	Hardware-description languages	1.0	UE	2.0				
	Hardware-software co-design	2.0	VO	3.0				
	Hardware-software co-design	1.0	UE	2.0				
	Power-aware computing	2.0	VU	3.0				
	Power-aware computing	1.0	LU	2.0				
	Distributed-systems architecture	2.0	VO	3.0				
	Distributed-systems architecture	1.0	UE	1.5				
	Embedded systems	2.0	VO	3.0				
	Embedded systems, laboratory	1.0	LU	1.5				
Total Embedded Audio		60.0		87.0				

Optional-Subject Catalogue: Acoustics and Recording Technology

Project institutes:
Institute of Broadband Communication (TU GRAZ)
Institute of Electronic Music and Acoustics (KUG)

Acoustics			
Technical acoustics for audio engineers (TU GRAZ)	2.0	VO	3.0
Musical acoustics 02 (KUG)	2.0	SE	3.0
Psychoacoustics 02 (KUG)	2.0	VO	3.0
Construction physics and noise(KUG)	1.0	VO	2.0
Constructions physics and noise (KUG)	1.0	UE	1.0
Acoustics for engine and vehicle (TU GRAZ)	2.0	VO	3.0
Test design for perceptual audio evaluation (KUG)	1.0	VU	1.5
Vibrometry (TU GRAZ)	2.0	VO	3.0
Vibrometry, laboratory (TU GRAZ)	1.0	LU	2.0
Acoustical Measurements 02 (KUG)	2.0	LU	3.0
Recording engineering and sound reproduction			
Multi-channel recording and postproduction (KUG)	1.0	VO	1.5
Multi-channel recording and postproduction (KUG)	1.0	LU	1.0
Sound reinforcement and supervision 2 (KUG)	1.0	LU	1.5
Recording and postproduction 2, laboratory (TU GRAZ)	2.0	LU	2.0
Recording and postproduction 03 (KUG)	2.0	LU	2.0
Recording and postproduction 03 (KUG)	2.0	SE	4.0
Film, TV Video TI (KUG)	2.0	UE	2.0
Movie sound track processing and DVD authoring (KUG)	1.0	LU	1.5
Total: Acoustics and recording technology	28.0		40.0

Optional-Subject Catalogue: Signal Processing and Language Communication

Project institutes:
Signal processing and speech communication, laboratory (TU GRAZ)
Institute of Electronic Music and Acoustics (KUG)

Advanced signal processing 1, seminar (TU GRAZ)	2.0	SE	3.0
Advanced signal processing 2, seminar (TU GRAZ)	2.0	SE	3.0
Speech communication 2 (TU GRAZ)	2.0	VO	3.0
Speech communication, laboratory (TU GRAZ)	2.0	LU	2.0
Audio signal processing (TU GRAZ)	2.0	VO	3.0
Audio signal processing (TU GRAZ)	1.0	UE	2.0
Non-linear signal processing (TU GRAZ)	2.0	VO	3.0
Non-linear signal processing (TU GRAZ)	1.0	UE	2.0
Signal processors (TU GRAZ)	2.0	VO	3.5
Signal processors, laboratory (TU GRAZ)	1.0	LU	2.0
Digital signal processing, laboratory (TU GRAZ)	2.0	LU	4.0
Linguistic principles of language engineering (TU GRAZ)	2.0	VO	3.0
Algorithms in acoustics and computer music 02 (KUG)	2.0	SE	3.0
Algorithms in acoustics and computer music 02 (KUG)	1.0	UE	1.0
Music Information Retrieval (KUG)	2.0	VU	3.0
Music Information Retrieval (KUG)	2.0	SE	3.0
Applied signal processing in acoustical MIMO-systems (KUG)	2.0	VO	3.0
Applied signal processing in acoustical MIMO-systems (KUG)	1.0	LU	1.5
Total Signal processing and language communication	31.0		48.0

Optional-Subject Catalogue: Computer Music and Multimedia

Project institutes:
Signal processing and speech communication, laboratory (TU GRAZ)
Institute of Electronic Music and Acoustics (KUG)

Computer music (KUG)			
Aesthetics of electronic music 02	2.0	VO	1.5
Computer music systems	2.0	LU	3.0
Computer music systems	2.0	VO	3.0
Computer music and multimedia 02	2.0	SE	3.0
Computer music and multimedia 04	2.0	SE	3.0
Artistic design with sound 01	1.0	UE	1.5
Sound design 01	2.0	UE	3.0
Sound design 02	2.0	UE	3.0
Realtime Sound Synthesis	2.0	SE	3.0
History of electro-acoustic music and media art 02	2.0	VO	2.0
Instrumental music and live-electronics	2.0	LU	3.0
Algorithmic composition	2.0	VU	3.0
Algorithmic composition	2.0	SE	3.0
Musicinformatics 01	2.0	SE	3.0
Musicinformatics 02	2.0	SE	3.0
Multimedia			
Sound reinforcement (KUG)	2.0	SE	3.0
Installation art (KUG)	2.0	LU	3.0
Image processing and pattern recognition (TU GRAZ)	2.0	VO	3.0
Image processing and pattern recognition (TU GRAZ)	1.0	KU	2.0
Multimedia information systems 01 (TU GRAZ)	2.0	VO	3.0
Multimedia information systems 01 (TU GRAZ)	1.0	KU	2.0
The Art and new media (KUG)	1.0	SE	2.0
The Art and new media (KUG)	1.0	LU	1.0
Music theory and musical skills (KUG)			
1 course Harmony out of 01-03	2.0	VU	3.0
2 courses Aural training for composers out of 01-06	4.0	UE	3.5
Instrument tuition 05	1.0	KE	2.0
Instrument tuition 06	1.0	KE	2.0
Instrumentation 02	1.0	VU	1.5
Arrangement and applied music 01	1.0	VU	1.5
Arrangement and applied music 02	1.0	VU	1.5
Harmonic analysis 02	2.0	VU	2.5
Technical development for, and support of, in artistic projects	2.0	UE	4.0
Performance practice of electronic music and sound supervision	2.0	UE	3.0
Total: Computer music and multimedia	58.0		84.5

§ 5b Free Optional Courses

Free optional courses in the Electrical Engineering and Audio Engineering master's programme serve as students' individual focus and further development and can be chosen without restriction from the range of courses offered by all recognised domestic and foreign universities.
Each semester hour (SH) of a free optional course is allocated on average 1 ECTS credit.

§ 6 Conditions of Admission to Examinations

No conditions of admission to examinations are stipulated.

§ 7 Examination Regulations

Courses are assessed individually.

1. Examinations of courses held in the form of lectures (VO) are to assess the whole content of the course.
2. Regarding courses held in the form of lectures with integrated practicals (VU), practicals (UE), laboratory practicals (LU), seminars (SE) or as artistic courses (KE, KG), there is a continuous assessment based on contributions made by students and/or accompanying tests.
3. Projects (PR) are completed with a written work and an oral presentation, which form part of the assessment. Projects can be carried out in the form of teamwork or individual work; in the case of teamwork, the individual performances must be able to be assessed.
4. Passed examinations are to be graded as "excellent" (1), "good" (2), "satisfactory" (3) or "pass" (4); failed examinations are to be graded as "fail" (5). Expressly declared courses are assessed with "participated with success", respectively "participated without success".
5. If a subject consists of several examination results corresponding to courses, a module grade is to be awarded, such that
   a) the grade of each examination result pertaining to the subject is multiplied by the ECTS credits of the relevant course,
   b) the values calculated according to clause 4a) are added,
   c) the result of the addition is divided by the sum of the ECTS credits of the courses and
   d) the result of the division is rounded to a whole-number grade if necessary. In the case of the values after the decimal point, those greater than 0.5 are to be rounded up, otherwise they are to be rounded down.

The different types of courses are laid down in part 3 of the appendix.

Additional to the types of course, the following maximum group sizes are stipulated:

1. For practicals (UE) and practical shares of lectures with integrated practicals (VU), the maximum group size is 30.
2. For seminars (SE), the maximum group size is 15.
3. For laboratory practicals (LU), the maximum group size is 6.
4. For projects (PR), the maximum group size is 6.

The allocation of places in individual courses takes place according to the guidelines in part 3 of the appendix.

§ 7a Final Oral Examination

The precondition for admission to the master's oral examination is proof of pass grades in all examination results according to § 4 and § 5 and a pass grade in the master's thesis.

The master's oral examination takes place in front of an examination senate composed of three persons which is appointed by the dean of studies at TU GRAZ and vice-rector of academics at KUG. The examination senate must include the assessor of the master's thesis. If the latter is prevented from coming, he or she can propose a replacement.

The student has to present the properly composed master's thesis in the course of the master's oral examination and subsequently conduct a thesis defence against members of the examination senate. The total time of the final oral examination may not exceed one hour. The overall grade is decided by the examination senate.

§ 7b Certificate of Graduation

The certificate of graduation from the master's programme contains

a) All the examination subjects according to § 5 and their grades,
b) The title of the chosen main catalogue including total amount of ECTS credits and the thus derived module grade of the optional courses taken in the main catalogue,
c) Total amount of ECTS credits and the thus derived module grade of the courses of the complementary subject under the title of "complementary optional courses",
d) The title and grade of the master's thesis,
e) The grade of the final oral examination and
f) The total amount in ECTS credits of the passed free optional courses according to § 5a,
g) The overall grade according to § 73 para. 3, UG 2002.

§ 8 Transitional Regulations

Regular students who began their diploma studies in Electrical Engineering and Audio Engineering before 1st October 2007 are entitled to continue and complete their studies according to the hitherto valid curriculum in the respective valid version until the end of the winter semester 2013/14.

§ 9 Entering into Effect

This curriculum entered into effect on 1st October 2007.

Appendix to the Curriculum of the Electrical Engineering and Audio Engineering Master's Programme

Part 1 of Appendix:

Recognition and equivalence list

Courses whose title, type, number of ECTS credits and number of semester hours are in agreement, are regarded as equivalent and are therefore not explicitly stated in the equivalence list.

For these courses and the courses stated in the equivalence list, recognition by the Dean of Studies responsible is not required.

Recognition List:

Diploma studies				**Master's Programme**				*)
	SHs		ECTS		SHs		ECTS	SHs
				Compulsory subjects				
Theoretical acoustics	2	VO	3	Theoretical acoustics	2	VU	3	-1
Theoretical acoustics	1	UE	1					
Communications engineering systems	1	VO	1.5	Fundamentals of digital communications	2	VO	2.5	1
				Optional-subject catalogue: Computer music and multimedia				
Computer music 04	1	SE	1.5	Computer music and multimedia	2	SE	3	1

*) Positive balance = changeover gain; negative balance = changeover loss.

Equivalence List:

Diploma studies				**Master's Programme**			
	SHs		ECTS		SHs		ECTS
				Compulsory subjects			
Control engineering	3	VO	4.5	Control engineering	3	VO	4
Control engineering	1	UE	1.5	Control engineering	1	UE	1
Adaptive systems	2	VO	3	Adaptive systems	2	VO	3
Adaptive systems	1	UE	1.5	Adaptive systems	1	UE	2
Communications engineering 1	2	LU	2.5	Communications engineering, laboratory	2	LU	3
Communications engineering systems	1	UE	1	Fundamentals of digital communications	1	UE	1.5
Electroacoustics	2	LU	2	Electroacoustics, laboratory	2	LU	3
Digital audio engineering	2	LU	2	Digital audio engineering, laboratory	2	LU	3
Computer music 03	2	SE	3	Computer music and multimedia 03	2	SE	3

Introduction to electronic music 02	2	VO	3	Sound synthesis 02	2	VU	2
Project 1 (audio engineer) Project 2 (audio engineer)	3 3	PR PR	6 6	Audio engineering project	6	PR	10
				Optional-subject catalogue: Embedded audio			
Radio and TV broadcasting technology	2	VO	3	Broadcast systems	2	VO	3
Sound reinforcement	1	LU	1	Sound reinforcement and supervision 1	1	LU	1
Electrical measurement 2	2	VO	3	Measurement technology 2	2	VO	3
Electrical measurement	2	LU	2.5	Measuring technology, laboratory	2	LU	2.5
Application of microprocessors 1	1	LU	1	Application of microprocessors 1, laboratory	1	LU	2
Communication networks	2	VO	3	Communication networks	2	VO	3
Information theory and coding	2	VO	3	Information theory and coding	2	VO	3
Information theory and coding	1	UE	1	Information theory and coding	1	UE	2
Optical communications engineering	3	VO	4	Optical communications engineering	3	VO	4.4
Optical communications engineering	1	UE	1	Optical communications engineering	1	UE	2
Hardware-description languages	1	UE	1	Hardware-description languages	1	UE	2
Hardware-software co-design	1	UE	1	Hardware-software co-design	1	UE	2
Distributed-systems architecture	1	RU	1	Distributed-systems architecture	1	UE	1.5
				Optional-subject catalogue: Acoustics and recording technology			
Technical acoustics for audio engineers	2	VO	3	Technical acoustics for audio engineers	2	VO	3
Acoustical measurements	2	VO	3	Vibrometry	2	VO	3
Acoustical measurements	1	LU	1	Vibrometry, laboratory	1	LU	2
Recording and postproduction 03	2	SE	3	Recording and postproduction 03	2	SE	4
Film, TV Video	2	SE	2	Film, TV Video TI	2	UE	2
				Optional-subject catalogue: Signal processing and language communication			
Statistical measuring	2	VO	3	Audio signal processing	2	VO	3
Statistical measuring	1	UE	2	Audio signal processing	1	UE	2
Nonlinear signal processing	1	UE	1	Nonlinear signal processing	1	UE	2
Signal processors	2	VO	3	Signal processors	2	VO	3.5
Signal processors	1	UE	1	Signal processors, laboratory	1	LU	2
Digital signal processing, laboratory	2	LU	2	Digital signal processing, laboratory	2	LU	4
Linguistic principles of language engineering	2	VO	3	Linguistic principles of language engineering	2	VU	3
				Optional-subject catalogue: Computer music and multimedia			
Aesthetics of electronic music 01	2	VO	1	Aesthetics of electronic music 02	2	VO	1.5
Computer music 02	2	SE	3	Computer music and multimedia 02	2	SE	3
Artistic design with sound 01	1	UE	1	Artistic design with sound 01	1	UE	1.5
Sound composition in real	2	SE	3.5	Realtime sound synthesis	2	SE	3

time							
Instrumental music and live electronics	2	SE	3	Instrumental music and live electronics	2	SE	3
History of electro-acoustic music and media art 01	2	VO	2	History of electro-acoustic music and media art 02	2	VO	2
Multimedia information systems	2	VO	3	Multimedia information systems 1	2	VO	3
Multimedia information systems	1	KU	1	Multimedia information systems 1	1	KU	2
The art and new media	1	SE	1.5	The art and new media	1	SE	2
1 Harmony course out of 01-05	4	VU	4	1 Harmony course out of 01-03	2	VU	3
2 courses Aural training for composers out of 1-6from 01-06	6	UE	6	2 courses Aural training for composers out of1-6from 01-06	4	UE	3.5
Instrumentation 02	1	VO	1.5	Instrumentation for audio engineers 02	1	VU	1.5
Harmonic analysis 02	2	SE	3	Harmonic analysis 02	2	VU	2.5

Part 2 of Appendix:

Recommended free optional courses

Free optional courses can be chosen from the range of courses of all recognised domestic and foreign universities without restriction according to § 5b of this curriculum.

Part 3 of Appendix:

Courses

(according to the guideline regarding types of courses issued by the Curricular Committee of the Senate of Graz University of Technology dated 10.1.2005) and the guideline regarding types of courses issued by the Curricular Committee of the University of Music and Performing Arts, Graz, dated 17.1.2005).

1. Lecture-type courses: VO, VU
   In lecture-type courses, the different parts of the subject and its methods are introduced in a well prepared, didactic way. Assessment is by examinations, either written, oral or written and oral according to the choice of the examiner. The examination mode must be defined in the course description.

   a. VO
      In lectures (VO), the content and methods of a subject are presented.

   b. VU
      Lectures with integrated practicals (VU), in addition to introducing the different parts of a subject and its methods, also offer guidance on independent acquisition of knowledge or independent application using examples. The

share of lectures and practicals is to be stipulated in the curriculum. These are continuous-assessment courses.

2. Seminar-type courses: SE
   Seminar-type courses involve scientific work and discussion and are intended to introduce discourse and argumentation into the subject. Students are required to carry out written work and/or an oral presentation and participation in a critical discussion. Seminars are continuous-assessment courses. Seminars (SE) serve to introduce scientific methods, to elaborate and critically evaluate results of the student's own work and special areas of scientific literature, and to exercise specialised language.

3. Courses of the type: UE, KU, LU, PR
   In practicals, abilities and skills are imparted in the framework of the scientific pre-professional education to expand and deepen the material taught in the respective lectures using practical, experimental, theoretical and/or design work. Practicals are continuous-assessment courses. The maximum size of groups is set by the curriculum or by the dean of studies of TU GRAZ for courses of Graz University of Technology and by the vice rector for academics of KUG for courses of the University of Music and Performing Arts, Graz. Special consideration must be given to the available space and required apparatus.
   The curriculum can stipulate that the practical must be passed as a precondition for registration of the associated lecture examination.

   a. UE
      In practicals (UE), student's abilities are developed by applying the subject matter to concrete problems.

   b. KU
      In design practicals (KU), abilities and skills in the framework of previous scientific education are imparted for the expanding and in-depth analysis of material taught in the respective lectures in terms of design. Special apparatus and/or a specially equipped room is required.

   c. LU
      In laboratory practicals (LU), skills and abilities are imparted in the framework of the scientific pre-professional education to expand and deepen the material taught in the respective lectures in practical, experimental and/or design work under especially intensive supervision. A special component of laboratory practicals includes preparing results of the work carried out.

   d. PR
      In projects (PR), experimental, theoretical and/ or design-applied work, and/ or small-scale research work is carried out, taking into account all the necessary working steps. Projects are completed with a written work and an oral presentation, which form part of the assessment. Projects can be carried out in the form of teamwork or individual work; in the case of teamwork, the individual performances must be able to be assessed.

4. Artistic private tutorials: KE
   The artistic private tutorial (KE) serves to promote the unfolding of students' individual artistic talents and the acquisition of artistic, technical skills.
   Course leaders are free to use a lesser amount of the course as group tuition if the teaching content and/ or applied methodology require it.

Allocation of places in the case of courses with limited numbers of participants:

If more students register for a course than is appropriate for one group, additional groups or parallel courses are to be scheduled.

If, in exceptional cases, the relevant highest number of participants in optional courses is exceeded due to a lack of resources, care must be taken to give the registered students the opportunity to take the course or a replacement course at the earliest possible time.