TECHNISCHE UNIVERSITÄT DRESDEN

Faculty Electrical Engineering and Information Technology

Study regulations for the consecutive Master programme Nanoelectronic Systems

as of 15 May 2015

Pursuant to § 36 of the Law Governing the Universities in the Free State of Saxony (Sächsisches Hochschulgesetz - SächsHSG) of 10 December 2008 (SächsGVBl. p. 900), last amended by article 10 of the Act of 26 June 2009 (SächsGVBl. pp. 375, 377), the Technische Universität Dresden enacts the following Examination Regulations as a statute.

Contents

Please note: This is an English translation of the German original. **Only the German version is legally binding.**

§ 1

Area of applicability

These Study Regulations define the objective, the contents, the structure and the order of events during studies for the consecutive Master programme Nanoelectronic Systems at the Technische Universität Dresden on the basis of the provisions of the applicable Law on Higher Education in the Free State of Saxony and the Examination Regulations.

§ 2

Aims of the programme

(1) The graduates of the Master programme Nanoelectronic Systems acquire methods, techniques and tools for the design and the manufacture of nanoelectronic systems and also for the application of these systems in selected applications areas and can reliably deploy this knowledge. Students will be enabled to analyse tasks in these areas and thence to develop effective solutions. They identify the interactions and interdependencies between these key issues and can take account of them when finding solutions. Graduates are familiar with the latest research and developments in these areas and are positively involved in the process.

(2) Thanks to their broad technical knowledge and their familiarity with the international research communities in the areas design, manufacture and application of nanoelectronic systems, which they acquired in the modules with an international orientation, graduates are fit to solve a variety of complex tasks in the design, manufacture and application of nanoelectronic systems in accordance with the chosen specialisation and after an adequate settling-in period in the industry.

§ 3

Admission requirements

(1) To be admitted to the programme, students must have earned a first job-qualifying university degree in Electrical Engineering, Information Systems Engineering, Computer Science, Physics or equivalent areas; it is mandatory that the degree is acknowledged in Germany.

(2) Moreover, students are expected to have particular technical knowledge in the fields of mathematics, electrical engineering and computer science.

(3) Fluency in English at level C1 of the Common European Framework of Reference for Languages (CEFR) is also a prerequisite.

(4) The fulfilment of these requirements is verified pursuant to the Regulations governing aptitude assessment.

(5) For part-time studies, applicants must provide proof of their employment and their employer's support.

§ 4

Beginning and duration of studies

(1) Students can commence studies in the winter semester.

(2) The standard period of study is 4 semesters during which students are required to accomplish face-to-face studies, self-study and the Master examination.

§ 5

Types of teaching and learning

(1) The academic material is organised in a modular structure. In the individual modules, the academic contents is communicated, consolidated and deepened in lectures, seminars, tutorials, lab courses, language classes, projects and also in self-study.

(2) Lectures provide introduction to the subject area of the module, where students normally attend as recipients. Therefore, lectures are supplemented by tutorials, as a rule. Tutorials provide opportunities for students to practice what they learned in lectures in selected subareas.

(3) Seminars allow students to gather information about a chosen topic under supervision on the basis of technical literature or other material, to present and discuss in a group what they worked out and to present it also in writing.

(4) Lab courses serve to apply theoretical knowledge and to acquire practical skills in potential professional fields. They serve to illustrate in experimentation the facts students have learned theoretically thus allowing them to make their own experience and practice their skills when handling devices, facilities and measuring instruments.

(5) Language courses provide theoretical and practical knowledge and skills in one or more foreign languages. They develop communication skills and intercultural competence in an academic and professional context also in everyday situations.

(6) Students work on research projects in which they develop the capacity to work in a team and to work out their own solutions and implement them within a given time frame. Students also develop and exercise the ability to document the results obtained in an adequate form and to present them correctly using appropriate language.

(7) Through self-study students can work on, repeat and deepen the subject matter as they see it.

§ 6

Structure and organisation of the programme

(1) The programme has a modular structure. The courses are offered in three semesters. During the fourth semester, students work on their Master thesis.

(2) The programme comprises eight required modules with 52 credits, a relevant number of required elective modules with 38 credits and a Master thesis with defence with a total of 30 (29+1) credits. The required elective modules allow students to focus on areas of particular interest.

(3) The module descriptions contain contents and qualification aims, the types of teaching and learning used, pre-exam achievements, usability, frequency, amount of work involved and duration of the various modules (Appendix 1).

(4) Classes are held in English.

(5) The appropriate distribution of the modules across the semesters, the observance of which allows the completion of studies within the standard period of study, the types and numbers of hours of the courses and also the number and fixed times of assessments and examinations are listed in the curriculum plan attached (Appendix 2). Part-time study is also possible on the basis of an adjusted curriculum plan (Appendix 3).

(6) The required elective modules offered and the curriculum plan can be modified by the Faculty Council on suggestion of the Academic Committee. The currently offered required elective modules shall be communicated by the faculty in the known manner as the semester starts. The modified curriculum plan is binding on those students to whom the faculty communicates it in the known manner as soon as studies begin. On application, the Examination Committee may decide on exceptions to sentence 3.

§ 7

Course contents

(1) The major focus of the Master programme Nanoelectronic Systems is on research.

(2) The programme comprises required modules on semiconductor technology, circuit and system design, principles of dependable systems, estimation and detection.

(3) The topics covered by the required elective modules include materials and technologies for nanoelectronic systems, in particular storage technology, nanotechnology, optoelectronics and molecular electronics, design methods and techniques for the realisation of nanoelectronic systems, e.g. high- level and low-level synthesis, characterisation and modelling of electron devices, extended integrated circuit and system design and computer arithmetic, application fields for embedded nanoelectronic systems, in particular design, construction and use of software systems, modelling and simulation methods, business and economics issues, and also the German language and culture.

§ 8

Credit points

(1) ECTS credits document the average student workload and individual progress. One credit is equivalent to a workload of 30 hours. As a rule, students can earn 60 credit points per academic year, i.e. 30 credits per semester. The total workload of the programme is 120 credits and comprises the types of teaching and learning, the academic achievements and assessments and also the Master thesis and the defence the type and scope of which are all defined in the module descriptions (Appendix 1).

(2) The module descriptions (Appendix 1) indicate how many credits students can earn in one module. Students can earn credit points after having passed the module exam. § 28 of the examination regulations remains unaffected.

§ 9

Student advisory service

(1) The general student advisory service is the responsibility of the Central student advisory service of TU Dresden and answers all questions regarding programmes offered, terms of enrolment and general student affairs. The subject-related advisory service throughout studies is the responsibility of the Faculty Electrical Engineering and Information Technology. This subject-related advisory service helps students, in particular, tailor and plan their studies.

(2) As the third semester starts, students who have not yet earned an attestation by that time, are obliged to seek advisory service.

§ 10

Adaptation of module descriptions

(1) A simplified procedure is used to adapt module descriptions to changed conditions to ensure the organisational conditions for the programme. The fields „module name“, „contents and qualification goals“, „types of teaching“, „pre-exam achievements for earning credit points“ and also „credit points/ and grades“ cannot be modified.

(2) In the simplified procedure, the Faculty Council on suggestion of the Academic Committee decides upon the modification of the module description. The modifications shall be communicated by the Faculty in the known manner.

§ 11

Coming into force and public notice

These examination regulations become effective as of 01 October 2011 and are publicly announced in the Official Notices of Technische Universität Dresden.

Issued on the basis of the decision of the faculty council of the Faculty Electrical Engineering and Information Technology made on 21 September 2011 and the approval of the rectorial board of 28 April 2015.

Dresden, 15 May 2015

The Rector

of Technische Universität Dresden

Prof. Dr. Dr.-Ing. habil. Hans Müller-Steinhagen

Appendix 1
Module descriptions

See separate document.

Appendix 2
Curriculum plan for full-time students

with type and number of SWS (= class hours per week per semester) and the necessary assessments, the type, hours and organisation of which are described in the module descriptions

A-2.1 summary with required modules

module no.	module name	1st semester	2nd semester	3rd semester	4th semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	
NES-11 06 01	Lab Sessions	0/1/0/5 2xPL				5
NES-11 06 02	Principles of Dependable Systems	2/2/0/0 PVL PL				6
NES-12 10 01	Fundamentals of Estimation and Detection	2/2/0/0 PL				6
NES-12 12 02	Semiconductor Technology	4/0/0/0	2/0/0/1 PL			10
NES-12 08 02	Radio Frequency Integrated Circuits		3/1/0/2 PL			7
NES-12 10 03	Hardware/Software Codesign		2/1/0/0 PL			4
NES-12 ASW	Academic and Scientific Work			*/*/*/* *		4
NES-12 PW	Project Work			project PL		10
	required elective modules	6 CP	16 CP	16 CP		38
	Master thesis				29 CP	29
	defence				1 CP	1
		30	**30**	**30**	**30**	**120**

V lecture
Ü tutorial
S seminar/language course
P lab course

PL assessment(s)
PVL pre-exam achievement(s)
CP credit points
* in acc. with student's choice

A-2.2 required elective modules

module no.	module name	1st semester	2nd semester	3rd semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	
NES-12 12 01	Materials for Nanoelectronics and Vacuum Technology	4/0/0/1 3xPL			6
NES-11 02 01	High Level Synthesis	2/2/0/0 PL			6
NES-11 06 06	Systems Engineering	2/2/0/0 PVL PL			5
NES-12 09 01	Stochastic Signals and Systems	2/2/0/0 PL			6
NES-12 10 02	Communications		2/1/0/0 PL		3
NES-30 GLC	German Language and Culture		0/0/4/0 PL		4
NES-10 01 01	Investing in a Sustainable Future		1/0/2/0 3xPL		4
NES-12 08 01	Lab VLSI Processor Design		0/2/0/2 PL		6
NES-11 02 02	Low Level Synthesis		2/2/0/0 PL		6
NES-13 14 01	Nanotechnology and Materials Science		4/2/0/2 2xPL		12
NES-11 06 03	Software-Fault Tolerance		2/2/0/0 PVL PL		6
NES-11 06 04	Wireless Sensor Networks		2/2/0/0 2xPL		6
NES-12 12 03	Memory Technology		2/1/0/0	2/1/0/0 PL	7
NES-12 08 03	Modelling and Characterisation of Electron Devices		2/2/0/0	0/0/0/2 PL	8

module no.	module name	1st semester	2nd semester	3rd semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	
NES-11 02 03	Computer Arithmetic			2/2/0/0 PL	6
NES-12 12 04	Electromechanical Networks			2/1/0/0 PL	4
NES-12 10 04	Hardware/Software Codesign Lab			0/1/0/2 PL	4
NES-12 08 04	Integrated Circuits for Broadband Optical Communications			3/1/0/2 PL	7
NES-12 10 05	Modelling and Simulation of Telecommunication Systems			2/1/0/0 PL	4
NES-13 14 02	Molecular Electronics			2/2/0/0 PL	6
NES-12 12 05	Optoelectronics			4/1/0/0 2xPL	7
NES-11 06 05	Real-Time Systems			2/1/0/0 PL	6
NES-12 08 05	Theory of Nonlinear Networks			3/1/0/0 PL	6
NES-11 06 07	Ubiquitous Information Systems			4/2/0/0 PL	9

Appendix 3
Curriculum plan for part-time students

with type and number of SWS (= class hours per week per semester) and the necessary assessments, the type, hours and organisation of which are described in the module descriptions

A-3.1 summary with required modules

module no.	module name	1st semester	2nd semester	3rd semester	4th semester	5th semester	6th semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	
NES-11 06 01	Lab Sessions	0/1/0/5 2xPL						5
NES-11 06 02	Principles of Dependable Systems	2/2/0/0 PVL PL						6
NES-12 12 02	Semiconductor Technology	4/0/0/0	2/0/0/1 PL					10
NES-12 08 02	Radio Frequency Integrated Circuits		3/1/0/2 PL					7
NES-12 10 03	Hardware/Software Codesign		2/1/0/0 PL					4
NES-12 10 01	Fundamentals of Estimation and Detection			2/2/0/0 PL				6
NES-12 PW	Project Work				project PL	project PL		10
NES-12 ASW	Academic and Scientific Work					*/*/*/* *		4
	required elective modules		4 CP	12 CP	12 CP	10 CP		38
	Master thesis						29 CP	29
	defence						1 CP	1
		18	**18**	**18**	**18**	**18**	**30**	**120**

V lecture
Ü tutorial
S seminar/language course
P lab course

PVL pre-exam achievement(s)
CP credit points
* in acc. with student's choice

PL assessment(s)

A-3.2 required elective modules

module no.	module name	1st semester	2nd semester	3rd semester	4th semester	5th semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P*	V/Ü/S/P*	V/Ü/S/P*	
NES-12 10 02	Communications		2/1/0/0 PL				3
NES-30 GLC	German Language and Culture		0/0/4/0 PL				4
NES-12 12 03	Memory Technology		2/1/0/0	2/1/0/0 PL			7
NES-12 08 03	Modelling and Characterisation of Electron Devices		2/2/0/0	0/0/0/2 PL			8
NES-12 10 04	Hardware/Software Codesign Lab			0/1/0/2 PL			4
NES-11 02 01	High Level Synthesis			2/2/0/0 PL			6
NES-12 12 01	Materials for Nanoelectronics and Vacuum Technology			4/0/0/1 3xPL			6
NES-12 10 05	Modelling and Simulation of Tele-communication Systems			2/1/0/0 PL			4
NES-11 06 06	Systems Engineering			2/2/0/0 PVL PL			5
NES-12 09 01	Stochastic Signals and Systems			2/2/0/0 PL			6
NES-12 08 01	Lab VLSI Processor Design				0/2/0/2 PL		6
NES-11 02 02	Low Level Synthesis				2/2/0/0 PL		6
NES-10 01 01	Investing in a Sustainable Future				1/0/2/0 3xPL		4
NES-13 14 01	Nanotechnology and Materials Sci-ence				4/2/0/2 2xPL		12
NES-11 06 03	Software-Fault Tolerance				2/2/0/0 PVL PL		6
NES-11 06 04	Wireless Sensor Networks				2/0/2/0 2x PL		6

module no.	module name	1st semester	2nd semester	3rd semester	4th semester	5th semester	CP
		V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	V/Ü/S/P	
NES-11 02 03	Computer Arithmetic					2/2/0/0 PL	6
NES-12 12 04	Electromechanical Networks					2/1/0/0 PL	4
NES-12 08 04	Integrated Circuits for Broadband Optical Communications					3/1/0/2 PL	7
NES-13 14 02	Molecular Electronics					2/2/0/0 PL	6
NES-12 12 05	Optoelectronics					4/1/0/0 2xPL	7
NES-11 06 05	Real-Time Systems					2/1/0/0 PL	6
NES-12 08 05	Theory of Nonlinear Networks					3/1/0/0 PL	6
NES-11 06 07	Ubiquitous Information Systems					4/2/0/0 PL	9