ASIIN Accreditation Report

Master's Degree Programme
Computer Science and Engineering

Provided by
Tomsk State Polytechnic University

Version: 05 December 2014

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A About the Accreditation Process

Title of the degree Programme	Labels applied for [1]	Previous ASIIN accreditation	Involved Technical Committees (TC)[2]
Master's degree programme Computer Science and Engineering	ASIIN, Euro-Inf®	N/A	TC 04
Date of the contract: 23.09.2013 **Submission of the final version of the self-assessment report:** 29.08.2014 **Date of the onsite visit:** 23.-24.09.2014 at: **Tomsk Polytechnic University, Institute of Cybernetics**			
Peer panel: Prof. Dr. Heinz Peter Gumm, Philipps-University Marburg Prof. Dr. Jörg Keller, University of Hagen Prof. Dr. Harald Loose, University of Applied Sciences Brandenburg Jürgen F. Schaldach, formerly T-Systems GEI GmbH Vladislav Abramov, North Caucasian Federal University			
Representative of the ASIIN headquarter: Mila Zarkh			
Responsible decision-making committee: Accreditation Commission for Degree Programmes			
Criteria used: European Standards and Guidelines as of 2009 (third edition) ASIIN General Criteria, as of 17.04.2013 Subject-Specific Criteria of Technical Committee 04 – Informatics, as of 09.12.2011 Euro-INF framework standards and accreditation criteria for informatics degree pro-			

[1] ASIIN Seal for degree programmes
[2] TC 04 – Informatics

grammes, as of 29.06.2011

In order to facilitate the legibility of this document, only masculine noun forms will be used hereinafter. Any gender-specific terms used in this document apply to both women and men.

B Characteristics of the Degree Programmes

a) Name & Final Degree	b) Areas of Specialization	c) Mode of Study	d) Duration & Credit Points	e) First time of offer & Intake rhythm	f) Number of students per intake	g) Fees
Computer Science and Engineering, Master of Science	- Computer Networks and Tele-communica-tions; - Computer Analysis and Data Inter-pretation; - Microproc-essor Sys-tems; - Software Systems Design Technolo-gies; - Distributed Automated Systems; - Control Systems Software Develop-ment	Full time	4 Semesters/ 120 ECTS	01.09.2006, annually in September (winter term)	Ca. 50	N/A

For the Master's degree programme Computer Science and Engineering, the self-assessment report states **the following learning outcomes**:

- LO 1: Apply in-depth knowledge of natural sciences and mathematics to perform research and engineering tasks in the field of computer science and engineering.
- LO 2: Apply in-depth specialized knowledge in the area of computer science and engineering to perform interdisciplinary engineering tasks.
- LO 3: Set and perform innovation tasks of engineering analysis related to develop-ing software and hardware for information systems and automated systems using analytical methods and complex models.
- LO 4: Carry out innovative engineering projects for developing hardware and soft-ware for automated systems of varied purposes using modern design methods, CAD systems, and best practices of designing competitive products.
- LO 5: Plan and carry out theoretical and experimental research in the area of de-signing automated systems hardware and software using the latest achievements

in science and technology, and best domestic and foreign practices; critically appraise the findings and make conclusions.
- LO 6: Perform author's supervision of the processes of design, implementation, and use of software and hardware for automated systems of varied purposes.
- LO 7: Use deep knowledge of project management to carry out innovative engineering activities taking into account the legal aspects of copyright protection.
- LO 8: Communicate within the professional environment and society in general, actively use foreign language proficiency, develop documentation, present and defend the results of innovative engineering activity both in native and foreign language.
- LO 9: Provide high efficiency in performing innovative engineering tasks both when working both individually and as member or leader of a team, including interdisciplinary and international teams.
- LO 10: Display responsibility for own work and work of a team in one's charge, commitment and readiness to adhere to professional ethics and norms of exercising innovative engineering activities. Display deep knowledge of legal, social, environmental, and cultural aspects of innovative engineering.
- LO 11: Display the ability for self-education, continuous self-improvement in the sphere of engineering, and the ability to teach.

The following **curriculum** for the Master's degree programme Computer Science and Engineering is presented:

No.	Module designation	Credits	Workload			Distribution by years			
						2nd year		2nd year	
			Total	Class	Self	1st sem. 18	2nd sem. 18 weeks	3rd sem. 18 weeks	4th sem. 0 weeks
						Hours per week			
M1	**Fundamental cycle**	**17**	**612**	**224**	**388**				
M1.Б	**Obligatory courses**	**7**	**252**	**80**	**172**				
M1.Б1	Intelligent Systems	4	144	48	96	3/5			
M1.Б2	Methods of Optimization	3	108	32	76	2/4			
M1.В	**Optional courses**	**10**	**360**	**144**	**216**				
M1.В1	Professional Foreign Language	4 2/2	144	64	80	2/2	2/2		
M1.В2.1	Network Operating Systems	3	108	48	60			3/3	
M1.В2.2	Neuroevolutionary Computing								
M1.В2.3	Design of Electronic and Microprocessor Systems								
M1.В2.4	GRID Technologies								
M1.В2.5	Databank Analysis								

M1.B3	Philosophy and Methodology Issues of Science and Engineering	3	108	32	76	2/4			
M2	**Professional cycle**	**41**	**1476**	**448**	**1028**				
M2.Б	**Obligatory courses**	**14**	**504**	**144**	**360**				
M2.Б1	Computing	6	216	64	152		4/8		
M2.Б2	Software Development	8	288	80	208	3/9	2/2		
No.	Module designation	Credits	Workload			Distribution by years			
						2nd year		2nd year	
			Total	Class	Self	1st sem. 18	2nd sem. 18 weeks	3rd sem. 18 weeks	4th sem. 0 weeks
						Hours per week			
		6/2							
M2.B	**Optional courses**	**27**	**972**	**304**	**668**				
M2.B1	Decision-Making Theory	3	108	48	60		3/3		
M2.B2	Information and Computer Network Security	4	144	48	96		3/5		
M2.B3	Selected Topics in Computer Science	4	144	32	112	2/6			
M2.B.1	**Profile 1 "Computer Networks and Telecommunica-**	**16**	**576**	**176**	**400**				
M2.B.1.1	Wireless Information Networks	3	108	32	76			2/4	
M2.B.1.2	Information and Telecommunication Systems Design	3	108	32	76			2/4	
M2.B.1.3	Simulation of Computer Networks and Telecommunication Systems	4	144	48	96			3/5	
M2.B.1.4	Internet Technologies: Protocols and Services	3	108	32	76			2/4	
M2.B.1.5	Administration in Telecommunication Systems	3	108	32	76			2/4	
M2.B.2	**Profile 2 "Computer Analysis and Data Inter-**	**16**	**576**	**176**	**400**				
M2.B.2.1	Computational Intelligence Methods	3	108	32	76			2/4	
No.	Module designation	Credits	Workload			Distribution by years			
						2nd year		2nd year	
			Total	Class	Self	1st sem. 18	2nd sem. 18 weeks	3rd sem. 18 weeks	4th sem. 0 weeks
						Hours per week			
M2.B.2.2	Intelligent Image Processing and	4	144	48	96			3/5	
M2.B.2.3	Neural Networks	3	108	32	76			2/4	

M2.B.2.4	Data Warehouses	3	108	32	76			2/4	
M2.B.2.5	Image Recognition Methods	3	108	32	76			2/4	
M2.B.3	**Profile 3 "Microprocessor Sys- tems"**	**16**	**576**	**176**	**400**				
M2.B.3.1	Methods of Logic Control Systems Design	3	108	32	76			2/4	
M2.B.3.2	Hardware and Software for Em- bedded Computers and Micro- controllers	4	144	48	96			3/5	
M2.B.3.3	Web Servers Software	3	108	32	76			2/4	
M2.B.3.4	Process Interface Methods and Tools	3	108	32	76			2/4	
M2.B.3.5	Methods and Tools of Digital Signal Processing	3	108	32	76			2/4	
M2.B.4	**Profile 4 "Software Systems Design Technologies"**	**16**	**576**	**176**	**400**				
M2.B.4.1	Modern Concepts of Database Organization	3	108	32	76			2/4	
M2.B.4.2	Information Systems Design Technologies	4	144	48	96			3/5	
No.	Module designation	Credits	Workload			Distribution by years			
						2nd year		2nd year	
			Total	Class	Self	1st sem. 18	2nd sem. 18 weeks	3rd sem. 18 weeks	4th sem. 0 weeks
						Hours per week			
M2.B.4.3	Corporate Network Applica- tions	3	108	32	76			2/4	
M2.B.4.4	Scripting Languages in Corpo- rate	3	108	32	76			2/4	
M2.B.4.5	Multimedia and Computer Graphics	3	108	32	76			2/4	
M2.B.5	**Profile 5 "Distributed Auto- mated Systems"**	**16**	**576**	**176**	**400**				
M2.B.5.1	Numerical Methods of Solving Boundary Value Problems in Design	3	108	32	76			2/4	
M2.B.5.2	Distributed Microprocessor Systems	4	144	48	96			3/5	
M2.B.5.3	Web Service Architecture	3	108	32	76			2/4	
M2.B.5.4	Distributed Information and Telecommunication Systems	3	108	32	76			2/4	
M2.B.5.5	Cloud Computing	3	108	32	76			2/4	
M2.B.6	**Profile 6 "Control Systems Software Development"**	**16**	**576**	**176**	**400**				

M2.B.6.1	Information Systems Administration	3	108	32	76			2/4	
M2.B.6.2	User Interfaces Design	4	144	48	96			3/5	
M2.B.6.3	Software Applications Design	3	108	32	76			2/4	
No.	Module designation	Credits	Workload			Distribution by years			
						2nd year		2nd year	
			Total	Class	Self	1st sem. 18 weeks	2nd sem. 18 weeks	3rd sem. 18 weeks	4th sem. 0 weeks
						Hours per week			
M2.B.6.4	Information Technologies	3	108	32	76			2/4	
M2.B.6.5	Computer Simulation	3	108	32	76			2/4	
M3	**Internship, Student Research and Development**	**21**	**828**		**828**				
M3.1	Student R&D during semester	18 4/6/8	720		720	0/10	0/14	0/16	
M3.2	Teaching practice	3	108		108		0/6		

The above table accounts for 79 credits obtained in regular modules. It does not mention the required 2 internships (7+8 Credits) and the Master Thesis which, together with its defense and the state examination amounts to 24 credits. Thus 120 credits are altogether obtained.

C Peer Report for the ASIIN Seal

1. Formal Specifications

Criterion 1 Formal Specifications

Evidence:

- Self-assessment report
- Characteristics of the Degree Programme, see chapter B
- Screenshots of the study management portal of the university, portal.tpu.ru
- Programme's website: http://masters.tpu.ru/navigation/priemnaya-kampaniya/napravleniya-podgotovki/informatika-i-vyichislitelnaya-texnika.html, as of 17.10.2014
- Applicant's guide at the University's website: http://abiturient.tpu.ru/files/2014/doc/2014-web-2014-02-19.pdf , as of 17.10.2014

Preliminary assessment and analysis of the peers:

The self-assessment report states all the relevant formal specification, such as degree programme title, programme duration, credit points awarded etc. All the relevant programme specifications can be found in the study management portal of the university. The relevant documents presented there are approved by the rector, up-to-date and accessible to all students and teachers.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

The panel deems this criterion fulfilled.

2. Degree programme: Concept & Implementation

Criterion 2.1 Objectives of the degree programme

Evidence:

- Self-assessment report

Preliminary assessment and analysis of the peers:
The objectives of the Master's programme Informatics and Computer Engineering reflect the level-specific requirements of the European Qualifications Frameworks and can be clearly allocated at level 7.

Criterion 2.2 Learning Outcomes of the Programme

Evidence:

- Discussions with representatives of the university [objectives, classification]
- Self-assessment report
- Characteristics of the Degree Programme, see chapter B

Preliminary assessment and analysis of the peers:
The panel deemed the definition of the learning outcomes of the programme to be clear and adequate for the qualification of the second academic cycle. The learning outcomes are achievable, accessible, developed together with all relevant stakeholders, and reflect currently foreseeable developments in the field of informatics and computer sciences. The definition of the learning outcomes fully complies with the Subject-Specific Criteria of the ASIIN Technical Committee 04 Informatics as well as with the EURO-Inf® Framework Standards and Accreditation criteria.

Starting with the learning outcome LO 1, which is "Apply in-depth knowledge of natural sciences and mathematics to perform research and engineering tasks in the field of computer science and engineering", the respective ASIIN subject-specific standard from the field of methodological competences foresees that a graduate "can make contributions to the further development of informatics as a scientific discipline". Also EURO-Inf® framework defines "a profound knowledge and understanding of the principles of informatics; i.e. general computer science expertise independent of current technology and applicable in the long term, rooted in mathematically founded theory or in the body of knowledge of methods that has become established" as a crucial minimum requirement for successful completion of the second-cycle degree in Informatics, which is reflected in the LO 1.

The following LOs 2 and 3 apply to the EURO-Inf® field of Analysis, Design and Implementation. LO 2 states the ability to "apply in-depth specialized knowledge in the area of computer science and engineering to perform interdisciplinary engineering tasks" and LO 3 the competence to "set and perform innovation tasks of engineering analysis related to developing software and hardware for information systems and automated systems using analytical methods and complex models", which fully and concretely reflects the requirement of the EURO-Inf® framework standard defining the "formulation and solution

of problems including new and emerging areas of their discipline" as one of the necessary competencies in the professional field. The definitions also comply with the ASIIN requirement stating that the graduates must be "able to formulate, structure and formalise problems stemming from a new and developing field within their specialisation, develop and evaluate possible approaches, and select and implement solutions".

The next learning outcome (LO 4) applies to the EURO-Inf® framework field of technological and methodological competence, and names the competence to "carry out innovative engineering projects for developing hardware and software for automated systems of varied purposes using modern design methods, CAD systems, and best practices of designing competitive products", which fully reflects on the one hand the "application of the state of the art or innovative methods in problem solving, possibly involving use of other disciplines" as well as the "awareness of the limits of today's knowledge and the practical application of the state-of-the-art technology" prescribed as necessary by EURO-INF® network. Also ASIIN criteria are fulfilled herewith: the LO4-statement quoted partly implies the technological competence-related standard stating that graduates must have "obtained profound technical knowledge in a chosen field of informatics and have thereby reached the limits of today's knowledge and state-of-the-art technology".

As for the learning outcome 5, it can be best allocated in the field of Underlying conceptual Basis for Informatics of the EURO-Inf® framework or to Methodological Competences foreseen by the ASIIN Technical committee 04: the university expects its graduates to be able to "plan and carry out theoretical and experimental research in the area of designing automated systems hardware and software using the latest achievements in science and technology, and best domestic and foreign practices; critically appraise the findings and make conclusions", whereas EURO-Inf® requires "critical awareness of topics at the forefront of their specialisation", which represents a brief summary of the quoted statement, just as the requirement by ASIIN that a graduate "can make contributions to the further development of informatics as a scientific discipline".

The methodological competences are represented by the LO 6: "Perform author's supervision of the processes of design, implementation, and use of software and hardware for automated systems of varied purposes", which complies with the EURO-Inf® requirement that a graduate must have demonstrated "knowledge and understanding of informatics to create information models, complex systems and processes" and the competence to apply "innovative methods to solving problems" according to the ASIIN criteria.

As for other professional competences, they are on the one hand reflected by the LO 7 "Use deep knowledge of project management to carry out innovative engineering activities taking into account the legal aspects of copyright protection", which complies with

the expectation of the EURO-INF® network stating the "understanding of the principles of project, risk and change management and the ability to apply methodologies and processes to manage projects and to mitigate risks" a crucial professional competence. Further on, the LO 8 addresses the critical ability to "communicate within the professional environment and society in general, actively use foreign language proficiency, develop documentation, present, and defend the results of innovative engineering activity both in native and foreign language", which additionally complies with the EURO-Inf expectation towards graduates to possess effective communication skills, also in international contexts. With this statement, the requirement towards social competences set by ASIIN is addressed, stating that the graduates must be "able to responsibly lead interdisciplinary groups or organizations and present the results of their work to outsiders". This is supported by the next LO (9) stating the ability to "provide high efficiency in performing innovative engineering tasks both when working both individually and as member or leader of a team, including interdisciplinary and international teams" to be necessary for the Master's programme graduates.

The statement that graduates must "display responsibility for own work and work of a team in one's charge, commitment and readiness to adhere to professional ethics and norms of exercising innovative engineering activities" and "Display deep knowledge of legal, social, environmental, and cultural aspects of innovative engineering" (LO 10) as well as "Display the ability for self-education, continuous self-improvement in the sphere of engineering, and the ability to teach" (LO 11) show a hands-on and concrete application of the ASIIN subject-specific criterion that graduates must be "able to define topics and objectives in professional practice [which may include also continuous self-education after graduation] as well as in academic contexts, derive assignments of tasks from these and organise and monitor the solution process".

The university presented a very mature procedure of definition and consolidation of the programme learning outcomes under involvement of all relevant stakeholders, where conceptual adjustments are made at least once in five years time. The panel found it to be laudable, not least also the fact that the achievement of the learning outcomes is monitored and analyzed annually.

All in all, the panel found that the presented learning outcomes provide a solid conceptual basis for the programme implementation and continuous further development of the programme contents.

Criterion 2.3 Learning outcomes of the modules/module objectives

Evidence:

- cf. module handbook

Preliminary assessment and analysis of the peers:

The module objectives, as defined in the submitted handbook and in a very thoroughly compiled objective's matrix, represent a more concrete and hands-on application of the programme learning outcomes and translate them to the practical requirements of the informatics and engineering practice and research. The handbook encompasses all module relevant information, starting from the title, the usual period of studies foreseen for tuition, the contents, the relation to curriculum (compulsory or elective), the intended module learning outcomes as well as forms of assessment and modalities for calculation of the final module mark. Each of six specializations offered (Computer Networks and Telecommunications; Computer Analysis and Data Interpretation; Microprocessor Systems; Software Systems Design Technologies; Distributed Automated Systems; Control Systems Software Development) has its own annex in the module handbook, which ensures additional transparency and comparability of the specializations. The module handbook herewith provides all relevant information for teachers and students and is a well compiled and very sound document available to all relevant stakeholders. In spite of this, the students admitted not to use the handbook a lot. Although they have the possibility to access all relevant information at once, they prefer to work with single syllabi of relevant subjects, where they found not only contents and topics for assessment, but also a weekly plan of the course implementation. They admitted that the module handbook is useful once a student decides to go abroad, since it provides comparability and facilitates the compilation for the learning agreement. However, besides this context, the module handbook is not a lot in use, which is not considered to be a major issue, as long as all relevant stakeholders get all information they need from other sources.

The peers were missing the module description of the teaching practice, research and development as well as both internships. Soon after the audit the program managers delivered the missing module descriptions. The module description for Philosophy and Methodology of Science is, however, still missing.

The peer panel was missing a module on the project management in the study programme design. Given that project management is one of the crucial competences – learning outcome 7 is completely dedicated to the project management – this finding was rather surprising. After the audit, the program coordinators submitted a list of courses in which project management competencies, as well as team work and team leading competencies could be acquired. Since the relevant competencies could not be inferred from

the description of the mentioned modules in the module handbook, it is suggested to revise and to update the description of the respective courses.

All in all, the panel deemed the module objectives and the relevant documentation (module handbooks as well as syllabi) to be a sound and very solid source of information for all stakeholders.

Criterion 2.4 Job market perspectives and practical relevance

Evidence:

- self-assessment report
- cf. statistics on graduates employment in terms of numbers and market sector
- Overview of companies for practical training
- Description of expected learning outcomes
- Discussion with students/alumni
- Discussion with programme coordinator's

Preliminary assessment and analysis of the peers:

The peers deemed the programme under review to have a clear practical relevance and to prepare the graduates adequately to the requirements of the labour market. This relevance is achieved not least through the two foreseen internships, one to be conducted in the industry after the second study term and one in the research shortly before the Master's thesis compilation, both taking five weeks with preparatory tasks and an internship report which is to be defended at a student's conference. Typical placements in the industry encompass such job profiles as software developer, software designer and programmer, whereas not only practical implementation skills are required, but also a scientific/optimizing approach is necessary, as several students stated. Some of these placements are paid internships, which are often followed by the part-time employment until the end of the study, subsequently translated to a full-time contract. This fact shows that the education of the graduates corresponds to the requirements of the labour market, and a generally high demand and very good employability of the TPU graduates.

The statistics provided in the appendix H have confirmed a rather good and partly even excellent e.g. full employment of the graduates depending on the specialization of the relevant graduates, but have provided no statement on how long it has taken them to find the employment or what career path the other 20-30% of alumni have chosen who's job placement is not followed up in the statistics. A follow up of these peculiarities and monitoring the employment difficulties of all each specialization over several years could

allow for an analysis of reasons and a statement whether they are of an external kind (e.g. lower demand on the labour market for certain specializations or lack of practical relevance in teaching).

Another point for consideration that the panel would like to give is that certain faculties might have to adjust their Key performance indicators in the overall internal benchmarking of the university, since a rate of 40% of alumni being employed is not evidence for a program's success in Informatics and Computer Science. Since this aspect addresses the university's quality assurance system and does not directly refer to the program, it is just a point for discussion and further enhancement of the QA system.

As a good practice, a continuous involvement of employers in the teaching processes (cf. also 5.1) is worthwhile mentioning. Every student is requested to take part in at least one employer's lectures in every term, so that a transfer of hands-on experience from the professional side into the teaching is ensured. Profile 1 ("Computer Networks and Communication") is taught by employers only.

A very laudable practice pursued by the university in terms of employability is organizing meetings of students from different departments which provide space and time for discussions, consultations and peer-to-peer coaching in employability. Also the additional support provided for the job placements by the career service, as well as the practice of requesting professional plans and wishes of students a lot in advance in order to help them with planning of their career is a very commendable approach and certainly an evidence for an excellent support infrastructure.

Criterion 2.5 Admissions and entry requirements

Evidence:

- Self-assessment report
- University-wide admission regulation as of 28.03.2014, 3rd version
- Programme-specific admission regulation, as of 17.06.2013
- discussion with rectorate representatives, programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:

The general admission regulation is valid on the university level and provides a framework for the implementation of the subject-specific admission criteria set for master's programs based on the obligatory (according to the state standard) part of the respective Bachelor's program (cf. 4.3.). The program-specific admission criteria dealt with in an admission test address a range of topics such as Programming Languages, IBM PC organization, Data Bases, Operating Systems, Computer Networks and Telecommunications,

Computer Security in order to allow for an assessment of the level of knowledge of the applicants. The whole range of questions of the admission examination, including literature hints for preparation, as well as the general admission rules, can be found at the university's website, which ensures transparency for the study applicants and allows for good preparation.

For foreign applicants with possibly different prerequisites, clear admission regulations are defined, requiring on the subject-specific and technical level exactly the same as of the domestic applicants but stating e.g. that social studies, geography and literature can be replaced by a history assessment, which has no major impact on the course of study but might reduce the entry requirements burden set by the general education background. Also for students with disabilities, separate requirements are in place and clearly defined in the university-wide admission regulation

Students can be admitted to the Master program based on successful completion of a Bachelor's degree in any discipline, not necessarily in Computer Science. Thus, in theory, if an applicant did not graduate from Informatics but passed the exam well, be it based on self-study or additional professional training, he can be admitted to the programme. The panel did not deem this fact for negative since the entry test allows for a very thorough assessment of the entry qualification, and as long as no major gaps in the qualification of the students are detected in spite of successfully passing the entry test, which would impede the course of studies, this procedure is fine.

Criterion 2.6 Curriculum/Content

Evidence:

- Curriculum
- Examples of syllabi
- Module descriptions
- Self-assessment report

Preliminary assessment and analysis of the peers:

The curriculum presented to the panel allows for a subsequent acquisition of the required knowledge, skills and competences and the achievement of the intended learning outcomes of the programme. The panel deemed that all learning outcomes which are equivalent or comparable to those defined by the ASIIN Technical Committee 04 clearly demonstrate the compliance with requirements for Master's level. The contents of the six specializations Computer Networks and Telecommunications, Computer Analysis and Data Interpretation, Microprocessor Systems, Software Systems Design Technologies,

Distributed Automated Systems, Control Systems Software Development show the expected content which complies with requirements of the international labour market and deals with the current research topics in the mentioned fields. The specialization modules are presented to the students in the course of the second semester so that they have the opportunity to compare contents and have enough time for a conscious choice of their future profile, which the panel found to be a good practice. For one specialization, at least ten students must apply for one module to be offered, which by a cohort of 55 students means that at least one is not offered every year. In cases where only few are missing to start a course, the programme coordinators start additional "acquisition initiatives" in related disciplines in order to make another option possible. The university and the students have convincingly confirmed that in the clear majority of cases, every student gets his first priority specialization area, and that everything is done in order to maintain the diversity of the programme. The peer deemed this individual approach to consulting on specializations and career, as well as for enabling as many specializations as possible with given resources to be a good approach in the study programme management.

The students commented on the classes of philosophy and economics as the most difficult disciplines, but they agreed that a broad general education must also be part of higher education. Moreover, the panel appreciates that the philosophy classes apparently have been content-wise adapted to the needs of IT specialists: brain storming and debates on virtual reality, future of humanity, information society, modern techniques of information processing, mind maps, visualization, debating techniques etc.For the given reasons, the panel considers these classes as useful.

Remarkably, there is also an obligatory module "Teaching Practice" preparing students for teaching in higher education and involving them into planning, implementation and evaluation/monitoring of teaching activities, as well as the design and development of teaching material for younger students. This is meant to ensure that young academics are prepared also for a scientific and teaching career in higher education. Since only one out of ten students strives for a career in the university, the programme management could think of making this module elective. On the other hand, presenting results, systems, methods and plans to customers or to coworkers is likely a skill that is useful not only in academia but also in business environments. In that regard, such a module could be considered useful.

Whereas the first internship is meant to be spent in a business environment, the second one is focused on preparation for the master thesis and gives the students additional time as well as a possibility to get thorough feedback on research methodologies from their supervisors as well as from peers, since the report on the internship is presented at a student's conference. The module's objectives, as presented in the additionally submitted

parts of the module handbook, aim at collecting the practical material, developing first a research design, including the definition of relevant data and procedures, followed up by research and a pre-defending of the research concept.

A good practice implemented at the TPU is an early involvement of the students in the research activities. On the one hand, the students, in their first semester select their supervisors according to their respective field of specialization . For this a special meeting is organized. After this, the students can already start consolidating their master's thesis topic and start focusing on this field (through electives and internships) during the whole course of study. On the other hand, and this is another peculiarity of the Master's program under review, there is a module entitled "Research and Development during semester" aiming at "consolidation and development of theoretical knowledge; acquiring of practical skills related to planning and performance of the theoretical and experimental research in the area of hardware and software systems design for various applications" with four, six and eight ECTS points every semester dedicated to self-study and independent research work.

The lectures and lab hours are seldom taking more than a half of the time calculated for the total module workload. The majority of time is spent on self-study, preparation for classes and flexible follow-up of topics discussed in class. This emphasizes that master students are early on encouraged to do research.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

The university provided the missing module descriptions which fully comply with ASIIN requirements. Additionally, the programme coordinators provided a detailed statement on the subsequently planned building up of the project management competences within several modules stating the module codes and content-wise peculiarities of the project management. The panel acknowledges the statement and the logical framework behind the concept of the project management skills. However, given the fact that the project management skills are mentioned explicitly as a programme learning outcome, the panel recommends to outline the skills in the module descriptions explicitly. The same applies for the English language competences, which are stated among programme learning outcomes. The panel recommends to enrich the module descriptions of relevant obligatory modules with course materials and bibliography in English language in order to make the fostering of the English skills visible in official programme documents. The hints on the appropriate teaching design for fostering the English competencies is treated elsewhere (cf. 3.3).

3. Degree Programme: Structures, Methods & Implementation

Criterion 3.1 Structure and modularity

Evidence:

- Curricula of the programme
- Module descriptions

Preliminary assessment and analysis of the peers:

The study programme consists of clearly structured modules fully complying with the master's level and organized in a way that the programme can be commenced in every academic year. The structure allows for international mobility (either short term, up to one month of participation in a summer/winter school or a one term mobility) as well as for at least two internships during the studies, and about 10% of students are taking part in the offered programmes. The university provides special grants for going abroad, which students can apply for on a competitive basis. The panel however deemed that the command of the English language not only on the level of teachers (cf. also 5.2) but also on the level of students should be further fostered. The peers noticed that the bibliography contained mostly Russian sources, which is to some extent obvious and natural but especially in the field of Informatics and Computer Engineering, where the research environment produces significant changes on very short notice, the students and graduates must be able to perceive all the relevant literature in the original language (in case of Informatics obviously in most cases English). Otherwise, as indicated above, the detailed syllabi, which are updated annually, indeed list more English sources. Moreover, master students are supposed to take at least three courses in English, one of which is the obligatory professional language course. It is correct that this course addresses a range of research-relevant topics with a clear practical application. Still, the students deemed that these lessons were not sufficiently/adequately suiting their professional needs. Thus, the teaching methods of English could still be further enhanced. The panel appreciates the initiatives taken, but finally concludes that the command of English among students should be enhanced. Based on good experiences from Germany, the peers encourage the programme coordinators to try to conduct the student's conferences in English and make students experience an authentic situation. The situation might change once the same Master's programme implemented in English should be started next year.

The structure provides also the flexibility to shorten the studies in case the student takes the double effort. Content-wise flexibility is ensured by at least 16% of electives in the core curriculum prescribed by the Federal Educations Standard (FES). The students more-

over confirmed that they have time slots for taking courses from other departments, which are not counted to their regular study programme but appear in the diploma supplement. An example for such an additional course is the patent management, taught on regular basis to engineering students and being also relevant for informatics.

Criterion 3.2 Workload and credit points

Evidence:

- Self-assessment report
- Discussions with students
- Module descriptions
- Course schedule, see below chapter B
- official orders Nr. 501 and 118, available in Appendix B

Preliminary assessment and analysis of the peers:
In spite of the fact that in the self-assessment report there is no separate analysis on the workload, the panel deduced the average workload from the curriculum and module descriptions and deemed the workload to be feasible and realistic. As indicated before, the amount of the self-study indicated in the module descriptions is significantly above average, which was deemed for positive at master's level (cf. 2.6), and which allows for flexibility of work distribution, so that the students confirmed the feasibility of workload and all in all very favourable study conditions.

The panel found out that the amount of 36 hours included in one credit (which would contradict the prescribed amount of max. 30 according to ECTS User's guide) is based on the Russian academic tradition where one academic hour equals 45 minutes, so that in average, 27 astronomic hours are laid down as calculation base.

The self-assessment report did not include a chronological curriculum overview showing the ECTS for every term but a table structured according to different cycles of the programme. Still, from the curriculum it became obvious that the average workload does not exceed 25 to 30 ECTS in a semester, and that the last term is reserved for compilation of the master's thesis only. The panel would however encourage the programme coordinators to set up a chronological and not cycle-structured curriculum overview in order to facilitate the comprehensibility of the average workload for the students, who admitted not to refer to credits ever, except the cases where they needed them for the international mobility.

The panel deemed the procedures for handling workload at TPU to be very transparent and laudably clear. Clear rules for recognition of workload, connected to internships or

performed abroad, are in place and accessible to students. The panel learned that detailed information on how the workload acknowledgment is conducted in cases where a student changes from one Higher Education Institution to another, or how activities undertaken before commencing the study can be counted on the individual basis, are regulated in the official orders Nr. 501 and 118 (available in Appendix B) and at curator's/advisor's office.

Criterion 3.3 Educational methods

Evidence:

- Discussion with teaching staff
- Discussion with students
- Module descriptions

Preliminary assessment and analysis of the peers:

The university presented a very consistent and mature concept of teaching technologies, encompassing i.a. student-centred problem-solving, practice oriented teaching technologies, and stated additionally to follow the international good practice in engineering education developed by the Massachusetts Institute of Technology, the CDIO model, used for Conceiving, Designing, Implementing and Operating their teaching activities. Each teaching staff member chooses the methodology for the courses individually, according to performance of the group and the individual teaching style. An especially positive aspect is that many teachers use different levels of tasks within one and the same group in order to provide individual support to weaker performing students. These means were even visible to students themselves, and they estimated that around 40% percent of weaker fellow students catch up in every discipline before the final exam, which proves that this procedure is effective and supportive. Interdisciplinary teaching is also very common, since some of employers report and teach directly from the practice from such fields as security in economics and banking, IT in medicine (classes conducted jointly with Tomsk medical university) etc. The module handbook makes a variety of diverse methods and tools visible.

The numerous practical works performed in the labs, which can partly be prepared at home, ensures the high practical relevance of the programme as well as high level of ability to work independently. The teachers prepare various methodical guides and also methodological readings for the lab classes, which are mostly implemented in team work. The students assign the responsibilities for programming, design, documentation independently from teachers and coordinate the work of each others, which is part of the

project-based learning already mentioned above (cf. 2.6). Besides the practical relevance of the teaching activities and methodologies, it became visible that the strengthening of research and relevant academic (teaching) skills is one of the main teaching objectives in the master's programme under review. This is definitely the adequate and helpful approach, which is not familiar and obvious for many HEI in Eastern Europe where master's students are often still following teaching concepts derived from the secondary education teaching habits. Also students confirmed that they notice the difference compared to the Bachelor's studies, where they were rather focusing on industry-relevant skills. The master's programme concept strives for combining both by prescribing an industrial as well as a research internship and also by focusing the learning outcomes on development, enhancement, optimization of given status quo.

What should be further strengthened is the teaching of English language, since a vast majority of students admitted that the classes did not meet their expectations as far as practical use for the future work is concerned. Some of them stated that increasing the number of weekly hours for English teaching would significantly increase the learning effect from these classes. The panel could see from the module descriptions as well as from the discussion with the teachers that they are doing the utmost for increasing the practical relevance of the contents taught. There are many very good initiatives in the teaching process already, such as deducing English lessons tasks from typical professional procedures in the mother tongue, including software documentation, presentation of new products or obliging students to compile at least 20% of the master's thesis and to make at least three defence slides in English. Still, additional means of enhancement in that respect should be considered, such as introducing further modules taught in English language, requiring the usage of the English language in case studies and role game imitating the professional contexts, as well as providing and also requiring active use of English reading resources. The overall concept of teaching the English language should be revised and adopted to the requirements of the labour market and of principles of interactive, practice-oriented teaching.

Therefore the panel recommends modernizing and adapting the teaching programme of the Professional English module to the needs of the future employment. A good approach could be surveying students at the beginning of the term for finding out what topics would be interesting, relevant and helpful, and adapt the programme to their statements. Another good option is to implement the Research and Development module conferences in English language, which on one hand provides a safe and stable framework for the students amongst their fellows, and the other gives a reality-near setting for practicing. To sum up, the panel appreciates the initiatives already in place, but still recommends revising the teaching methodology of the Professional English module in order to

additionally motivate the students and further enhance the command of the foreign language.

Criterion 3.4 Support and advice

Evidence:

- Discussion with students
- Discussion with teaching staff
- Self-assessment report

Preliminary assessment and analysis of the peers:

The university provides a very good support and advice infrastructure where students can address different contact persons on different levels (starting from the most direct one, the lecturer of the relevant course during his weekly consultancy hours, curator's institute, tutor's institute, social support, psychological support, business start-up incubators) in case of questions or difficulties emerging in the course of studies. The first institutions ensure the support in the field of professional orientation and career planning, by organizing meetings of students of different departments and advising on employability.

There is very good support and advice in terms of international mobility. The university not only provides special grants for academic mobility, but also advises on the choice of courses and electives abroad. The students stated that the application procedure is clear, transparent and fair, which is evidence for, all in all, good results of support and advice. Also the consultancy among students works well – there are initiatives involving senior students into consultations of younger students, also the students' parliament started its activities recently and aims at further enhancement of the study situation. Generally, students confirmed that they always know whom to turn to with different kinds of concerns and topics, be it subject-specific or general or even life- and working style questions, so that the peers deemed the initiatives in place to be adequate for the successful management of the programme and achievement of the learning outcomes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

The panel deems this criterion to be fulfilled. The recommendation on further enhancement of the English teaching skills remains valid and will be assessed during re-accreditation.

4. Examination: System, Concept & Implementation

Criterion 4 Exams: System, concept & implementation

Evidence:

- Self-assessment report
- Discussion with students
- Internal study management portal of the University (guest login)
- Module descriptions
- subject-specific syllabi
- Exam regulations

Preliminary assessment and analysis of the peers:

There are three forms of examination in place, one being the ongoing assessment during a semester (containing two checkpoints during conference weeks), the second one is an interim assessment (exams and pass-fail/credit test during exam sessions) and the third one is the final State assessment (defence of a master's thesis). The form of exam is defined in the module handbook as well as in the subject-specific syllabi, so that students are informed about the assessment modalities in due time. Also, the timing of the exams allows for preparation since students know in advance when the exam period ("exam session") will take place. There is a maximum of two exams in a week and an average of 4-5 exams a semester, so that the workload caused by the interim exams (= end-of-term module assessments) is feasible and does not cause structural pressure on students. The examination forms are evidently adjusted to the module objectives: the practical classes, such as for instance computing, are assessed with at least 60% of the lab work conducted during the term, and 40% by the written exam on theoretical approaches and tools of computing.

The assessment forms are mostly interactive: presentation during a students' conference or participation in the exhibition, which the peers found to be very valuable for training of the debating and defence skills of the graduates. This form of work is a very commendable approach to Master's education, since the focus lies on the development of research skills and competences and the time dedicated to the self-study and independent work is very high, which fosters the ability to work autonomously.

An interesting option is the voluntary participation in the conference week, which allows for additional scores for the interim exam and can also be taken outside the university (different HEI). The practice of early experience of presenting of and debating on the results of conducted work is very valuable for students.

The modules “Design of Electronic and Microprocessor Systems”, “GRID technologies” and “Intelligent Systems” as well as Professional Foreign Language are concluded with an oral exam. Particularly in case of the latter one, the necessity of developing and assessing the oral communication skills is obvious.

The panel was surprised that there were mostly only excellent marks awarded to the students. The explanation was on the one hand that only best performing students go for master’s in Informatics; those who have no real interest in theoretical and scientific deepening of the skills and abilities, could work with a bachelor’s degree and left the university after completing the Bachelor’s programme. Moreover, the programme under review is ranked as a priority degree programme and all student placements are funded by the State, none is paying tuition fee, and every student benefits from a scholarship. Obviously, for these conditions, the admission is rather competitive, so that best students are selected.

The programme is concluded by the thesis (cf. also Final exam in this chapter) which must encompass both theoretical treatment of a certain problem with a practical solution. The thesis is submitted two weeks before the defence to the supervisor and to the state attestation commission, consisting both of representatives of chairs and industry. The defence includes a presentation on results of the research, a session for discussion and questions as well as reading aloud the supervisor’s review. This procedure is very similar to the European ones and fulfils the requirements for due assessment of the achievement of the learning outcomes. All in all, the exam routine allows for a thorough assessment of student’s performance and the achievement of the learning outcomes of the modules.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The panel deemed the examination forms to allow for the necessary variety for the competence-oriented performance assessment and considers this criterion to be fulfilled.

5. Resources

Criterion 5.1 Staff involved

Evidence:

- cf. analysis of needs and capacities
- cf. staff handbook
- list of and information about research projects in the self-assessment report

Preliminary assessment and analysis of the peers:

The university provided a detailed and very thoroughly set up statement on how staffing of the programme under review is implemented and monitored. According to the self-assessment report and the staff handbook, more than 80% of staff have at least a PhD or a Doctor of Science (the second major scientific thesis defended in the former Soviet Union), and Master's graduates employed as assistant or senior lecturers must have at least one year of research and teaching experience except for those who completed two years of post-graduate studies. There are tables indicating teaching load for different kinds of work placement, as well as listing general tasks of academic staff, including teaching, academic methodology, research and development, administration, pedagogy, staff development. Some part-time teachers listed in the staff handbook are representatives of the employer's side (e.g. INCOM Group, Head of Department, "Vostokgazprom" JSC, Vice President, Tomsk Administration) and enrich the study courses with additional insights from job-relevant practice. The panel deemed the qualification of the staff to be all in all adequate for the successful programme implementation.

The feasibility of the workload and actual time available for the research activities remained, however, rather unclear during the audit. That is why the panel requested a staff workload overview as an additional document, in order to see how much time is spent on administration and teaching activities and how much time remains for research and development. The comprehensive matrix submitted to the panel reflects and underlines the statement of the self-assessment report and shows that generally, especially in the higher teaching hierarchy, more time for research and less time for administration is foreseen, so that the ambitious strategic aim of the university's leadership for strengthening research activities appears to be plausible. Information from the self-assessment report states that in the official workload document signed by the employee and the Director of the Institute of Cybernetics annually, the workload paid extra is not included. This regulation might in long-term have a negative effect on the research activities if additional assignments in teaching are paid extra while on the other side no additional time for research arises. That is why the panel recommends monitoring and analysing the options for research and development activities of the staff on regular basis. The department should find ways to strengthen and to reward strong research performance in order to provide good role models for future researchers graduating from the institute and to guarantee that teaching activities are based on a solid base of outstanding research performance.

Criterion 5.2 Staff development

Evidence:

- Self-assessment report
- Acceptance of non-teaching periods for research purposes
- Capacity development offers / Further education
- Discussion with programme coordinators and teaching staff

Preliminary assessment and analysis of the peers:

Since the panel learned that only approximately one out of ten graduates go for the research career path, it is understandable that the university invests a lot of effort in making a career at the university more attractive. Numerous initiatives and a wide range of possible additional benefits for employees are listed in the self-assessment report (such as additional remuneration for publications, for outstanding performance, for the nomination as best professor/associate professor/lecturer of the year, for concluding a PhD degree as well as for successful supervision of such etc.) and regulated in official documents of the university. Non-monetary initiatives (diplomas, certificates of merit, letters of commendation, TPU Gallery of Honour) are especially commendable, since they are an important motivation tool as well. Also, social initiatives like providing kindergarten places to the children of staff or offering reduced tuition fees for children, is a good way of making the position at the university attractive and encourage young academics to work at the university.

A very commendable approach to sustainable staff development meant as further training is awarding of scholarships for post-graduate and doctoral studies at TPU. Assistant and Senior Lecturers are herewith stimulated to move on with their academic career. Another good and – compared to the rest of Eastern Europe – progressive tool of successful staff development is defining a five-year period (even in cases of unlimited working contracts) for revising the success of the performance of every employee. This avoids a very frequent phenomenon for Eastern Europe that people stay more or less in the same position for many years and sometimes decades without significant move forward.

As for short-term staff development, a range of practice-oriented and adequate initiatives supports the policy of further training. The panel found it laudable that the whole range of further trainings as well as symposia, conferences, relevant scientific meetings and colloquia are announced at the website of the department for further training, so that the offer is transparent to all interested staff. Typical trainings, which are conducted quite frequently, are trainings or short internship in the industry on operating the recently purchased equipment or various online seminars on teaching design, computer-mediated teaching and other skills related to the professional area. This broad offer of operatively

needed courses is a very commendable approach to staff development which ensures efficiency of the teaching process.

Also academic exchange programmes with other Russian universities (e.g. Kazan State University, Sotchi State University etc.) as well as some HEI abroad (e.g. Technical University of Dresden, Technical University of Munich, etc.) are already in place; the offer is being continuously enlarged and more and more in use by the staff, and by now, at least 50% took part in the exchange within Russia and another 50% abroad, which proves a high interest from the personnel's side in taking part in such activities. Also sabbaticals are an option which is envisaged for longer time already, but not yet in implementation. All these initiatives prove an already advanced and mature personnel management system. The panel nevertheless deemed that the command of English language among teachers could still be improved, since such a specialization as Informatics requires a quick perception of relevant literature. In order to be able to actively participate in the international professional scientific discourses, the staff should be enabled and supported to further develop their English skills. The panel therefore recommends enlarging the number and monitoring the efficiency of Professional English Courses for teachers in place, which is not least a prerequisite for successful mobility.

All in all, the panel deemed the staffing to be qualitatively as well as quantitatively enough as to ensure an adequate implementation of the programme.

Criterion 5.3 Institutional environment, financial and physical resources

Evidence:

- Visitation of the labs
- Visitation of the centre for further training
- Self-assessment report

Preliminary assessment and analysis of the peers:

The university has all relevant resources which are necessary for the implementation of the programme on a due level in the next years. On the one hand, the TPU Science & Research Library (SRL) provides a very good base for teaching and learning, not least by providing every student with at least one methodological and one instructional manual for every module. The resources of the library are kept up-to-date by requesting professors to submit a list of solicited resources at the beginning of every term. The library provides all the necessary online resources, including all relevant Russian journals but also overarching Informatics full text data bases, which ensures good availability of all relevant

resources and thus also a good framework for independent research work and study of student.

The labs presented during the campus guided tour meet the requirements for achieving the intended learning outcomes and reflect the average level and quality of equipment for the implementation of a master's programme. The facilities will be more and more developed in the next years, since the university was awarded the title of a research university in 2010 and informatics/IT is a priority area in the strategic development plan of the university. The research activities are fostered starting from the master's level, student's involvement into research is even one of the KPI. Student involvement into research therefore plays a crucial role in the implementation of the university's strategy, as it was shown in the parts 2.3 and 2.6 of this report.

As a positive point, especially for the field of IT, the infrastructure of the business incubators, research and experimentation sites provided to all students and staff is worthwhile mentioning. Since IT bears a high potential for innovation and in consequence start-ups, this resource is very supportive for young entrepreneurs.

As for content-wise cooperation, a range of joint projects with partner research and industrial bodies allows for a solid transfer between theory and practice (see for instance cooperation projects with the Siberian State Aerospace University, the Siberian Federal University and the Karlsruhe Institute of Technology). Also the cooperation with industry allows for diversity in research and early involvement of students into the applied research tasks (for instance joint projects with GAZPROM).

The university maintains a range of international cooperation with universities in Germany, Spain, Czech Republic and Poland in order to facilitate students' and teachers' mobility. By now, about 10% of all students go abroad for long term mobility (i.e. for at least one term or longer), many of them within double degree programmes. The university provides scholarships including the compensation of travel costs and subsistence costs, which is a laudable approach to stimulating students to go abroad and to enable academic exchange also for those who would not be able to pay it privately. For those who cannot go abroad for longer time, short intensive courses at partner institutions are also supported by the university. Still, the international mobility of students as well as of teachers could be further enhanced. Taking an internship abroad or conducting the research and development internship at the partner institution from the double-degree programme could be an additional option for those students who do not want to go abroad for a whole term. Also teaching staff mobility should be further enhanced since it contributes to the enhancement of the command of the English language and provides

inspiration for joint research projects. The panel therefore recommends to further stimulate the participation in the academic mobility.

All these resource provide a very solid basis for successful implementation of the programme.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

The university presented a teacher's workload matrix stating the workload of the teachers dedicated to administration, teaching and research activities. The panel considers the workload to be adequate but encourages the programme coordinators to monitor teacher's administrative and teaching workload and to think of ways of operational flexibilisation for allowing additional time for research activities, especially in the view of the fact that TPU has been awarded the title of a Research university.

This criterion is considered as fulfilled.

6. Quality Management: Further Development of Degree Programmes

Criterion 6.1 Quality assurance & further development

Evidence:

- Self-assessment report
- Audit discussions

Preliminary assessment and analysis of the peers:

The university implemented a quality assurance system in line with the standards of ISO 9001:2008 since 2001 and several bodies of the university, including the Institute of Cybernetics, hold a certificate of the procedures regarding Mission, Quality Policies, Quality Guidelines, TPU Education Standards and further relevant fields. The Quality policies for further development of the teaching design are described in the self-assessment report and involve – apart from the academic staff – both students and employers into the curriculum modernization and enhancement process. The processes in place and methods used are adequate in order to monitor all teaching-relevant processes and to prevent a failure of achieving the goals (cf. also 6.2).

Criterion 6.2 Instruments, methods and data

Evidence:

- Self-assessment report

Preliminary assessment and analysis of the peers:

The processes defined in the framework of the QMS system encompass such fields of the teaching process as training, education, research, methodology, international cooperation and human resources, and hereby ensure a holistic view on the programme management and sustainable programme enhancement. For instance, starting a new programme is a procedure which cannot be successfully implemented without the participation of employers and students (agreement on the learning outcomes, concept and annual monitoring on meeting the demand and needs).

One of the key procedures are alumni surveys, including graduates' assessment of the teaching process organization, graduates' self-assessment of the level of knowledge and skills gained in the course of study as well as general assessment of achievement of the results of the programme objectives and learning outcomes. The retrospective view is a reliable source of information given that, ideally, graduates have gained some professional experiences before they are surveyed. Also regular surveys on the opinion of the faculty members on diverse university- and management-related issues (e.g. most recent on distance-learning efficiency, level of student's performance, etc.) are a good approach in order to make sure that the processes in place meet the requirements and are fit for purpose. It is especially laudable that several processes are implemented automatically, for instance the monitoring of student progression done by the portal of the university. From these data, conclusions on variance of performance of different cohorts are visible at once. There is a very low drop-out rate, mainly caused by the fact that some students skip the process of getting the second degree because they are qualified enough to have an adequate job placement on the labour market. The above-average developed structure of support and advice helps to prevent that good performing students quit the study programme for other reasons.

The only weak point of an all in all very well functioning quality assurance system are the loop closing measures, e.g. feedback to students on the results and key insights of the questionnaire evaluation. The students stated that in many cases, they were not informed on the evaluation results, and therefore preferred the questionnaires set up and distributed by the student parliament members on different relevant topics, since they directly saw the impact of their efforts. Therefore the panel recommends to ensure that all students are informed on key findings and insights from the student surveying.

The instruments, methods and data of the quality management system in place provide a complete picture on all teaching and learning relevant processes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

The university provided a very sound description of the quality assurance system in place which fully complies with the requirements of ASIIN.

7. Documentation & Transparency

Criterion 7.1 Relevant Regulations

Evidence:

- Admission regulations, cf. official documents provided jointly with the self-assessment report
- Examination regulations, cf. official documents provided jointly with the self-assessment report as well as website
- Other relevant regulations (orders quoted in the self-assessment report) are published in the study management portal of TPU

Preliminary assessment and analysis of the peers:
The regulations quoted in the self-assessment report were partly presented as a part of document package for assessment, partly available at the website and also partly accessible in the study management portal of TPU. Thus, the relevant documents are accessible to all relevant stakeholders. The regulations encompass all key stipulations for admissions, the operation of the programme and graduation. They are legally valid and in force.

Criterion 7.2 Diploma Supplement and Certificate

Evidence:

- Self-assessment report

Preliminary assessment and analysis of the peers:
The university issues an English language Diploma Supplement which provides information on an individual's performance, the title awarded, content and level of the successfully completed degree, project works conducted during the two years, study mode (full or part time), as well as the topic of the master's thesis. The diploma supplement does not provide insight into the learning outcomes of the programme, nor on how the final mark was calculated (including weighting of marks) so that no transparency towards out-

siders is assured as far as incorporation of every single study programme component is concerned. Also statistical data should be provided in accordance with the ECTS User Guide to assist in interpreting the individual degree. Therefore the panel requests a revised example of the diploma supplement as an additional document.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 7:

A Diploma supplement corresponding to the requirements as described in the report is mandatory and herewith a requirement for the accreditation. The programme coordinators have already started the revision process and will soon submit a revised version of the diploma supplement.

D Additional Documents

Before preparing their final assessment, the panel asks that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

D 1. Module description of the module Philosophy and Methodology of Science

E Comment of the Higher Education Institution (06.11.2014)

The institution provided a detailed statement as well as the following additional documents:

D 1. Module description of the module Philosophy and Methodology of Science

F Summary: Peer recommendations (10.11.2014)

Taking into account the additional information and the comments given by Tomsk polytechnic University, the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ma Computer Science and Engineering	With requirements	Euro-Inf®	30.09.2020

Requirements

A 1. (ASIIN 7.2.) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives, intended learning outcomes, structure and level of the degree, as well as about an individual's performance.

Recommendations

E 1. (ASIIN 2.3) It is recommended to outline the project management-relevant skills in the module descriptions in order to make them explicitly visible and to ensure the alignment of the programme learning outcomes and the module learning outcomes.

E 2. (ASIIN 2.3) It is recommended to outline explicitly the English competences in several obligatory modules in order to ensure the alignment of the programme learning outcomes and the module learning outcomes.

E 3. (ASIIN 3.3, 3.1) It is recommended to revise and to modernize the teaching methodology of the English language in order to additionally motivate the students, prepare them for the academic and professional mobility and make them proficient users of the foreign language. It is recommended to revise the teaching methodology and to enrich it with practice-oriented and interactive tasks and to introduce active usage of the reading resources in the Foreign language.

E 4. (ASIIN 5.1) It is recommended to monitor and to reduce the teaching load of the academic staff in order to strengthen its research capability.

E 5. (ASIIN 5.2) It is recommended to enlarge the number and monitor the efficiency of Professional English Courses for teachers in place.

E 6. (ASIIN 5.3) It is recommended to further stimulate as well as stipulate the participation in the academic mobility.

E 7. (ASIIN 6.2) It is recommended to provide students with feedback on the results from questionnaires.

G Comment of the Technical Committee 04 - Informatics/Computer Science (13.11.2014)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee fully agrees with the requirements and recommendations proposed by the peers.

Assessment and analysis for the award of the Euro-Inf® Label:

The Technical Committee deems that the intended learning outcomes of the degree programme comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Programme	**ASIIN seal**	**Subject-specific Label**	**Maximum duration of accreditation**
Ma Computer Science and Engineering	With requirements	Euro-Inf®	30.09.2020

H Decision of the Accreditation Commission (05.12.2014)

Assessment and analysis for the award of the ASIIN seal:

The Accreditation Commission agrees with the requirements and recommendations proposed by the Technical Committee and the peers. It makes minor editorial amendments to the wording of some recommendations and combined recommendation 1 and 2.

Assessment and analysis for the award of the Euro-Inf® Label:

The Accreditation Commission deems that the intended learning outcomes of the degree programme comply with the Subject-Specific Criteria of the Technical Committee 04 - Informatics.

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN seal	Subject-specific Label	Maximum duration of accreditation
Ma Computer Science and Engineering	With requirements	Euro-Inf®	30.09.2020

Requirements

A 1. (ASIIN 7.2) A programme-specific Diploma Supplement has to be prepared and handed out to students on a regular basis providing information about the objectives, intended learning outcomes, structure and level of the degree, as well as about an individual's performance.

Recommendations

E 1. (ASIIN 2.3) It is recommended to outline the project management-relevant skills and the English competences in the module descriptions in order to make them explicitly visible and to ensure the alignment of the programme learning outcomes with the module learning outcomes.

E 2. (ASIIN 3.3, 3.1) It is recommended to modernize the teaching methodology of the English language and to enrich it with practice-oriented and interactive tasks and to introduce active usage of the reading resources in the foreign language.

E 3. (ASIIN 5.1) It is recommended to monitor and to reduce the teaching load of the academic staff in order to strengthen its research capability.

E 4. (ASIIN 5.2) It is recommended to enlarge the number and monitor the efficiency of Professional English Courses for teachers in place.

E 5. (ASIIN 5.3) It is recommended to further stimulate as well as stipulate the participation in the academic mobility.

E 6. (ASIIN 6.2) It is recommended to provide students with feedback on the results from questionnaires.