ASIIN Accreditation Report

Bachelor's Degree Programme

Ba Mechanical Design, Manufacture and Automation

Ba Energy and Power Engineering

Provided by

University of Shanghai for Science and Technology

Version: 08.04.2016

Table of Content

A About the Accreditation Process

Title of the degree Programme	Labels applied for [1]	Previous accreditation	Involved Technical Committees (TC)[2]
Ba Mechanical Design, Manufacture and Automation	ASIIN, AR, EUR-ACE® Label	/	01, 02
Ba Energy and Power Engineering	ASIIN, AR, EUR-ACE® Label	/	01, 02
Date of the contract: 19.09.2012 **Submission of the final version of the self-assessment report:** 08.10.2014 **Date of the onsite visit:** 07.-08.01.2015 **at:** 516 Jungong Road, Shanghai, P. R. China			
Peer panel: Prof. Dr. Jürgen Bast, Technical University Bergakademie Freiberg Prof. Dr. Frank Gronwald, Technical University Hamburg-Harburg Prof. Dr. Hans-Rainer Ludwig, University of Applied Sciences Frankfurt am Main Dr. Christoph Hanisch, Festo AG & Co. KG Student peer: Chuanchuan Chu, Tongji University			
Representative of the ASIIN headquarter: Dr. Thomas Lichtenberg			
Responsible decision-making committee: Accreditation Commission for Degree Programmes			

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes

[2] TC: Technical Committee for the following subject areas: TC 01 – Mechanical Engineering/Process Engineering; TC 02 – Electrical Engineering/Information Technology

Criteria used:

European Standards and Guidelines, version 10.05.2005

ASIIN General Criteria, version 28.06.2012

Subject-Specific Criteria of Technical Committee 01 - Mechanical Engineering/Process Engineering as of 09.12.2011

Subject-Specific Criteria of Technical Committee 02 - Electrical Engineering/Information Technology as of 09.12.2011

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
Energy and Power Engineering, B.Eng.		Full time	8 Semester 240 CP	Sep. 01, 1960, Fall Semester	N° 300-350 per year	RMB 5,000 Yuan per academic year
Mechanical Design, Manufacture and Automation, B.Eng.		Full time	8 Semester 240 CP	Jan. 09, 1978, Fall Semester	N° 350 per year	RMB 5,000 Yuan per academic year

For the degree programme Ba Energy and Power Engineering, the self-assessment report states the following **intended learning outcomes**:

Energy and Power Engineering Program takes the theories, methods, practices and applications in the process of energy production, conversion and utilization as a direction for learning and employment. Energy and Power Engineering Program focuses on training outstanding engineers with good social adaptation capability, international vision and engineering practice capability, who are acquainted with strong theoretical foundation and professional knowledge, and capable of the design, manufacturing, management, research, development, installation, operation and marketing in the related fields of Energy and Power Engineering. Energy and Power Engineering Program covers four directions: Thermal Power Engineering, Power Machinery Engineering, and Refrigeration and Air Conditioning Engineering, Engineering Thermophysics. For Thermal Power Engineering, engineering technical personnel are trained in such aspects as research and development of energy conversion and utilization technology and equipment, as well as emission control technology associated with energy conversion process, operation and control of energy conversion and utilization equipment. For Power Machinery Engineering, engineering technical personnel are trained in such aspects as research and development, design, manufacturing, operation and control of steam turbines, gas turbines, compressors, fans, pumps and other power machinery.

For Refrigeration and Air Conditioning Engineering, engineering technical personnel are trained in research and development of refrigeration and air conditioning technology as well as cryogenic technology; design, manufacturing, operation and control of refrigera-

tion and air conditioning equipment, as well as cryogenic equipment. For Engineering Thermophysics, research and application-oriented personnel are trained in studying and analyzing the multiphase flow, heat and mass transfer, energy conversion and utilization as well as combustion processes and theories, etc. which are related to energy systems and power equipment.

The following **curriculum** is presented:

Curriculum of Energy and Power Engineering Program

Module Name	Course		S1		S2		S3		S4		S5		S6		S7		S8		
	Course Name	Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
Language Teaching	College English 1,2,3,4	L	2	64	2	64	2	64	2	64									
	Reading and Writing in Technical English	L					2	64											
Mathematics, Physics and Chemistry	Calculus(1),(2)	L	6	96	6	96													
	Linear Algebra	L					2	32											
	Probability Theory and Mathematical Statistics	L							3	48									
	Complex Variable and Integral Transformation	L									2	32							
	College Chemistry	L	4.5	48															
	College Chemistry Experiment	L&P	1	18															
	College Physics (1)(2)	L			4	64	4	64											
	College Physics Experiment(1)(2	L&P			1	18	1	18											
Informatics	Information Technology	L	2	32															
	Introduction to Computer	L			3	48													
	Program Design and Practice(c)	L					3	48											
Engineering	Fundamentals of Engineering Drawing	L	4	64															
	Electrical Engineering and Electronics(1),(2)	L			6	96													
	Theoretical Mechanics	L			6	96													
	Mechanics of Materials	L					6	96											
	Mechanical Principle and Mechanical Parts	L					6	96											
	Fundamentals of Engineering Materials	L&P					3	48											

B Characteristics of the Degree Programmes

Curriculum of Energy and Power Engineering Program																					
Module Name	Course		S1		S2		S3		S4		S5		S6		S7		S8				
	Course Name	Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours			
Fundamentals	Engineering Thermodynamics	L&P							6	96											
	Machine Design	L							6	96											
	Engineering Fluid Mechanics	L&P							6	96											
	Computer Modeling Practice	L&P							3	48											
	Combustion	L&P									6	96									
	Heat Transfer	L&P									6	96									
Engineering Applications	Measurement and Control Technology of Power Engineering	L&P							4	64											
	CFD Numerical Simulation	L&P									4	64									
	Pumps and Fans	L&P									4	64									
	Thermal Engineering	L&P									4	64									
	Air Pollution Control Engineering	L									4	64									
	Manufacturing Technology of Thermal Power Machinery	L&P											4	64							
	New Energy Engineering	L&P											4	64							
	Fundamentals of Cryogenic Technology	L											4	64							
	Power-Saving Technology	L													4	64					
	Thermal Power Plants	L													4	64					
	Course Name CP Hours																				

Curriculum of Energy and Power Engineering Program																					
Module Name	Course					S1		S2		S3		S4		S5		S6		S7		S8		
	Course Name				Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
Advanced Subjects (electives)	Power Machinery Engineering	Principles of Steam Turbine	3	48	L											18	288					
		Strength and Vibration of Turbine Machinery	3	48	L																	
		Equipment and Operation of Steam Turbine	3	48	L																	
	Thermal Power Engineering	Principles of Boiler	3	48	L																	
		Design and Calculation of Boiler	3	48	L																	
		Materials and Strength of Boiler	3	48	L																	
	Engineering Thermophysics	Thermodynamic Equipment and System Optimization	3	48	L																	
		Clean Combustion Technology	3	48	L																	
		Principles and Design of Heat Exchanger	3	48	L&P																	
		Air Conditioning Engineering	3	48	L																	

Curriculum of Energy and Power Engineering Program																					
Module Name	Course					S1		S2		S3		S4		S5		S6		S7		S8		
	Course Name				Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
	Refrigeration and Air Conditioning Engineering	Principles and Equipment of Refrigeration	3	48	L&P																	
		Refrigeration Compressor	3	48	L																	
		Gas Turbine Theory and Application	3	48	L&P																	
		Combined-Cycle System	3	48	L																	
		Nuclear Reactor Engineering	3	48	L																	
		Refrigeration Equipment and Automatization	3	48	L													9	144			
		Wind Power Generation Technology	3	48	L&P																	
		Solar Power Generation and Thermal Utiliation	3	48	L&P																	
General Courses	Ideological,Moral Cultivation and Law Basis				L	1	32															
	Introduction to China's Modern and Contemporary History				L	1	32															
	Introduction to Basic Principles of Marxism				L	1	32															
	Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics				L	1.5	48															

Curriculum of Energy and Power Engineering Program																			
Module Name	Course		S1		S2		S3		S4		S5		S6		S7		S8		
	Course Name	Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
	Social Practice	P	1	32															
	Military Theories	L	1	32															
	Miliary Training	P	1	2W															
	Physical Education 1,2,3,4	P	1	32	1	32	1	32	1	32									
Practical Training	Metalworking Practice	P									3	3W							
	Special Comprehensive Experiment	P													4	4W			
	Student's Project	P													4	4W			
	Innovation and Entrepreneurship Project Training	L&P													4	4W			
	Internship	P															14	10W	
Bachelor Thesis	Bachelor Thesis	L&P															16	12W	SUM
CP/semester			28		29		30		31		33		30		29		30		240

For the degree programme Ba Mechanical Design, Manufacture and Automation, the self-assessment report states the following **intended learning outcomes**:

Mechanical Design, Manufacture and Automation Program takes Mechatronics as the development direction and machine tool of CNC technology as feature, advanced engineering technical personnel are trained to be familiar with mechanical engineering fundamental theories and methods, equipped with such fundamental skills as computer applications and mechanical and electrical control, and capable of designing, manufacturing, automated detection and control, production, management and marketing of mechanical products. After the four–year study, students in this program are required to acquire solid

basics of Mathematics, natural sciences, humanities and social sciences; systematically grasp the broad professional fundamentals and knowledge; be trained in the related fields of this program, and acquire the basic skills of design, operation and analysis of mechanical and electrical equipment and systems; understand the development trend in Mechanical Engineering; be skillful of computer application and obtain National Computer Grade II certificate; be proficient in reading the professional materials in English related to this program, and have strong English communication skills and obtain College English Test Band 4 certificate; have teamwork and enterprise production management capabilities. Students are expected to be able to apply the knowledge they have learnt, have strong capabilities to solve various engineering problems, be competent of the different kinds of jobs, and have good further-study capability and personal development prospects.

Curriculum "Mechanical Design, Manufacture and Automation"

			S1		S2		S3		S4		S5		S6		S7		S8		
Module Group	Module	Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
Language Teaching	College English(1),(2),(3),(4)	L&E	2.0	64	2.0	64	2.0	64	2.0	64									
	Reading and Writing in Technical English	L&E					2.0	64											
	Intermediate Interpretation for Science and Technology	L&E							1.0	32									
Mathematics, Physics and Chemistry	Calculus(1),(2)	L&E	6.0	96	6.0	96													
	Linear Algebra	L&E					2.0	32											
	Probability Theory and Mathematical Statistics	L&E							3.0	48									
	Complex Variable and Integral Transformation	L&E									2.0	32							
	College Chemistry	L&E	4.5	48															
	College Chemistry Experiment	P	1.0	18															
	College Physics (1),(2)	L&E			4.0	64	4.0	64											
	College Physics Experiment(1),(2)	P			1.0	18	1.0	18											
Informatics	Information Technology	L&E	2.0	32															
	Program Design and Practice(c)	L&E			3.0	48													
	Advanced Programming and Its Application	L&E									2.0	32							
General Education Courses	Ideological,Moral Cultivation and Law Basis	L&E	1.0	32															
	Introduction to China's Modern and Contemporary History	L&E	1.0	32															
	Introduction to Basic Principles of Marxism	L&E	1.0	32															
	Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics	L&E	1.5	48															
	Social Internship	P	1.0	32															
	Military Theories	L&E	1.0	32															
	Military Training	P	1.0	2W															
	Physical Education(1),(2),(3),(4)	P	1.0	32	1.0	32	1.0	32	1.0	32									
	Engineering Economics	L&E													2.0	32			
	Production and Operations Management	L&E															2.0	32	
Professional Fundamental Courses	Fundamentals of Engineering Drawing	L&E	4.5	48															
	Mechanical Engineering Drawing	L&E			4.5	48													
	Mechanical Measuring and Drawing	L&E			1.0	18													
	Electrical Engineering and Electronics(1),(2)	L&E			4.5	48	4.5	48											
	Experiment of Electric and Electronics	P					2.0	36											
	Theoretical Mechanics	L&E					6.0	64											
	Engineering Thermodynamics	L&E					4.5	48											
	Engineering Fluid Mechanics Foundation	L&E					3.0	32											
	Mechanics of Materials	L&E							6.0	64									
	Material Mechanics Experiments	P							1.0	18									

B Characteristics of the Degree Programmes

Curriculum "Mechanical Design, Manufacture and Automation"																					
					S1		S2		S3		S4		S5		S6		S7		S8		
Module Group	Module			Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
	Heat Transfer			L&E							3.0	32									
	Fundamentals of Mechanical Vibrations			L&E							3.0	32									
	Principle of Microcomputer and Interface			L&E							4.5	48									
	Mechanical Dynamics			L&E									3.0	32							
	Fundamentals of Engineering Materials			L&E									3.0	32							
Machine Design	Machine Design			L&E							6.0	64									
	Experiment of Machine Design			P									2.0	36							
	Practice for Machine Design			P									2.0	2W							
	Fundamentals of Mechanical Test and Control			L&E									6.0	64							
	Comprehensive Experiments of Mechanical Test and Control			P									2.0	36							
	Tolerance Measurement and Verification of Geometrical Quantity			L&E									3.0	32							
	Mechanical Part Design			L&E									6.0	64							
	Mechanical Structural Design			L&E											6.0	64					
	Practice for Mechanical Structural Design			P											2.0	2W					
	Computer Aided Design Technology			L&E											4.5	48					
	Computer Aided 3D Structural Design			L&E											4.5	48					
Manufacturing Technology	Mechanical Manufacturing Technology			L&E											6.0	64					
	English Reading and Writing for Mechanical Engineering			L&E											2.0	32					
	Hydraulic and Pneumatic Technology			L&E											4.5	48					
	Numerical Control Technology			L&E													3.0	32			
	Course Design of Mechanical Manufacturing Technology			P													2.0	2W			
	Advanced Manufacturing Technology			L&E													3.0	32			
	Virtual Manufacturing Technology			L&E															4.5	48	
Elective Courses	Professional Elective Courses	CP	Hours														6.0	96			
	Finite Elements Method	2.0	32	L&E																	
	Computer Aided Process Planning and Product Data Management	2.0	32	L&E																	
	Precision Machining Technology	2.0	32	L&E																	
	Modern Design Methods	2.0	32	L&E																	
	Electrical Control for Machines	2.0	32	L&E																	
	Mechatronics System Design	2.0	32	L&E																	
	Industrial Robot	2.0	32	L&E																	
	Computer Control in Engineering	2.0	32	L&E																	

Curriculum "Mechanical Design, Manufacture and Automation"																					
					S1		S2		S3		S4		S5		S6		S7		S8		
Module Group	Module			Type	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	CP	Hours	
Internship	Metalworking Practice			P			3.0	3W													
	Production Practice			P													2.0	2W			
	Comprehensive Experiment for Mechanical Engineering			P													6.0	108			
	Comprehensive Practice for Mechanical			P													6.0	108			
	Comprehensive Training for Mechanical			P															6.0	108	
Bachelor Thesis	Bachelor Thesis			P															16.0	12W	SUM
CP/semester					28.5		30.0		32.0		30.5		31.0		29.5		30.0		28.5		240

(L&E-Lecture and Exercise, P-Practice, S-Semester,W-Week)

C Peer Report for the ASIIN Seal[3]

1. Formal Specifications

Criterion 1 Formal Specifications

Evidence:

- Self-Assessment Report
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=46&flag=4 (access 13.01.202015)
- http://merz.usst.edu.cn/ (access 13.01.2015)

Preliminary assessment and analysis of the peers:

The university provided subject-specific websites with relevant information about the study programs. After analyzing the curriculum and the intended learning outcomes of the two degree programs the auditors concluded that the names of the degree programs correspond well to the contents and the aims of the programs. Both study programs are full-time programs aiming at the "Bachelor of Engineering" as a final degree. The standard period of study is set at four years and 240 ECTS credit points can be gained in total. The expected intake number of students for the Bachelor Program Energy and Power Engineering is 300 to 350 and for the Bachelor Program Mechanical Design, Manufacture and Automation 330. The Bachelor Program Energy and Power Engineering was introduced in fall semester 1960 and the Bachelor Program Mechanical Design, Manufacture and Automation in fall semester 1978; both programs start in the fall semester. RMB 5,000 Yuan per academic year must be paid for both programs; the University added that scholarships and special programs are in place for students who cannot afford the study fees. The auditors concluded that all formal specifications are properly defined.

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

The peers confirmed that this criterion was fulfilled.

[3] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

2. Degree programme: Concept & Implementation

Criterion 2.1 Objectives of the degree programme

Evidence:

- Self-Assessment Report, chapter 2
- Diploma Supplement, § 4.2
- http://merz.usst.edu.cn/Pages/Degree1/2.2.1.html (Access 13.01.2015)
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=48&flag=4 (Access 13.01.2015)

Preliminary assessment and analysis of the peers:

The University of Shanghai for Science and Technology defined the study aims and the intended learning outcomes of the two Bachelor Programs at a level of higher education which corresponds to learning outcomes relevant to level 6 of the European Qualifications Framework. This encompasses competences like advanced knowledge of the field of study and to manage complex technical activities or projects. “Advanced skills to solve complex and unpredictable problems” are not clearly defined in the learning outcomes of the Bachelor Program Energy and Power Engineering. Please compare criterion 2.2 for further explanations.

From a professional point of view, the University explained that graduates of both programs are widely accepted in the job market because they have a strong practical capability and a foundation of professional knowledge. The survey of graduates depicted that graduates worked at enterprises related to energy, power, electricity, machinery, aviation, aerospace, chemical engineering, petroleum, metallurgy, electronics and construction, as well as research institutes, universities, design institutes and relevant government departments for energy conversion and utilization, and research. The latest graduates’ employment rate ranked at the forefront among all programs of USST over the past years. The auditors could understand the professional allocation of graduates of these two study programs.

Criterion 2.2 Learning Outcomes of the Programme

Evidence:

- Self-Assessment Report, chapter 2
- Diploma Supplements, § 4.2
- http://merz.usst.edu.cn/Pages/Degree1/2.2.1.html (Access 13.01.2015)
- http://merz.usst.edu.cn/Pages/Degree1/2.1.html (Access 13.01.2015)

- http://ndxyen.usst.edu.cn/content.aspx?info_lb=46&flag=4 (Access 13.01.2015)
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=48&flag=4 (Access 13.01.2015)
- Discussions with representatives of the university [objectives, classification]

Preliminary assessment and analysis of the peers:
The auditors confirmed that the University defined and specified the intended learning outcomes for the two programs as a whole. The aims and the intended learning outcomes of the study programs are published on the program specific websites and are hence available for interested stakeholder groups. In addition, every student receives a full set of study relevant documents prior to the commencement of the studies as the University indicated. The aims of the study programs are included in the Diploma Supplement in § 4.2 under "Program requirements". In the Bachelor Program Mechanical Design, Manufacture and Automation the complete learning outcomes as specified on the website are presented in § 4.2. The auditors noticed that for the Bachelor Program Energy and Power Engineering only the first paragraph of the aims as published on the website was included in the Diploma Supplement; this reflects only parts of the intended learning outcomes as the auditors could see. The auditors underlined that the learning outcomes must be specified in an official document in a way that students may rely on them, for example, in the scope of the internal quality assurance system. Apart from this, the auditors confirmed that the intended learning outcomes are accessible to the relevant stakeholders.

The auditors wanted to know if other stakeholders were involved in the formulation of the aims and the learning outcomes of the study programs. The University exemplified that representatives of enterprises and graduates of the study programs were invited yearly to comment on their experiences with students and graduates and to provide advice on the contents of the curriculum. Also students were asked to give their input to improve the teaching and learning effectiveness. Given this information and input, the curriculum of the study programs is revised where this deemed necessary. The auditors strongly supported the involvement of stakeholders in the revision process of the study programs.

The **Subject-Specific Criteria (SSC)** of the Technical Committee for Mechanical Engineering and Process Engineering provide the basis for judging whether the intended learning outcomes framed by Higher Education Institutions are constituted in the degree programmes in a comprehensible manner. The auditors agreed that the areas of competence as set forth by the *Subject-Specific Criteria* (SSC) for degree programmes are partly met for the different degree programmes as explained in this paragraph.

Furthermore, the University applied for the EUR-ACE® (European Accredited Engineer) Label. The EUR-ACE® Label is a quality certificate for engineering degree programs and is

recognized Europe-wide. During the accreditation process, the reviewers verified whether the two engineering degree programs comply with the criteria fixed in the EUR-ACE Framework Standards. The Subject-Specific Criteria (SSC) of the Technical Committee for Mechanical Engineering and Process Engineering are closely linked to the EUR-ACE Framework Standards; consequently, the analysis of the Subject-Specific Criteria encompasses the EUR-ACE Framework Standards.

The knowledge and understanding of the *scientific and mathematical principles* are captured in learning outcomes like "understanding of Mathematics and natural sciences" and the "ability to understand the key directions and prospects of modern technology development"; the learning outcomes are the same for both programs for this specific field of competence. *Engineering Analysis* is considered in the learning outcome that graduates are supposed to have the "ability to understand and get involved in the production management processes of general manufacturing enterprises, and understand potential positions and technical requirements". In the Bachelor Program Mechanical Design, Manufacture and Automation it is clearly stated that graduates shall be able to "apply their knowledge to solve engineering problems"; the auditors noted the problem solving aspect is not mentioned in the learning outcomes of the Bachelor Program Energy and Power Engineering. The auditors pointed out that the problem-solving competence was a requirement on Bachelor's Degree Programs according to the Subject-Specific Criteria of ASIIN and they underlined that the learning outcomes have to be amended accordingly. *Engineering Design* is aimed for in the learning outcome of the Bachelor Program Mechanical Design, Manufacture and Automation in the sense that graduates should have the "ability to innovative design, process, and improve of mechanical products". The learning outcomes for the Bachelor Program Energy and Power Engineering state that graduates should have obtained "the capability in innovative design, processing and improvement of energy-related industrial products". Competences in *Investigations and Assessment* are stated in learning outcomes like the "ability to acquire and apply professional knowledge" or the "ability in relearning, further education, and scientific research". In the Bachelor Program Mechanical Design, Manufacture and Automation the envisaged learning outcomes are described in the sense that students shall acquire an "understanding of the basics of information technology", the "ability to acquire and apply information efficiently" and the "understanding of the general methods of literature, information and data retrieval". The *Engineering Practice* is described in manifold ways in the learning outcomes. The Bachelor Program Mechanical Design, Manufacture and Automation underlines that graduates obtained the "ability to apply professional knowledge to work" or have the "ability to integrate computer with professional knowledge, particularly the capability of computer-aided design, analysis, manufacturing and measurement". Similarly

the learning outcomes of the Bachelor Program Energy and Power Engineering state that graduates have the "ability to acquire and apply professional knowledge" and work "with strong professional practice skills and capabilities in career" or achieve "engineering and professional practice capability". Lastly, *Transferable Skills* of the graduates shall be obtained like the "capability in international communication" and "Team-work and management capabilities". The learning outcomes for these fields of competence are similar in both programs.

Given the above mentioned limitations, the auditors confirmed that the intended learning outcomes reflect the orientation framework for the subject concerned as described in the relevant ASIIN Subject-Specific Criteria. By the same token, the EUR-ACE Framework Standards regarding the intended learning outcomes are fulfilled for the First Cycle Degree Programs (Bachelor) in line with the Bologna Declaration.

After thorough analysis the auditors concluded that the names of the programs reflect the intended learning outcomes and also the linguistic focus of the programs.

Criterion 2.3 Learning outcomes of the modules/module objectives

Evidence:

- Self-Assessment Report
- module description / Module Handbook
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=51&flag=4 (Access 13.01.2015)
- http://merz.usst.edu.cn/download/Appendix/Appendix%20B2%20Module%20Handbook%20of%20Mechanical%20Design,%20Manufacture%20and%20Automation%20Program.pdf (Access 13.01.2015)

Preliminary assessment and analysis of the peers:

The auditors wanted to understand the concept of a "module" as applied by the University because they noticed that the curricula distinguish between "Module Groups" and "Modules" (Bachelor Program Mechanical Design, Manufacture and Automation) or "Modules" and "Courses" (Bachelor Program Energy and Power Engineering). The University explained that, according to their understanding, "modules" are broad fields of competence like Mathematics, Physics and Chemistry or Engineering Fundamentals broken down into smaller entities like courses with 2-6 credit points. The auditors corrected that, according to the ASIIN criterion, a module is supposed to be a coherent and consistent package of teaching and learning in itself. The size and duration of the modules should allow students to combine them flexibly and facilitate the transfer of credits. Further-

more, modules should not stretch over more than two semesters to facilitate this goal of flexible transfer of credits. This is to be discussed in more detail under criterion 3.2.

Despite the different understanding of the concept of a "module" the auditors confirmed that the intended learning outcomes for the two programs are systematically put into practice within the individual modules of the programs. The modules of each study program are described in a Module Handbook which is available for relevant stakeholders on the internet.

The auditors analyzed the Module Handbook and emphasized that the quality of the module descriptions is of high standard. Almost all relevant information was provided like the semester(s) in which the module is taught, the lecturer, the language, the workload, credit points, recommended prerequisites, module objectives, study and examination, and reading lists are by and large defined. The module objectives, for example, distinguish in most cases between knowledge, skills and competences but in some cases the competences are not output-oriented formulated (e.g. Strength and Vibration of Turbine Machinery, Principles of Boiler, Design and Calculation of Boiler, Thermodynamic Equipment and System Optimization) and the auditors encouraged the University to make sure that the module descriptions are formulated consistently output oriented. Even though in most cases the type of examination is well defined in the module descriptions, the auditors discovered a few examples where the type of examination was not clearly defined (e.g. Nuclear Reactor Engineering, Solar Power Generation and Thermal Utilization). The auditors underlined that they discovered only minor need for amendment like modules descriptions must be modified to include the type of examination more clearly (written, oral, presentation, report) and ascertain that the objectives of the module descriptions are formulated consistently output oriented.

Criterion 2.4 Job market perspectives and practical relevance

Evidence:

- Self-Assessment Report, chapter 2.4
- Appendix F: Official Documents about Learning Rules and Examination Regulations in English Language
- Statistics on graduates employment in terms of numbers and market sector
- Overview of companies for practical training
- Description of expected learning outcomes

Preliminary assessment and analysis of the peers:

The auditors acknowledged that the Energy and Power Engineering Program was a pilot program included in the Ministry of Education Plan for educating and training outstanding engineers. The peers understood that particularly the government of Shanghai focuses on new and high-tech industries for alternative forms of power supply. The auditors learnt that there is a tremendous demand for graduates in large companies, research institutions, universities and government departments. The University underlined that most of the graduates find employment within the first few months after graduation and provided a list of employer institutions. The Bachelor Program Mechanical Design, Manufacture and Automation served as pilot program for different governmental institutions as the University explicated. The University had carried out an analysis to track the whereabouts of graduates and the auditors could understand that the employment rate of the graduates of this program has remained at above 95% in last four years. The University also provided a list of employing institutions. Even though the results of this analysis had not been made available to the auditors they were convinced that there is a demand on the labor market for graduates from both programs who possess the intended competences.

The auditors wanted to know if the training offered was appropriately linked to professional practice and learnt that for the Bachelor Energy and Power Engineering an "Energy and Power Engineering Experiment Teaching Center" was established to ascertain that sufficient space and laboratory equipment was available for students to carry out numerous experiments. In the Bachelor Mechanical Design, Manufacture and Automation Program fourteen experimental units had been established for experiments. In both programs short term (metalworking practice (three weeks), social practices (two weeks) and production practice (two weeks)) and long-term internships need to be conducted. The long-term internship is an in-enterprise internship of 12 weeks; the students are supposed to find a place for a practical placement themselves and carry out the internship according to internship outline and relevant requirements, and under the double guidance of in-university supervisors and enterprise mentors. In addition, students may also participate in technological innovation practice activities and develop technical innovations. Finally, the Bachelor thesis gives students the opportunity to test students' capability to apply theoretical knowledge to a practical problem. The auditors were assured that the education was appropriately linked to practice.

Criterion 2.5 Admissions and entry requirements

Evidence:

- Self-Assessment Report, chapter 2.5
- http://merz.usst.edu.cn/Pages/Degree1/2.5.3.html (access 13.01.2015)
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=45&flag=4 (access 13.01.2015)

Preliminary assessment and analysis of the peers:

The auditors discussed the admission rules and procedures with the university representatives. The admission and entry conditions are published on both program websites. The auditors were informed that everybody who wants to study at a Chinese University has to participate in the National University Entrance Exam of the People's Republic of China. Pupils who want to participate in this exam have to meet the following requirements: (1) complying with the Constitution and Laws of the People's Republic of China; (2) graduated from an advanced secondary school or with equivalent education; (3) physically healthy. The auditors wondered if physically challenged people can also apply and will be admitted to study, and the University clarified that special support was provided to students with special requirements. In addition, there exists a specific university for deaf and blind people. The auditors wanted to know the contents of the general entrance exam and learnt that this exam covers topics like languages (Chinese, English), Natural Sciences and Social Sciences. About 10% of the pupils reach a score that qualifies them for University Studies. Based on the additional information that about 90% of the students complete their degree in the given timeframe the auditors confirmed that the entry requirements are obviously designed in a way to facilitate the achievement of the learning outcomes.

The auditors were surprised to hear that students apply for the University choosing the best ranked Universities first. Only if students are admitted to a University, they decide the subject they want to study. The University decides about the admission of students itself complying with so-called admission transparency rules. About 70% of the applicants are admitted, coming from all regions and nations of China. Provincial admission offices are responsible for supervising universities implementation of national admission policies and plans. The auditors concluded that the procedures for admission to the programs are governed by strictly applied and transparent procedures and ensure that all applicants are treated equally. Regarding foreign students, the University explained that presently about 1.000 foreign students are enrolled at USST. About 300-400 of the foreign students come from other Asian countries and have to pass a language test to be admitted at the University. About 300-400 students come from Europe or the USA for specific exchange

programs and can attend English lectures. The auditors understood that also appropriate regulations are in place to accommodate the specific needs of foreign students.

The auditors could not find any regulation on the recognition of competences and credit points received at other universities. The peers kindly asked for the provision of rules of recognition of competences gained at other universities.

Criterion 2.6 Curriculum/Content

Evidence:

- Self-Assessment Report, chapter
- Appendix D1, Curriculum of Energy and Power Engineering Program
- http://ndxyen.usst.edu.cn/userfiles/files/Appendix%20D1%20Curriculum%20of%20Energy%20and%20Power%20Engineering%20Program(3).pdf (access 13.01.2015)
- Appendix D2, Curriculum of Mechanical Design, Manufacture and Automation Program
- http://merz.usst.edu.cn/download/Appendix/Appendix%20D2%20Curriculum%20of%20Mechanical%20Design,%20Manufacture%20and%20Automation%20Program.pdf (access 13.01.2015)
- Curriculum / content overview
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:

The auditors assessed the curricula of both programs under review against the program objectives provided on the program specific webpage as well as against the stipulations of the Subject-Specific Criteria. The University provided curricula for both study programs published on the program specific webpage but no objective matrices, indicating the correlation between intended learning outcomes and the modules in which the respective competences can be obtained, were available. The auditors acknowledged that the curricula contain a number of so-called “general courses” like “Introduction to China's Modern and Contemporary History”, “Introduction to Basic Principles of Marxism”, “Introduction to Mao Zedong Thoughts and the Theoretical System of Socialism with Chinese Characteristics” and so on, which should be seen in the specific context of the Chinese education system. The auditors focused primarily on modules that contribute to the fulfillment of the intended learning outcomes for the specific study programs. In both programs a number of modules in Mathematics, Physics and Chemistry are taught, starting at college level and setting the basis for more complex engineering subjects. The auditors were con-

vinced that these subjects were in line with the mathematics and natural science foundation as indicated in the subject-specific criteria. This was further supported by "Professional Fundamental Courses" taught in both programs corresponding by and large to aspects of "Engineering Analysis" as specified in the subject-specific criteria. But the auditors did not comprehend where specifically problem-solving competences in engineering were taught. The University responded that in the course "Innovation and Entrepreneurship Project Training" students are either given an engineering problem by the lecturer or they identify an engineering problem in close cooperation with their lecturer which they have to solve independently; the same approach is applied for the "Students' Project". The auditors comprehended that engineering problem-solving competences were appropriately dealt with. The University explained that competences in the field of "Engineering Design" are covered in courses in the Bachelor Program Mechanical Design, Manufacture and Automation like "Computer Aided Process Planning and Product Data Management", "Course Design of Mechanical Manufacturing Technology" or "Modern Design Methods". Similarly, the peers understood that in the study program Energy and Power Engineering courses like "CFD Numerical Simulation" or "Machine Design" are able to develop competences in the field of engineering design. Nevertheless, after having examined the laboratories and the "engineering design tasks" the auditors felt it would be fruitful for the University to consider to stress more the design methodology in the papers handed in by the students (e.g. the Bachelor thesis) to include a discussion of the "State of the Art" (e.g. designing a machine or mechanical device, using a methodical engineering approach (such as list of requirements, functional analysis, creativity techniques and morphologic boxes) and including the hole dimensioning as well of machine elements as strength and fatigue calculation of shafts and machine parts) and to challenge the students to propose optional solutions for the problem before giving arguments for their specific choice. Given the non existing Chinese language skill on the part of the auditors it was decided to ask the University about the assumed auditors' observation. If their observation proves to be correct the auditors agree to include a recommendation as they feel it will help to the University to develop its high standard even further. The peers confirmed that the numerous experiments (e.g. "Comprehensive Experiment for Mechanical Engineering" or "Special Comprehensive Experiment") that needed to be carried out by the students fostered competences in "Investigations and Assessment". Competences in literature research are particularly trained through the Bachelor's Thesis. The auditors comprehended that "Engineering Practice" was obtained through the "Comprehensive Practice for Mechanical" or the "Internship". Transferrable Skills were to be obtained in different courses. The auditors welcomed a compulsory course "Social Internship (Practice)" which is part of the curriculum to foster social skills. Other courses like the students' project or the internship support the development of competences like team work and effective com-

munication. A training of scientific research and citation prior to the Bachelor Thesis might be helpful, but in general, the auditors concluded that the curriculum that is in place makes it possible to achieve the intended learning outcomes by the time the degree is completed; unintended overlaps are avoided.

With regard to the EUR-ACE Label the auditors verified that the description of objectives and intended learning outcomes in the self-assessment report as well as the competences as described in the module descriptions, comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01 apart from the limitations as noted before. Based on the above mentioned analysis the auditors recommend to award the EUR-ACE® Label under the condition of fulfillment of the requirements.

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

The auditors appreciated that USST intended to change § 4.2 in the Diploma Supplement and to provide more details on the intended learning outcomes for the Bachelor Mechanical Design, Manufacture and Automation Program. Until this change will have been implemented the peers stick to this requirement.

The auditors welcomed the indication of USST to elaborate on the problem solving aspect in the learning outcomes of the Bachelor Program Energy and Power Engineering. Furthermore, the auditors were pleased about the intention of USST to continuously improve the training plan and desired learning outcomes of the two programs to meet the Subject-Specific Criteria (SSC) and criteria of ASIIN completely. The peers also welcomed that USST will revise the module description and apply consistently output-oriented objectives and define the form of examinations; the auditors stick to this requirement until its fulfillment.

The peers thanked USST for the explanation that the Chinese Ministry of Education has corresponding admission rules for physically challenged people in place and have no doubt that students with limitations will receive appropriate support from USST to be able to pursue their studies.

The auditors gratefully received the additional document “Appendix D1 Rules on Grade Recognition and Credit Awarding for USST Undergraduate Students Studying Elsewhere” and concluded that there are appropriate rules for the recognition of credit points obtained elsewhere in place.

Finally, the auditors understood that the objective matrices were properly published on the website of USST. The auditors conclude that all other criteria were properly met.

3. Degree Program: Structures, Methods & Implementation

Criterion 3.1 Structure and modularity

Evidence:

- Curricular structures
- Module descriptions
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
Both study programs are four-year undergraduate programs. According to the curriculum, the entire course system is divided into nine course modules, and the learning contents of different modules are interrelated according to time sequence. The auditors tried to understand the concept of modules and concluded that the University defines modules in a broader sense like fields of competence. These fields of competence like Mathematics, Physics and Chemistry consist of different courses; these courses vary in size from 1 to 12 ECTS points. The auditors explained that modules should be coherent and consistent packages of teaching and learning in itself. Hence, it would be advisable to restructure the modules to achieve this goal. Furthermore, the auditors recommended avoiding half credit points because this impairs the flexibility to exchange modules.

Analyzing the curriculum of the two Bachelor programs it turned out that the given curriculum was not designed in a way to facilitate the transfer of credits. The auditors asked if the program concept allowed for time to be spent at another higher education institution or on a practical placement without loss of time. The University responded that the curriculum does not foresee a specific semester for mobility. The students confirmed that international mobility hardly takes place even though there is a growing interest among students to study abroad. The auditors underlined that the modules should be redefined in a sense to form smaller and consistent learning packages not stretching over more than two semesters; the curriculum should allow for time for mobility without loss of time.

Criterion 3.2 Workload and credit points

Evidence:

- Curricular structures
- Module descriptions
- Appendix P1 Practice Base Contract List of Energy and Power Engineering Program

- Appendix P2 Practice Base Contract List of Mechanical Design, Manufacture and Automation Program
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The auditors praised that all modules have a clear and transparent concept of ECTS credit points. The University clarified that Chinese credit points consider contact hours only, while ECTS credits count contact hours and self-study hours. The ECTS points as indicated in the module descriptions comprise the complete workload of a student including contact time and self-study time; according to the module descriptions 30 (in some cases also 32) study hours (including contact hours and self-study hours) are equivalent to one ECTS credit point. The University added that credit points were only given if the learning objectives of a module had been achieved. The auditors welcomed the distinction between contact time and self-study time in the module descriptions even though they indicated that some cases were logically not understandable. For example, English language courses do not show any self-study time at all but students have to do homework and study vocabulary which should be expressed in self-study time.

The auditors asked how the allocation of credit hours to modules was verified and learnt that the lecturers provided homework to the students to ascertain self-study time. Besides, in the evaluation of courses the self-study time was also asked for. The students explained that the work load was, in general, reasonable and acceptable to them which confirmed the impression of the auditors that the distribution of workload was fairly well managed. The students pointed out that the actual workload depended on the individual student and the capacities to work and comprehend.

In both programs a mandatory internship needs to be implemented. The auditors wondered how it was ascertained that the students obtained relevant practical competences through the internship carried out in an enterprise and how it was aligned to the curriculum of the study programs. The University explained that the students were supposed to identify a suitable position for in internship on their own. The University maintains a number of official cooperation agreements with different companies offering internships for students from different degree programs. A list of cooperation agreements had been provided by Appendix P1 and P2. Only if the students are not successful the lecturer provides assistance. In most cases the students were capable to find appropriate internship places in companies in line with their study program. A university lecturer has to be the supervisor of the internship and the students are required to work on a scientific engineering task which has to be determined beforehand. At the end of the internship they have to submit a report which is being assessed by the supervisor. The enterprise pro-

vides a technical supervisor for daily assistance. The auditors confirmed that the internship was meaningfully integrated into the curriculum and adequately supervised by teaching staff from the higher education institution.

Rules for recognizing external activities had not been provided to the peers and they kindly request to make this information available.

On average, 60 credit points are awarded each year, 30 per semester in the study programs. There are slight deviations like in the Bachelor Energy and Power Engineering Program. In the first semester only 28 ECTS credit point can be obtained and in the fifth 32. The auditors gained the impression that the workload was distributed adequately over the different semesters.

Criterion 3.3 Educational methods

Evidence:

- Self-Assessment Report, chapter 3.3
- Appendix O1 Awarding Sample List of Energy and Power Engineering Program
- Appendix O2 Awarding Sample List of Mechanical Design, Manufacture and Automation Program
- Module descriptions
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:

The module handbook provided a proper overview of the "type of teaching" that is applied. The lecturers explained that they use a number of different teaching methods. The lecturers further explained that fundamental courses are mostly taught in the form of large classes (about 100 students), while professional fundamental courses are usually taught in the form of medium classes (about 60 students) and some professional courses are taught in the form of small classes (about 40 students). Most of the course modules include theoretical knowledge as well as experiments. The auditors understood that for the practical parts the students are subdivided into small groups of 3-4 students and confirmed that this is appropriate for laboratory work. The lecturers underlined that the educational methods of one course had been elected as a quality course in Shanghai, one teacher won the "Shanghai outstanding teacher award" of the University and eighteen teachers won the teaching achievement award of Shanghai and the University. The auditors were impressed about the numerous teaching awards the teachers had received in both programs as presented in Appendix O1 and O2 and confirmed that the teaching methods and tools supported the achievement of the learning outcomes. The auditors

also confirmed that in the Bachelor Program Energy and Power Engineering all together 27 ECTS points of elective courses had to be carried out which allow the students to develop an individual focus. In the Bachelor Program Mechanical Design, Manufacture and Automation only 6 ECTS credit points for elective courses were foreseen. The auditors were of the opinion that this is very low and may not allow students to develop a focal area; they recommend increasing the number of elective ECTS points.

Except some logical inconsistencies with regard to the allocation of contact time and self-study time as explained under criterion 3.2, the auditors welcomed the distinction of self-study and contact time for each module in the module descriptions and were convinced that the available time allows students sufficient opportunity to carry out independent academic work

Criterion 3.4 Support and advice

Evidence:

- Self-Assessment Report
- Appendix F Official Documents about Learning Rules and Examination Regulations in English Language
- Discussions with students and teaching staff
- http://www.usst.edu.cn/ (Access 13.01.2015)
- http://merz.usst.edu.cn/Pages/Degree2/3.4.html (Access 13.01.2015)
- http://ndxyen.usst.edu.cn/content.aspx?info_lb=7&flag=7 (Access 13.01.2015)

Preliminary assessment and analysis of the peers:

The auditors had noticed that a number of different advisory offices were in place and learnt the purpose of the different offices. For administrative routine support of undergraduate students the Office of Teaching Affairs with its subordinate offices is the address to raise questions and receive first information. Furthermore, the Student Office is responsible for guiding and supporting students of every department and school. Each program has three full-time undergraduate counselors for each grade, who are responsible for the guidance in terms of help to freshmen to plan their studies as early as possible. Therefore, most of the freshmen plan for their occupational development in the first year of their university life under the guidance of counselors. Every class has a class instructor who normally is a teacher with doctorate and responsible for providing students with professional advice and guidance. The students underlined that they could turn directly to the class instructor if need arises and tutorials were offered in most subjects. The auditors recognized that the University undertakes an enormous advisory effort to help students

to achieve their goal. The students also confirmed that information for the study programs is available on the internet and that every student receives a complete set of information for the respective degree program when enrolling. Most modules maintain a course webpage where questions can also be posted. The auditors discovered a lot of helpful information on the subject-specific webpage available in English; they were surprised that the webpage did not mention any web-mail address for direct contacting (only address and telephone number). Even though the general webpage, indicated in the self-assessment report, was only available in Chinese, the peers were convinced that sufficient resources were available and that the subject-specific and general advisory methods were suitable for supporting students to achieve the learning outcomes and complete their degree within the normal period of study.

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

The peers were pleased that USST wants to reshape its modules and revise the curriculum to allow for student mobility without loss of time. The envisaged requirement shall remain valid until the changes will have been properly implemented.

The auditors welcomed that USST wants to increase the elective ECTS to 20 for Mechanical Design, Manufacture and Automation Program.

The peers supported that USST wants to incorporate self-study time in the English language courses and that USST will improve the English webpage with an e-mail contact for international communication. The auditors confirmed that the rest of the criteria are properly fulfilled.

4. Examination: System, Concept & Implementation

Criterion 4 Exams: System, concept & implementation

Evidence:

- Self-Assessment Report, chapter 4
- Appendix E: Exam Regulations and Teaching Quality Assurance Process
- Regulations on Course Examinations for Full-time Undergraduates of University of Shanghai for Science and Technology
- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:

According to "Regulations on Course Examinations for Full-time Undergraduates of University of Shanghai for Science and Technology", the forms of examinations include written examination, oral examination, experimental and documental report, etc. The auditors pointed out that most module descriptions (with a few exceptions as detailed in criterion 2.3) provided comprehensive information on the type of examination and the students are informed about the type of examination at the beginning of the module; they noticed that many modules have mid-semester examinations. Examinations are usually arranged in the exam week at the end of each semester; the exam time of some electives may be arranged by the teachers themselves, but they should be completed in the current semester. The peers were surprised to hear from the students that examinations are usually easy to pass because the students are well prepared as they claimed. Even in difficult subjects appropriate support is in place to ensure that all students properly comprehend the topic as the students pointed out. The University added that in difficult modules like Mathematics about 20-30% failed the first attempt of the examination; rules for a second attempt are clearly defined and about half of those who had failed the first time passed the second attempt. Those students who fail the exam a second time have to participate in the respective course all over again and receive special assistance because it is the expectation of the University that lecturers provide special support to feeble students; almost all students pass the third attempt. The auditors concluded that the organization and distribution of examinations was appropriate to achieve the intended learning outcomes without structural pressure. After thorough analysis of the examinations provided by the University and as far as the auditors could comprehend the examination as some of them were in Chinese they indicated that in some cases the type (multiple choices) and the content of the examinations appears to be not yet appropriately designed to support the attainment of the intended learning outcomes. Besides of the in-course-tests (30%) and multiple choice questions (ca. 20%) in the written exams, these exams should contain also at least one problem, wherein a step-by-step approach should be demanded by the students on the way to their solution. By such means, the design of examinations could be amended to better attain the intended learning outcomes, the auditors emphasized.

The timescale for marking exams does not interfere with individual academic progression as the students confirmed.

Even though the module descriptions provide information on the type of examinations and the bachelor thesis needs to be defended by the candidate, the auditors were not able to judge whether the students were capable of orally discussing a problem from their

specialist area and how it might be solved. The auditors kindly requested a list of oral examinations and presentations the students are obliged to carry out.

A 12-week bachelor thesis is envisaged for the eighth semester, and students are required to solve independently tasks and write the thesis under the guidance of advisors. As for off-campus bachelor thesis, students are required to define the topic of the thesis with the supervisor and to keep contact with the advisor on-campus, so as to ensure the progress is in line with bachelor thesis progress on-campus. Both examiners of the final thesis must belong to the body of professional lecturers who deliver the program. After having analyzed the bachelor thesis as provided by the University and taking into consideration that some thesis needed to be translated from Chinese to English, the auditors noted that some of the theses could be composed more consequently in a better general structure (such as to report the state of the art, to classify the relation between the actual problem and engineering science and application in general, to carry out alternative options and to judge the best solution, which is worked out in detail, to reflect economical as well as ecological and health aspects and finally to summarize the thesis). Especially if the task of a thesis includes a design problem, this should be worked out after the standardized methodology following VDI 2222. The auditors strongly recommended following more consistently the European standards of engineering methodology.

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

The auditors thanked USST for the clarification on the high pass rate of students and understood that the excellent support measures as well as the strict admission procedures foster the good performance of students. The peers were pleased about USST's indication to improve the examination forms according to the intended learning outcomes to strengthen students' capability.

The auditors gratefully received the full list of oral examinations and presentations that were mandatory for students in both programs and concluded that the number and kind of oral examinations was appropriate to properly develop skills in verbal expression.

The peers welcomed that USST wants to follow the recommendation of the auditors and make sure that the final thesis follows the European standards of engineering methodology more consistently.

5. Resources

Criterion 5.1 Staff involved

Evidence:

- Appendix A1 Staff Handbook of Energy and Power Engineering Program
- Appendix A2 Staff Handbook of Mechanical Design, Manufacture and Automation Program
- Analysis of needs and capacities
- Appendix C1 Project List of Energy and Power Engineering Program
- Appendix C2 Project List of Mechanical Design, Manufacture and Automation Program
- Discussions with program coordinators and teaching staff

Preliminary assessment and analysis of the peers:
The peer group studied the staff handbooks of both degree programs and concluded that the composition of the teaching body was able to ensure that the intended learning outcomes are achieved by the time the degree is completed. The peers welcomed the fact that many of the staff members had spent parts of the academic career abroad. After having explained the available resources compared with the needed capacities the auditors could comprehend the explanation of the University that sufficient resources were available to implement the study degree programs in a way to reach the intended learning outcomes.

The University provided long lists for both degree programs outlining the research activities that had taken place in the last years. The University underlined that the cooperation with the private sector had been strengthened in recent years and about 70% of the externally acquired means originated from private businesses. The University also developed new study areas in close cooperation with private businesses like “renewable energies”, for example. Project based tasks are sometimes connected to the research work of the lecturers; students in bachelor programs can participate in research activities when writing their final thesis. The auditors confirmed that the research activities of teaching staff ensured that the educational level sought is attained.

Criterion 5.2 Staff development

Evidence:

- Capacity development offers / Further education

- Discussions with students and teaching staff

Preliminary assessment and analysis of the peers:
The auditors were told that one of the administrative offices was primarily in charge for didactical and educational trainings. Newly appointed staff members were obliged to participate in a four months preparatory educational training and have to present demonstrational classes where feedback is provided. Furthermore, the University applies "collegial training" which means that new lecturers conduct classes jointly with colleagues and can benefit from their experiences. The University offers a platform with a "Teaching development plan" inviting professors to participate in didactical lectures on teaching methods. As indicated in criterion 3.3 University staff members have received numerous awards for excellent teaching. The auditors welcomed that opportunities for further development of subject-relevant knowledge and teaching skills were available.

Criterion 5.3 Institutional environment, financial and physical resources

Evidence:

- Self-Assessment Report, chapter 2.2 and 2.3
- Appendix G1 Investment Equipment in Three Years of Energy and Power Engineering Program
- Appendix G2 Investment Equipment in Three Years of Mechanical Design, Manufacture and Automation Program
- Appendix H1 Information about Laboratory Center of Energy and Power Engineering Program
- Appendix H2 Information about Laboratory Center of Mechanical Design, Manufacture and Automation Program
- Appendix Q1 Offices for of Energy and Power Engineering Program
- Appendix Q2 Offices for Mechanical Design, Manufacture and Automation Program
- Appendix P1 Practice Base Contract List of Energy and Power Engineering Program
- Appendix P2 Practice Base Contract List of Mechanical Design, Manufacture and Automation Program
- On-sight visit of physical resources
- Discussions with program coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The self-assessment report provided a detailed list of equipment available; the auditors visited the laboratories to gain a first-hand impression of the equipment and were impressed about the laboratories and the educational equipment. The peer group gained a positive impression of the facilities and technical equipment available and concluded that the laboratories were adequate for basic education. In a second and on-sight decided visit of the research laboratories the auditors could confirm that some innovative technical equipment had been purchased and was available for more elaborated research activities. The students confirmed that the laboratories were adequate for student training although sometimes it becomes crowded in the laboratories given the number of students; but by and large it suffices. The students criticised that there was no air conditioning in the dormitories and in summertime it was literally impossible to work there. But students had the opportunity to move to other labs or the library for working. The students confirmed that sufficient computer labs and required software were available; the computer software could partly be downloaded to personal computers.

The University provided a list of cooperation agreements with private businesses which shows the linkages of the institution with the private sector. In the self-assessment report it was outlined that a number of staff members gained international academic experiences. The University also maintained double degree programs (e.g. University of Applied Sciences Furtwangen, Germany). Nevertheless, the students complained that there were too little opportunities to study abroad particularly in Europe or the USA. In criterion 3.1 it was explained in more detail that international mobility should be enhanced.

Financial information was made available to the auditors; the auditors concluded that financing is secured for the duration of the accreditation of degree programmes under review.

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

The auditors highly appreciated the information that Chinese government and USST were striving to expand international cooperation, increase support budget and the number of scholarships at different levels to facilitate students for foreign exchange and learning. The peers also welcomed that USST wants to make available necessary investments within the scope of USST finance budget to improve study and living conditions of students. The auditors confirmed that these criteria were fulfilled.

6. Quality Management: Further Development of Degree Programmes

Criterion 6.1 Quality assurance & further development

Evidence:

- Self-Assessment Report, chapter 6
- Appendix I assessment form
- Appendix M1 Teachers Evaluation of Energy and Power Engineering Program
- Appendix M2 Teachers Evaluation of Mechanical Design, Manufacture and Automation Program
- Discussions with program coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The auditors were impressed about the complex quality management system that pursued a threefold approach. Firstly, for each course the students were required to complete an online evaluation sheet. The results were made known to the teacher. If teachers received unsatisfactory results, they University provided assistance to them in terms of counseling and teaching assistance. In most cases the performance of the teachers improved considerably. The results of the student evaluation was neither published nor discussed with the students; but the students confirmed that they noticed changes if a lecturer received unsatisfactory results. The second quality management tool was the “collegial evaluation” where elder and experienced colleagues witnessed classes of younger colleagues and supported them with “collegial advices”. The third layer of quality management was “external evaluation” carried out by staff members who had retired and who assessed classes from an external perspective. The auditors were impressed about this elaborated and complex quality management approach and wondered why this was not documented anywhere; they strongly recommended preparing a comprehensive documentation about the quality management system. Although the auditors gained the impression that feedback loops were in place and led to changes if staff members did not perform adequately they highlighted that students should also be involved more actively in the quality management system.

In addition to the evaluation of teaching, the University invited graduates from different degree programs every two years to report about their working experiences and asked them to provide feedback on the education of USST in the light of expectations of employers. The peers encouraged the University to pursue the tacking and involvement of alumnis more systematically. Finally, the University maintained regular meetings with

employer organizations to receive feedback from businesses to improve the curricula. The auditors acknowledged that measures had been determined to ensure the regular further development of the degree programs.

Criterion 6.2 Instruments, methods and data

Evidence:

- Self-Assessment Report, chapter 6
- Appendix I assessment form
- Appendix M1 Teachers Evaluation of Energy and Power Engineering Program
- Appendix M2 Teachers Evaluation of Mechanical Design, Manufacture and Automation Program
- Discussions with program coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The auditors were impressed about the statistical data that about 90% of the students finished their degree in the regular time of the degree programs; about 97% successfully finished the degree after six years. A bachelor student cannot study more than 6 years. This data showed that the admission procedures as well as the support measures were appropriate to lead the vast majority of students to successful graduation.

The teacher's evaluation data showed either excellent or good results; worse grades were not given by the students. Given that these results reflect the true judgment of the students, the teacher training and evaluation approaches seemed to lead to very satisfactory results. Finally, the involvement of graduates and business stakeholders provided feedback if the degree programs developed competences needed at the labor market.

The auditors saw suitable methods and instruments in place to ensure that the quality of degree programs was maintained and further developed.

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

The peers acknowledged that the quality management system of USST was documented in "Documents Collection of Teaching Management (USST 2013)" in Chinese text and in "Regulations Performance Assessment for Academic Staff in USST". Even though the peers are not able to read these documents they obtained a thorough understanding of USST's quality management system and were of the opinion that documentation in Chinese was sufficient. The peers could also follow the argumentation of USST that the participation of students in the feedback loops was properly implemented. The peers en-

couraged the university to provide an English translation of this document to further support its international orientation.

7. Documentation & Transparency

Criterion 7.1 Relevant Regulations

Evidence:

- Appendix E Exam Regulations and Teaching Quality Assurance Process (no date given)
- Appendix F Official Documents about Learning Rules and Examination Regulations in English Language (no date given)

Preliminary assessment and analysis of the peers:
The peers noted that all aspects of admission, examinations, Progress, Probation and Disqualification, Grading Policy, Examinations were outlined on the webpage; the fee structure was explained in the self-assessment report and during the audit. The University explained that all these regulations were clearly defined by Chinese laws. The Quality Management System was also described in Appendix E but the peers underline that this needs to be elaborated more thoroughly.

Criterion 7.2 Diploma Supplement and Certificate

Evidence:

- Appendix J1 Diploma Sample of Energy and Power Engineering Program
- Appendix J2 Diploma Sample of Mechanical Design, Manufacture and Automation Program
- Appendix K1 Diploma Supplement of Energy and Power Engineering Program
- Appendix K2 Diploma Supplement of Mechanical Design, Manufacture and Automation Program
- Appendix L1 Transcript Sample of Energy and Power Engineering Program
- Appendix L2 Transcript Sample of Mechanical Design, Manufacture and Automation Program

Preliminary assessment and analysis of the peers:
English language Diploma Supplements for both study programs were provided to the auditors. The peers confirmed that the Diploma Supplements allowed interested parties

to gain insight into the structure, content and level of the successfully completed degree; the provided Transcript of Records explains the individual performance of the graduate.

The Transcript of Records indicates the performance for each course but the auditors could not understand how the final mark was calculated (including weighting of marks).

Under 4.5 in the Diploma Supplement statistical data is provided in accordance with the ECTS User Guide to assist in interpreting the individual degree.

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

The auditors thanked USST for explaining the calculation of the final grade but they underlined that this must be transparent for everyone who may read the Transcript of Records. Hence, the peers emphasized that it must be explained within the Diploma supplement how the final grade is calculated so that also externals can comprehend the final grade.

D Additional Documents

Before preparing their final assessment, the panel asked for 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. Rules of recognition of competences gained at other universities
D 2. List of oral exams, presentations

All requested documents were provided.

E Final Assessment of Peers

The auditors recommend the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mechanical Design, Manufacture and Automation	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020
Ba Energy and Power Engineering	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020

Requirements

A 1. (ASIIN 2.3) The modules descriptions must be modified to include the type of examination more clearly (written, oral, presentation, report) and to ascertain that the objectives of the module descriptions are formulated consistently output oriented

A 2. (ASIIN 3.1) The size and duration of the modules must allow students to combine them flexibly and to facilitate the transfer of credits. The program concept must allow for time to be spent at another higher education institution or on a practical placement without loss of time.

A 3. (ASIIN 4) The design of examinations needs to be amended to better attain the intended learning outcomes.

A 4. (ASIIN 7.2) The Diploma Supplement must indicate how the final mark is calculated (including weighting of marks).

Bachelor Mechanical Design, Manufacture and Automation Program

A 5. (ASIIN 2.2) The learning outcomes of the study program must be specified in an official document in a way that students may rely on them, for example, in the scope of the internal quality assurance system.

Bachelor Program Energy and Power Engineering

A 6. (ASIIN 2.2) The intended learning outcomes must indicate that competences of solving engineering problems shall be obtained.

Recommendations

E 1. (ASIIN 4) It is recommended that the final thesis follows the European standards of engineering methodology more consistently (e.g. discussion of the state of the art, list of requirements, technical and economical considerations on the solution).

Bachelor Mechanical Design, Manufacture and Automation Program

E 2. (ASIIN 3.3) It is recommended to increase the number of elective ECTS points.

F Final Assessment of Technical Committees

Technical Committee 01 – Mechanical Engineering/Process Engineering (05.03.2015)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee 01 discussed the accreditation procedure and wondered if it was appropriate to refer to "European standards" for a Chinese University. It was explained that the peers represented a European Accreditation Agency and hence took European standards as the basis of reference. In addition, the university reacted openly to the suggestion of the peers to consider European Standards. The Technical Committee accepted the proposed requirements and recommendations of the peers.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01.

The Technical Committee 01 – Mechanical and Process Engineering recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mechanical Design, Manufacture and Automation	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020
Ba Energy and Power Engineering	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020

Requirements

A 7. (ASIIN 2.3) The modules descriptions must be modified to include the type of examination more clearly (written, oral, presentation, report) and to ascertain that the objectives of the module descriptions are formulated consistently output oriented

A 8. (ASIIN 3.1) The size and duration of the modules must allow students to combine them flexibly and to facilitate the transfer of credits. The program concept must al-

low for time to be spent at another higher education institution or on a practical placement without loss of time.

A 9. (ASIIN 4) The design of examinations needs to be amended to better attain the intended learning outcomes.

A 10. (ASIIN 7.2) The Diploma Supplement must indicate how the final mark is calculated (including weighting of marks).

Bachelor Mechanical Design, Manufacture and Automation Program

A 11. (ASIIN 2.2) The learning outcomes of the study program must be specified in an official document in a way that students may rely on them, for example, in the scope of the internal quality assurance system.

Bachelor Program Energy and Power Engineering

A 12. (ASIIN 2.2) The intended learning outcomes must indicate that competences of solving engineering problems shall be obtained.

Recommendations

E 2. (ASIIN 4) It is recommended that the final thesis follows the European standards of engineering methodology more consistently (e.g. discussion of the state of the art, list of requirements, technical and economical considerations on the solution).

Bachelor Mechanical Design, Manufacture and Automation Program

E 2. (ASIIN 3.3) It is recommended to increase the number of elective ECTS points.

Technical Committee 02 – Electrical Engineering/Information Technology (10.03.2015)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure. All in all, it deems the assessment of the peers as well as the proposed requirements and recommendations adequate. Nevertheless, the Technical Committee suggests some minor editorial modifications for reason of clarification.

Concerning requirement 5, it points out that according to the preliminary assessment of the peers the requirement apparently is referring to the Bachelor's programme Energy and Power Engineering. The responsible programme coordinator at ASIIN headquarters should check this. Since the report states unmistakably that the learning outcomes for both degree programmes have been well defined and published on the website of the university, the only remaining deficit seems to be that they haven't been integrated completely in the respective Diploma Supplement. The Diploma Supplement in turn, being issued after graduation, by its very nature isn't the right place to rely upon in the course of internal quality assurance processes. This purpose is obviously served already through the publication of the learning outcomes on the HEI's website. Following this, the Technical Committee proposes to modify and slightly amend this requirement accordingly.

Also, the Technical Committee deems the phrase "European standards" in recommendation 1 to be inadequate and furthermore concludes that the additional information in brackets which has been detailed in the report could be left out of the recommendation. It proposes a modification taking into account these objections.

Furthermore, the Technical Committee proposes a modification of the wording of recommendation 2 so as to better grasp the peers' underlying suggestion.

Additionally, the Technical Committee concluded from the report that the peers judged the shortcomings of the module descriptions referred to in requirement 1 to be of *minor importance* (see preliminary assessment of criterion 2.3 and of criterion 4 as well). Therefore, it appears not to be understandable at first sight why there should be a requirement to that end. In this regard, the Technical Committee decides asking the responsible programme manager to check whether the assessment in the report and the peers' conclusion are fully consistent. In consequence, it might make sense to transfer the requirement to a recommendation.

Assessment and analysis for the award of the EUR-ACE® Label:

The Technical Committee deems that the intended learning outcomes of the degree programmes do comply with the engineering specific part of the Subject-Specific Criteria of the Technical Committee 02 in conjunction with those of the Technical Committee 01.

The Technical Committee 02 – Electrical Engineering and Information Technology recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mechanical Design, Manufacture and Automation	With requirements	EUR-ACE with requirements	30.09.2020
Ba Energy and Power Engineering	With requirements	EUR-ACE with requirements	30.09.2020

Requirements

A 1. (ASIIN 2.3) The modules descriptions must be modified to include the type of examination more clearly (written, oral, presentation, report) and to ascertain that the objectives of the module descriptions are formulated consistently output oriented.

A 2. (ASIIN 3.1) The size and duration of the modules must allow students to combine them flexibly and to facilitate the transfer of credits. The program concept must allow for time to be spent at another higher education institution or on a practical placement without loss of time.

A 3. (ASIIN 4) The design of examinations needs to be amended to better attain the intended learning outcomes.

A 4. (ASIIN 7.2) The Diploma Supplement must indicate how the final mark is calculated (including weighting of marks).

Bachelor Mechanical Design, Manufacture and Automation Program

A 5. (ASIIN 2.2) The learning outcomes of the study program need to be specified completely and consistently in the diploma supplement.

Bachelor Program Energy and Power Engineering

A 6. (ASIIN 2.2) The intended learning outcomes must indicate that competences of solving engineering problems shall be obtained.

Recommendations

E 1. (ASIIN 4) It is recommended that the final thesis more in line with the International Scientific standards of engineering methodology.

Bachelor Mechanical Design, Manufacture and Automation Program

E 2. (ASIIN 3.3) It is recommended to increase the proportion of elective modules.

G Final Assessment of the Accreditation Commission (27.03.2015)

Assessment and analysis for the award of the ASIIN seal:

The Commission discussed requirement number 1 which indicated some minor issues in the module descriptions that need to be corrected. The Commission understood that in the report it was clearly stated that the module descriptions were of very good quality and underlined that under these circumstances the requirement was disproportionate. The Commission decided to remove the first requirement.

The Commission made some orthographical changes at requirement number 3 to clarify the intended meaning. The Commission accepted the proposed changes of the Technical Committee 02 for Requirement 4 and the Recommendations 1 and 2. All the other requirements were accepted.

Assessment and analysis for the award of the EUR-ACE Label:

The Accreditation Commission for Degree Programmes stated that all programmes fulfil the field specific criteria of the technical committee 01 and 02 and awarded the EUR-ACE Label for both programmes.

The Accreditation Commission for Degree Programmes decides about the award of the ASIIN Seal and the EUR-ACE Label as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mechanical Design, Manufacture and Automation	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020
Ba Energy and Power Engineering	ASIIN-seal with requirements	EUR-ACE with requirements	30.09.2020

Requirements

A 1. (ASIIN 3.1) The size and duration of the modules must allow students to combine them flexibly and to facilitate the transfer of credits. The program concept must allow for time to be spent at another higher education institution or on a practical placement without loss of time.

A 2. (ASIIN 4) The design of examinations needs to be amended to better assess the achievement of the intended learning outcomes. Possible types of exams should clearly be defined.

A 3. (ASIIN 7.2) The Diploma Supplement must indicate how the final mark is calculated (including weighting of marks).

Bachelor Mechanical Design, Manufacture and Automation Program

A 4. (ASIIN 2.2) The learning outcomes of the study program need to be specified completely and consistently in the diploma supplement.

Bachelor Program Energy and Power Engineering

A 5. (ASIIN 2.2) The intended learning outcomes must indicate that competences of solving engineering problems shall be obtained.

Recommendations

E 1. (ASIIN 4) It is recommended that the final thesis is more in line with the International Scientific standards of engineering methodology.

Bachelor Mechanical Design, Manufacture and Automation Program

E 2. (ASIIN 3.3) It is recommended to increase the proportion of elective modules.

H Fulfillment of Requirements

Final Assessment of the Accreditation Commission (08.04.2016)

The Accreditation Commission discussed the accreditation procedure and comprehended the reasoning of the peers that the study programmes had been modularized; however, it could still further be improved. Hence, the Accreditation Commission includes an advice in the letter to the University to further improve the structure of the study plan towards a completely modularized scheme.

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditation
Ba Mechanical Design, Manufacture and Automation	All requirements fulfilled*	EUR-ACE	30.09.2020
Ba Energy and Power Engineering	All requirements fulfilled*	EUR-ACE	30.09.2020

Die Accreditation Commission decides to include the following advice in the letter to the University:

“The university is advised to further improve the structure of the study plan towards a completely modularized scheme; this will be verified during the re-accreditation procedure.”