



ASIIN Accreditation Report

Bachelor's Degree Programmes

- ***Mechanical Engineering – Research and Development Programme***
- ***Mechanical Engineering – Project Oriented Applied Programme***

Master's Degree Programme

- ***Mechanical Engineering – Research and Development Programme***

offered by

University of Ljubljana

ASIIN Accreditation procedure including an on-site visit for

Bachelor's Degree Programmes

- ***Mechanical Engineering – Research and Development Programme***
- ***Mechanical Engineering – Project Oriented Applied Programme***

Master's Degree Programme

- ***Mechanical Engineering – Research and Development Programme***

offered by

University of Ljubljana

on 25 and 26 September 2012

Quality Labels applied for

Within the scope of assessing the degree programmes, Ljubljana University applied for the award of these labels:

- ASIIN seal for individual degree programmes
 - EUR-ACE® Label
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Audit Team

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A Preliminary Remark

The on-site visit for the above mentioned degree programmes took place at University of Ljubljana, Slovenia, on 25 and 26 September 2012.

Prior to the talks with the representatives of the university, the peers met to prepare their questions and to discuss the self-assessment report. Professor Hampe was asked to act as speaker of the audit team for the aforementioned degree programmes. ASIIN's Technical Committees 01 – Mechanical Engineering is responsible for the accreditation procedure of these programmes.

The peers held discussions with the following groups:

University management, responsible managers of degree programmes, teaching staff, students (some of the students are also in the role as graduates from the Bachelor's programme) and industry representatives.

Additionally, the auditors inspected the infrastructure and the technical equipment at the Faculty of Mechanical Engineering, University of Ljubljana.

The following chapters relate to the report provided by the University of Ljubljana in June 2012 as well as to the discussions and information provided during the on-site visit including samples of exams and final theses.

The assessment and the award of the ASIIN-seal are always based on the European Standards and Guidelines (ESG). In the case of the award of other seals or labels, the criteria of the respective seal or label-owner (ENAAE) are considered additionally.

Based on the „EUR-ACE Framework Standards for the Accreditation of Engineering Programmes”, ENAAE as owner of the label has authorized ASIIN to award the EUR-ACE® Label. The assessment for the award of the EUR-ACE® Label is based on the General Criteria of ASIIN as well as on the Subject-Specific Criteria (SSC) of the Technical Committee 01 – Mechanical Engineering.

The report has the following structure: Chapter B presents the facts which are necessary for the assessment of the requested seals. The information principally stems for the self-assessment report and related appendices provided by the Higher Education Institution. The following chapters include separate assessments of the peers about the compliance with the criteria for the requested seals. The statement of the HEI is subsequently included with the exact wording. The final recommendation of the peers and the Technical Committees as well as the final decision of the Accreditation Commission are drafted after and based on the statement of the HEI (and additional documents, if applicable).

Any gender-specific terms used in this document apply to both women and men.

B Description of the degree programmes

B-1 Formal specifications

a) Name & Awarded Degree	d) Study-Mode	e) Programme Duration & Credit points	f) first & annual enrollment	g) expected intake	h) fees
Mechanical Engineering - Research and Development Programme / B.Sc. in Mechanical Eng.	Full time	6 semester 180 CP	WS 2008 WS	300 per year	no fee
Mechanical Engineering - Research and Development Programme / Master of Science in Mechanical Eng. or Master Professor in Mechanical Eng. ¹	Full time	4 Semester 120 CP	WS 2011 WS	260 per year	no fee
Mechanical Engineering - Project Oriented Applied Programme / B.Sc. in Mechanical Eng.	Full time	6 Semester 180 CP	WS 2009 WS	400 per year	no fee

B-2 Degree Programme: content concept & implementation

Objectives of the degree programmes	<p>The primary objective of the <u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u> is to provide the qualification of a professional, who will be able to solve complex research and development problems and tasks in the area of mechanical engineering efficiently and creatively. Strong fundamental and rather basic professional knowledge is emphasised. This enables the programme's graduates to make their acquaintance with and understand a wide range of mechanical engineering problems and to obtain, at the same time, a large amount of interdisciplinary knowledge. Considering that the programme is conceived intentionally as a programme, which is to be followed by a corresponding master's programme, the employment opportunities for the graduates will certainly be, despite equipped with a broader knowledge from the area of mechanical engineering, substantially scarce. The main goal of the programme is to encourage most of the graduates to continue their education on the masters' level with the research and development-oriented study emphasised.</p>
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¹ The Master's Study Programme awards two different degrees which is in accordance with its structure. With regard to the topics addressed and related study fields the programme can be divided in two specific parts, one giving an engineering education (seven basic and six interdisciplinary study fields) and the other a pedagogic one (one study field).

	<p>The <u>Master Mechanical Engineering</u> programme is in its substance a continuation and an upgrade of the three-year undergraduate programmes in mechanical engineering (both programmes) and the topics addressed therein. Considering advanced topics the programme is clearly oriented, in the spirit of the Bologna reform, into specific professional fields of mechanical engineering individually. By introducing at the same time in the programme new interdisciplinary fields of study and including related topics, the needs and demands of current economic and social development are followed. This context also provides the justification for the introduced Engineering pedagogy study field, with which the Faculty of Mechanical Engineering (FME) assumes the responsibility to ensure a higher level of quality and efficiency in the education of technical profiles involved in teaching the mechanical engineering courses and general technical courses in upper secondary schools. The primary goal of the master's degree programme is to educate graduates, giving them a full qualification to conduct independent interdisciplinary research and development projects and to design, manage and realise applied projects. The fundamental objectives in the programme in the Engineering pedagogy field focus is on ensuring competences and skills for autonomous work in the secondary education and teaching. Based on modern didactic theories the graduates develop the potential of evaluating one's own practice and creating innovative solutions in the school practice.</p> <p>The primary goal of <u>Bachelor's degree programme Mechanical Engineering - Project Oriented Applied Programme</u> is to provide a fundamental education in the field of mechanical engineering and sufficient applied knowledge in a narrower professional field of study selected by the student. The acquired knowledge, skills and competences will enable the graduates for immediate employment in the enterprise sector. They will be able, being in possession of fundamental engineering knowledge upgraded adequately with applied mechanical engineering know-how, to integrate into the processes of management and maintenance of production, as well as into the project design and technological work involving also creative applied development of new, technically more demanding products with a higher value added.</p>
<p>Learning outcomes of the degree programmes</p>	<p>The university states in the self-assessment report the following learning outcomes: The <u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u> is focused on providing graduates with</p>

- broad and basic engineering skills, especially quality mechanical engineering skills, and thus adequate employability,
- strong fundamental knowledge and the understanding of a wide range of mechanical engineering topics,
- necessary competences and skills to continue studying on the master's level,
- extensive mechanical engineering knowledge and skills, making students capable of linking different application areas together in an interdisciplinary way.

The graduates will have the following general competences:

- ability to define, understand and creatively solve professional challenges,
- developing creative, analytical and synthetic thinking
- developing professional responsibility and ethics,
- professional communication and writing communication skills, including the use of foreign technical language,
- ability to use information and communication technology,
- ability to find sources, make critical judgement of information, upgrade the acquired skills independently and further develop the knowledge on various specific areas of engineering,
- ability for teamwork and establishing interdisciplinary partnerships,
- considering the safety, functional, economic and environmental principles in their work,
- respecting the engineering code.

The Master's degree programme is focused on providing graduates with

- necessary qualifications and competences that will guarantee direct employability,
- in-depth fundamental and targeted professional and engineering knowledge primarily in the field of mechanical engineering,
- methodological approaches to support a scientific way of thinking for innovative research work,
- consciousness of the importance of interdisciplinary connections in the process of grasping new products and advanced technologies,
- basic requirements for a successful continuation of study on the doctoral level,

The graduates will possess the following general competences:

- ability to define and understand fundamental scientific problems, and ability to creatively tackle with professional challenges,
- improved capability of developing creative, analytical and synthetic thinking,
- ability to develop new knowledge and higher cognitive skills, related to the creation of new knowledge,

- ability to assume responsibility for one's own professional development and learning by evaluation and reflection on one's own work (learning by experience, supervision),
- ability of autonomous work in different social activities and liberal professions,
- professional communication and writing skills, also in international spheres,
- ability to use information and communication technology,
- qualification to use the obtained knowledge for autonomous solving of technical problems in mechanical engineering,
- ability to find sources, make critical judgment of information, upgrade the acquired skills independently and further develop the knowledge on various specific areas of engineering.
- ability for teamwork and establishing interdisciplinary partnerships,
- mastering management and organizational skills,
- considering the safety, functional, economic and environmental principles in their work,
- respecting and developing the engineering code.

The Bachelor's degree programme Mechanical Engineering - Project Oriented Applied Programme is focused on providing graduates with

- proper fundamental engineering knowledge and the necessary applied skills in the selected field of mechanical engineering skills, and thus direct adequate employability,
- understanding of assimilated knowledge in the field of mechanical engineering,
- adequate background in a wider field of mechanical engineering, enabling students for an interdisciplinary cooperation with the experts from other disciplines

The graduates will have the following general competences

- ability to use the attained knowledge in the practice,
- ability to work autonomously in the framework of knowledge provided by the selected study field,
- ability to manage their time,
- ability to break down professional tasks of smaller complexity to subtasks,
- development of critical and self-critical thinking,
- qualification for teamwork and interdisciplinary connections with the professionals from other disciplines,
- ability to manage a technological unit or project,
- adaptation to changing working situations,
- considering the safety, functional, economic and environmental principles in their work,

	<ul style="list-style-type: none"> • ability to communicate professionally and express oneself in writing, • ability to present professional problems and the solutions thereof in their environment and wider, • ability to use information and communications technology, • ability to find sources of knowledge, select among the available resources and use the knowledge acquired for their work, • knowing the important expert vocabulary in English or German language, • developing professional responsibility and ethics, • respecting the engineering code.
<p>Learning outcomes of the modules/module objectives</p>	<p>The objectives of the individual modules are provided in the module description.</p> <p>The module descriptions are not yet available to students in electronic form on the website. The university states that there is currently a project running to make the module descriptions and all other information on the degree programmes available soon.</p>
<p>Job market perspectives and practical relevance</p>	<p>Employment opportunities for graduates for the programmes under scrutiny are described by the university as follows:</p> <p><u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u></p> <p>The main goal is to build after five years of education a competent graduate, capable of leading and solving complex research and development tasks. Through providing students extensively with fundamental theoretical knowledge, whereas the technical part of mechanical engineering is not addressed so in depth, the 3-year-programme may be considered to be fully research focused. Accordingly, the direct entry of the labour market is rather scarce considering the insufficiency of the attained professional qualification.</p> <p><u>Master's degree programme</u></p> <p>This 2-year-programme is conceived as fully research oriented. Professional qualification of graduates is supposed to be high, and it is attained by laboratory and project work. The graduates are supposed to possess competences which allow them to solve complex research and development tasks, and to organise and lead working R&D teams. They can be easily joined in interdisciplinary, as well as international cooperation. Placement of graduates on the labour market is excellent. The labour market in Slovenia is characterised by permanent lack of mechanical engineers of this education level.</p>

	<p><u>Bachelor's degree programme Mechanical Engineering – Project oriented Applied Programme</u></p> <p>This 3-year-programme is conceived as fully professional oriented providing the graduates with competences which allow them to obtain readily industrial placement. The programme includes a compulsory practical training. Placement of graduates on the labour market is excellent. The labour market in Slovenia is characterised by permanent lack of mechanical engineers of this education level.</p> <p>Demand from industry and their actual needs are regularly available by the respective authority of the Ministry of Economy of Republic of Slovenia, as well as directly by individual demand from the companies.</p> <p>Practical elements in the programmes include laboratory and project work as well as practical trainings (in industry).</p>
<p>Admissions and entry requirements</p>	<p>The university describes the following entry requirements:</p> <p>The <u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u> can be entered by anyone who has A) passed the matura exam, B) passed the vocational education final exam in any of the secondary schools and the exam in one of the matura subjects: Mechanics, Physics, Mathematics, Computing, Electrical Engineering or Foreign Language (the selected subject must not be one of those that the candidate has taken as part of the vocational education final exam), C) completed any of the 4-year secondary school programmes before 1 June 1995. In case of restricted enrolment, candidates from items A and C will be selected on the basis of grade point average of matura or final exam and 60% of points, grade point average in third and fourth year 40% of points. Candidates from item B will be selected on the basis of grade point average of vocational education final exam, 40% of points, grade point average in third and fourth year and 40% of points and result of a matura subject 20% of points.</p> <p>The <u>Bachelor's degree programme Mechanical Engineering - Project Oriented Applied Programme</u> can be entered by anyone who has passed the final exam in any of the 4-year secondary schools, the vocational education matura exam or the matura exam. In case of restricted enrolment, candidates will be selected based on grade point average of the final exam, the vocational education matura exam or the matura exam and 60% of points and grade point average in the third and fourth year 40% of points.</p>

No aptitude test is foreseen which is in accordance with the national regulation. No test is allowed for investigation on engineering aptitude.

In accordance with Articles 38.a of the HEA and Article 16 of the Transitional and final provisions to the HEA-E (OG RS no. 119/20.11.2006) and Article 117 of the Statute of the University of Ljubljana eligible for enrolment in the Master's degree programme are the candidates who completed one of the following programmes:

- Level 1 undergraduate study programme (Bologna university or higher education professional study programme in the amount of at least 180 ECTS) in the field of mechanical engineering or related technical, natural and mathematical sciences.
- Level 1 undergraduate study programme (Bologna university or higher education specialisation study program in the amount of at least 180 ECTS) other than those mentioned in the first paragraph, provided that before entering the masters' study programme MECHANICAL ENGINEERING they have fulfilled the study requirements from the undergraduate study programme MECHANICAL ENGINEERING – Research and development programme in the amount of 44 ECTS from the topics of vital importance to continue the studies: Mathematics 2, Strength of materials, Materials science 2, Thermodynamics, Heat transfer, Machine elements 2 and Design methodology, higher education study programme in the field of mechanical engineering or related technical, natural and mathematical sciences (before the adoption of the Higher Education Act in 2004),
- higher education professional study programme (before the adoption of the Higher Education Act in 2004) other than those mentioned in the previous paragraph, provided that before entering the masters' study programme MECHANICAL ENGINEERING they have fulfilled the study requirements from the undergraduate study programme MECHANICAL ENGINEERING – Research and development programme in the amount of 44 ECTS from the topics of vital importance to continue the studies: Mathematics 2, Strength of materials, Materials science 2, Thermodynamics, Heat transfer, Machine elements 2 and Design methodology.

In case of restricted enrolment, candidates will be selected based on their performance during previous studies and written selection exam from mechanical engineering, taking into account the average grade in undergraduate studies, including the degree (40 %) and the result in the written selection exam (60 %). The written exam consists of checking the topics of vital importance to continue the studies:

	<p>Mathematics 2, Strength of materials, Materials science 2, Thermodynamics, Heat transfer, Machine elements 2 and Design methodology.</p> <p>Rules for the recognition of external achievements are stipulated Article 8 of the Rules on testing and grading the knowledge of students at UL FS. They read: A student may also complete exam(s) for a certain study year abroad, provided the exams are taken at an appropriate foreign university in scope of the ERASMUS, CEEPUS, IAESTE international exchange or some other comparable university study, if the student proves that the subject matter of the course or the Curriculum in scope of which the exam was completed, and for which he wishes that the exam is recognised, is compatible with the subject matter of a course at FS. The comparability of subject matter must be in excess of 50% and the number of ECTS must be the same. The grade for a course from the study programme is entered into the report book by the chair of the course, and the grade for an elective course is entered into the study programme by the competent vice dean.</p>
<p>Curriculum / content</p>	<p>The curriculum of the <u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u> consists of the following modules: Mathematics 1-3, Statics and Kinematics, Descriptive Geometry and Tech. Documentation, Energy and Environment, Physics, Strength of Materials, Engineering Materials 1, Space Modelling, Thermodynamics, Material Science 2, Machine Elements 1-2, Numerical Methods, Fluid Mechanics, Heat Transfer, Manufacturing Technologies 1, Project Management, Numerical Modelling Methods, Measurement Techniques, Design Methodology, Tribology. During the three years, three modules are elective courses (12 ECTS) to be chosen from the pool of five "Elective general courses" offered by the faculty, from any programme, any faculty or university. In addition, the curriculum consists of six elective courses (32 ECTS) to be chosen from a pool of 12 "Elective specialised courses".</p> <p>The curriculum of <u>Master's degree programme</u> depends on the chosen "field curriculum": Machine Design and Mechanics, Power and Process Engineering, Production Engineering, Mechatronics and Laser Technology, Traffic Safety Systems, Engineering Rheology, Environmental Engineering, Welding, Terotechnology, Engineering Pedagogy, Engineering Safety. Three of these field curriculums are subdivided into specialisations. Field curriculum Machine Design and Mechanics offers the specialisations Mechanics of Materials, Systems and Processes or Engineering Design and Product Development.</p>

	<p>Field curriculum Power and Process Engineering offers as specialisation either Thermal and Process Engineering or Energy Technology. Within the field curriculum Production Engineering the student can choose between Production Technologies and Systems or Design of Production Systems. Each of the field curriculums includes a Master's practicum and a Master's thesis. The detailed curriculums are provided in the self-assessment report.</p> <p>The curriculum of the <u>Bachelor's degree programme Mechanical Engineering – Project-Oriented Applied Programme</u> consists of the following modules: Engineering Mathematics 1-2, Engineering Physics, Technical Documentation, Electrical Engineering and Electronics, Energetics and Environment, Informatics and Computing, Engineering Mechanics 1-2, Product Conceptualisation and Systems Design, Measurement, Production Engineering, Engineering Materials, Engineering Thermodynamics 1, Machine Elements 1-2, Heat and Mass Transfer, Programming and Numerical Methods, Fundamentals of Control. The curriculum in year 2 and year 3 of the degree programme depends on the specialisation chosen: Power, Process and Environmental Engineering (PPE), Engineering Design, Machine Operation and Maintenance (DOM), Production Engineering (PRO), Mechatronics (MEC) and Aviation (AVI) which are again divided into sub-specialisations. Depending on the specialisation there are compulsory modules and electives. The degree programmes include a final thesis and a practical training.</p>
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B-3 Degree programme: structures, methods and implementation

<p>Structure and modularity</p>	<p>The Faculty has a credit point system in place. The module's size is between 3 and 10 credit points.</p> <p>Opportunities for study abroad are described as follows: Mobility of students from both <u>Bachelor's degree programmes</u> is not really encouraged, though it is not prevented. Student's mobility at the <u>Master level</u> of study is highly recommended. Interest of our students to study a semester or even two abroad is great.</p> <p>Applied exchange programmes are the following: ERASMUS, CEEPUS, IAESTE international exchange or comparable programmes.</p>
<p>Workload and credit points</p>	<p>According to the self-assessment report 1 ECTS is allocated for 30 hours of student workload.</p> <p>Each semester is composed of 30 ECTS.</p>

	Practical training is integrated in the curriculum and awarded with credit points.
Educational methods	<p>The following educational methods are in use:</p> <p>Didactic concepts with teaching methods and didactic means used in individual study programme are chosen in a way to support the attainment of the programme's objectives, taking their appropriateness to the educational level into account. Particularities can be seen in the description of individual subject given in the enclosed Module Handbook.</p> <p>Besides compulsory components, there is a range of elective and compulsory elective subjects (see B-3 Curriculum).</p>
Support and advice	<p>Offers for the support and advice of students are provided as described below:</p> <p>The Faculty's operation is supported by the organisational units: secretarial office, financial and accounting services, student matters office, human resources office, international co-operation office, technical maintenance, library, computer centre and publishing.</p> <p>Supervision is conducted by the chair head and vice-deans and is regularly monitored through students' survey.</p>

B-4 Examinations: system, concept and organisation

Exam methods	<p>According to Article 4 of the Rules on Testing and Grading the Knowledge of Students at UL FS and the information gathered during the discussions, the exam methods described subsequently are foreseen:</p> <p>The exams are oral, written, or written and oral. The exams are public. The public nature of exams is ensured by the announcement of the exam periods, including the date, time and location of the conduction of exams. The public nature of exams is also ensured by giving the students the right to see the examined written exam and obtain a justification of the achieved result.</p> <p>The Master's thesis is worth 15 credit points and the final thesis in the <u>Bachelor's degree programme Mechanical Engineering – Project-Oriented Applied Programme</u> 12 credit points. The final thesis in each of the programme includes a colloquium. The <u>Bachelor's degree programme Mechanical Engineering - Research and Development Programme</u> does not include a final thesis.</p> <p>Students have the possibility to write thesis externally in cooperation with an industry partner.</p>
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	<p>The type of examination is laid down in the module description for each module</p>
<p>Exam organisation</p>	<p>According to the Rules on Testing and Grading the Knowledge of Students at UL FS the following examination rules apply:</p> <p>Exams are conducted during exam periods. The regular exam terms are the winter, the spring and the fall exam term. The chair of the course sets at least two exam periods in the winter and the summer exam term, and at least one exam period in the autumn exam term. A list of regular exam periods is published by the student matters office on the basis of agreements with the chairs of the courses, study year mentors and the vice dean for pedagogical work, not later than one month before the exam term. The assignment must take into consideration that the student is not required to take more than one exam on the same day.</p> <p>The exam periods in the postgraduate studies are not necessarily scheduled during the exam terms. They are normally assigned upon an agreement between the students and the chairs of the courses.</p> <p>The student must sign up for an exam one week in advance, or not later than 72 hours before the announced exam period. The student signs up for the exam through an electronic system. The examiner may only admit to the exam students who signed up for the exam in accordance with these Rules.</p> <p>A student may take an exam in an individual course after the completion of the lectures in this course if he has fulfilled all the obligations set for this course in the study programme and the study regulations.</p> <p>The student may take exams from the year he is enrolled in, and the missing exams. If a student has re-enrolled in the same year of the studies, he may take exercises and exams for a higher year of study based on a permission given by the responsible vice-dean. The chair of the course publishes the grade of the exam not later than in 7 working days after the exam has been taken.</p> <p>The exam is evaluated by an individual examiner or an exam commission. The exam is conducted before a commission when so determined by these Rules. The examiner or a member of the exam commission may only be a higher education teacher with a valid habilitation.</p> <p>A student who has not successfully completed an exam may retake the exam up to four times. It is possible to retake an exam in the same exam term but more than 14 days must pass between an unsuccessful taking of an exam and its retaking. The Senate of FS may grant the student upon his request the permission to take an exam for the sixth time. The student takes the exam for the fourth, fifth and sixth time in front of a commission that</p>

	<p>consists of at least two and not more than three higher education teachers. The student must cover the costs of taking these exams regardless of the outcome of an exam, except if he withdraws from the exam in due time.</p>
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B-5 Resources

<p>Staff involved</p>	<p>According to the HEI, the Faculty's staff consists of 89 Professors, 98 assistants, 6 lecturers, 37 technical collators, 24 research fellows, 50 young researchers, 18 people of chairs administration and 38 people in common professional services. Some professors are teaching just in one programme, some in several. The total amount of teaching hours is 7 hours per week by professors, and 12 hours by the assistants. By the exercises additional support with technical collators, research fellows and young researchers is used.</p> <p>The university states the following regarding their research activities:</p> <p>The Faculty has been conducting pedagogic, research and professional work in the field of mechanical engineering for more than 60 years. The Faculty performs intensive research activity in all professional fields that are incorporated by its content in the considered study programmes. This activity is related both to classical mechanical engineering as well as to recently developed interdisciplinary fields. Scientific excellence can be proved by considering international impact of the teaching and research staff. A broad and strong collaboration with international scientific partners has been established both on the research level as well as on the academic one. The Faculty plays an important role in supporting R&D activities in Slovenian companies, which can be actually, due to globalisation, considered as international. The Faculty has large research equipment which allows its researchers to perform most complex and advanced research investigations. Proofs on that can be provided on request.</p> <p>The research & development activities relevant to the degree programme are given in the staff handbook. They include among others: Mechanics in technics, harmonizing air conditioning inspection and audit procedures in the tertiary building sector, Noise Reduction of Vacuum cleaner Suction Unit for Wet Suction, Laser triangulation in medicine, Engineering Design, Behaviour of dissipative systems under extreme thermo-mechanical loading, Development of reliable fatigue life prediction processes for light weight exhaust systems, Modelling and Prediction of Road Traffic Activities, Driving Conditions and Critical States, Acoustic Emission Testing, Innovative production systems, etc.</p>
<p>Staff development</p>	<p>The University mentions the following subject-related and didactical further training for staff:</p>

	The professors have the opportunity for sabbaticals.
Institutional environment, financial and physical resources	<p>The university consists of three academies and 23 faculties.</p> <p>The Faculty is managed by its bodies: the Dean, the Senate, the Academic Assembly and the Faculty's Students Council. The Faculty is managed, represented and presented by its Dean. In his work he is assisted by four Vice-Deans for the following areas: two Vice-Deans for educational activities, i.e. one for postgraduate studies (levels 2 and 3) and one for undergraduate studies (level 1), a Vice-Dean for science and research activities, and a Vice-Dean for the Bologna reform. The educational, scientific, research and professional activities are conducted in scope of 18 educational and research units – chairs, and 36 laboratories.</p> <p>The financial basis of the programmes is described as solid. The annual budget for educational activities (public funds) amounts to 5% of the total university's budget. The number of staff is 6% of the total staff of the university. Regarding the funds out of 7 FP programmes in 2010 - 2011 the Faculty is on rank 4 of all members of the university (faculties and academies). Moreover, the Faculty has most projects (255) with partners in 2010- 2011.</p> <p>According to the self-assessment report, the faculty has concluded cooperation agreements with Technical University Munich, Technical University Vienna, Technical University Delft, Polytechnique Grenoble and many others.</p> <p>The faculty has 575 PC for employees and students. Students have access to literature, during the opening hours. Certain magazines are available in electronic form. All laboratories are equipped for the implementation of accredited facilities.</p>

B-6 Quality Management: further development of degree programmes

Quality assurance and further development	<p>Aiming to achieve and maintain a high level of education, the Faculty sets the quality goals and adopts the policy for their realization in the Quality manual. Accordingly, the Faculty sets up the organisational structure and responsibilities, defines the processes, procedures and sources for the monitoring and assessment of individual activities and elements of the studying process. The annual Quality report, which is approved by the Senate of the member faculty, contains an assessment of educational, scientific, research and professional work. Internally, the monitoring and subsequent assessment is performed regularly on a month, semester, year and/or study programme basis, while externally the assessment is</p>
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performed either by the University or the National Agency of Higher Education with a several years period. Also informal assessment from the side of industrial companies is encouraged. The respective assessment findings are thoroughly analysed and actions for improvements are proposed for consideration and approval to the Faculty Senate. Self-evaluations are carried out once a year in scope of the preparation of the Member Faculty's report on quality control and assurance.

A system for electronic tracking of students installed at the Faculty enables the tracking and analysis of weekly performance for all study activities (the current pedagogical process and exam obligations). Using the student information system, the Student matters office at the Faculty regularly collects, analyses and processes data on students' learning outcomes and the whole education, for the purposes of verification, improvement and upgrading of the whole educational process.

The analyses of learning outcomes are a key part of the faculty's strategy, aiming to ensure an efficient educational process. Data is collected on completed/missing obligations, signing up for exams and progression of students, records of presence and performance at exercises are kept etc. The analyses conducted by year, fields of study, courses, generations and study programmes are prepared for weekly consideration at the Dean's collegium and monthly for the Senate of the Faculty. Based on the findings of the self-evaluation and any proposed improvements, given during the self-evaluation process, the Faculty's management prepares the measures for the deployment of the strategy of quality improvement and submits them for consideration and approval to the Faculty's Senate.

The progress that has been made in this field with the programmes is visible in more efficient, continuous and uninterrupted operation of the Quality monitoring commission; regular student surveys on educational work for all executants involved in the process of education; the results of student surveys conducted after the conclusion of each exam period are immediately analysed, used and made available; the results of the student survey are taken into account in the stimulation of career development of cooperating (especially younger) teachers and assistants.

The students participate in the self-evaluation directly through the student survey or indirectly through their representatives in all segments which concern them directly (in all study commissions, and especially in the commission for the assessment of the quality of work). The Student Council of the Faculty is actively involved in the preparation of the quality report.

The evaluation procedures applied during the degree programme are used for the graduate surveys. The Faculty monitors and compares the

	competencies of graduates on the basis of an analysis of study success and achievement of competencies set forth in the study programme. The competencies of graduates and their progress in the practice are tracked by occasional written surveys in the enterprise sector, but they can be observed even better through the direct projects with the industry, as well as joint projects with foreign companies and universities involving the graduates.
Instruments, methods & data	The Faculty provides data on the number of students in each year of the three degree programmes from 2008 – 2012 which allows to a certain extent an assessment of the drop-out rate. Moreover, they provide data on the number of graduates from the Faculty during the last five years.

B-7 Documentation and transparency

Relevant regulations	The regulations below have been provided for assessment: <ul style="list-style-type: none"> • Rules on the Graduation at FS (put into force) • Rules on Testing and Grading the Knowledge of Students at UL FS (put into force)
Diploma Supplement and qualification certificate	Samples of the Diploma Supplement in English language have been provided during the visit. They provide information about the nature, level, context, content and status of the studies, the success of the graduate as well as about the composition of the final grade. In addition to the national grade, a grading scheme is foreseen.

C Assessment of the peers – ASIIN Seal and EUR-ACE® Label

Based on the General Criteria for the Accreditation of Degree Programmes and the Subject-Specific Criteria of Technical Committee 01 – Mechanical Engineering/Process Engineering valid at the time of conclusion of the contract.

Re 1: Formal Specifications

The auditors considered the names of the degree programmes as adequate to reflect the objectives and contents of the programmes.

The auditors verified whether the awarded degrees comply with Slovenian regulations and found that they do. They understood that there is no official English translation foreseen for the degrees awarded.

The peers confirm the classification of the Master's degree programme as having a research-oriented profile. On the one hand, they see that teachers are involved in research and publishing, the department co-operates with various research groups on national and

international level and the major part of funding is coming from industry and research organizations.

The auditors took note of the standard period of study and the credit points. They understood that according to Slovenian law 180 credit points are awarded for the Bachelor, i.e. 6 semesters are expected in a full time mode.

The auditors took note of the other formal aspects of the degree programmes and took it into consideration for their assessment.

Re 2: Degree Programme: content concept & implementation

2.1 Objectives of the degree programmes

In general, the level of objectives and learning outcomes of these degree programmes seemed to reflect the level of European first and second cycle programmes.

The peers understood that the objectives as stipulated in the self-assessment report are not yet available for stakeholders (i.e. students, industry representatives, etc.). (see also 2.2)

The auditors used the overall objectives and outcomes as reference for the analysis of the curricula of the programmes.

2.2 Learning outcomes of the degree programmes

The peers assessed the learning outcomes of the degree programmes as a whole. Overall, the audit team found that the learning outcomes have been described sufficiently and transparently yielding a sound basis for the assessment of the students' and graduates' knowledge, skills and competences. According to the audit team the learning outcomes reflect the level of the qualification sought and are achievable, valid, and reflect currently foreseeable developments in the subject area.

The peers appreciate the leaflets and information for applicants and students available online as well as in a paper version. However, the peers got the impression that the learning outcomes as described in the self-assessment report are not yet published. Therefore, they recommend that the intended learning outcomes and objectives for the programme as a whole are accessible to the relevant stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.

The stated objectives and learning outcomes provided the peers with a reference for the evaluation of the programmes' curricula and resources.

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

The peers deemed that the intended learning outcomes of the degree programmes under review comply with the engineering specific part of Subject-Specific Criteria of the Technical Committee 01 – Mechanical Engineering / Process Engineering. Therefore, they recommend the award of the EUR-ACE® label.

2.3 Learning outcomes of the modules/module objectives

The peers positively emphasise the module descriptions for the degree programmes which contain all necessary information. The only aspect the peers consider to be improved is the taxonomy of the learning outcomes at module level. The auditors discuss with the programme coordinators Bloom's taxonomy that foresees six levels of learning outcomes which they believe is useful for describing the learning outcomes, also to improve the comparability of learning outcomes for students that aspire to spend a semester abroad. The peers are convinced that the students gain in fact the knowledge, skills and competences required in the degree programmes under scrutiny. Nevertheless, the auditors recommend revising the learning outcomes of the modules, in particular using a common taxonomy.

The peers discovered that the module descriptions as presented seem not to be available for students or other persons interested in the degree programmes. The auditors understood that the first lecture is used by the teacher to inform the students on all the details given in the module description. Nevertheless, they recommend making the module descriptions available for relevant stakeholders – particularly students and lecturers – for consultation, e.g. to facilitate or support the decision which specialisation or module to choose.

2.4 Job market perspectives and practical relevance

The peers discussed the job market perspectives with the representatives from the university and from industry. The peers recognised a general demand for graduates for the Bachelor's degree programme – Project-Oriented Applied Programme and the Master's degree programme and that the competences as presented allow graduates for a professional career in the respective areas. They welcome the link between the university and the industry which subsequently leads to an ongoing exchange of information on the needs and demand and, thus, the involvement of industry in the development of the programmes. The industry representatives stated – convincingly for the peers - that they recruit graduates from the two programmes; however, due to the current economic situation in Slovenia the demand is not as high as desired. The peers understood from the students that these also seek to work abroad.

Regarding the Bachelor's degree programme - Research and Development programme the peers doubt the employability of the graduates. The peers deemed the practical elements compared to the other two degree programmes rather low in order to prepare students for dealing with industry-related problems and tasks. The peers could follow the argumentation of the university that this Bachelor's degree is rather considered as an intermediate state before enrolling in the Master's degree programme. The peers took note of the fact that for those students seeking to work after finishing the Bachelor's degree opportunities exist to change to the programme easily. The peers recognised the university's efforts to support students who seek to switch from one Bachelor's degree programme to the other.

2.5 Admissions and entry requirements

The auditors discussed with the representative of the university the admission requirements.

As mentioned above the university stated that it is possible to switch between the degree programmes. The peers understood that the representatives of the Bachelor's degree programme would prefer to have an aptitude test or an interview for selecting applicants.

However, they are not allowed to do so. Nevertheless, the peers found that the admission requirements are reasonable for maintaining the quality of the Bachelor's degree programme.

Regarding the Master's degree programme the peers took note of the fact that students have first to graduate from a Bachelor's degree before they can enrol into the Master's degree programme. The peers saw that procedures for admission to the programme are governed by strictly applied and transparent procedures and quality criteria.

The peers discussed with the university's representatives the recognition of qualifications gained at another institution of higher education, in particular abroad. The university representatives described the process they have in place if a student desires to go abroad for one or more semester. The peers understood that before the student is going abroad a learning agreement is signed that ensures that the selected modules at the other higher education institution and subsequently the qualifications gained can be recognised. The peers welcome that if the module offered at the other university is not exactly the same they recognise the learning outcomes by comparing the results (i.e. by reports that had to be provided at the other higher education institution etc.). They also conduct a kind of discussion about the subject in order to assess if the learning outcomes are achieved. The peers made the university aware of the fact that the regulations on the recognition of exams abroad are less flexible as it is in fact handled.

2.6 Curriculum/content

The auditors found that the curriculum of the degree programmes under scrutiny corresponds to the intended objectives and learning outcomes. They saw that objectives and content of the individual modules are coordinated in order to avoid any unintended overlaps.

When sighting the sample of final projects and exam papers provided by the university, the auditors gained the impression that they reflect the aspired qualification level.

Re 3: Degree programme: structures, methods and implementation

3.1 Structure and modularity

The audit team found that the ASIIN-criteria for modularization are basically met.

As already mentioned above, the peers took note of the procedure regarding the possibility to spend some time abroad without loss of time, i.e. the recognition of qualifications gained abroad. The audit team assesses the process as clear and well organized. Nevertheless, the peers got the impression that the university is not explicitly encouraging students to spend some time of their studies abroad. In the discussion with the students they saw that some of them already have been abroad for one semester. In this regard, the peers positively recognized the enthusiasm and high motivation of students, not only to go abroad but also regarding their studies in general. Therefore, the peers recommend strengthening and enlarging co-operations within Europe to improve students' opportunities to spent time at another higher education institution or on an industrial placement abroad.

The peers discussed with the representatives of the university the numerous specializations in the degree programmes. They appreciate the university's objective to enable the students to

focus their area of interest and also to meet the demand from industry by offering a large number of choices. However, they understood that a specialisation is only conducted if 15 students choose it which in particular might be difficult for the Master's degree programme as well as for the Bachelor's degree – Project-Oriented Applied Programme. From the discussion with the students the peers learned that so far not all of the specialisations offered were in fact conducted. The peers could follow the argumentation that at least 15 students are required for each specialisation as this has implications on the funding. However, the peers recommend for the Master's degree programme Mechanical Engineering and Bachelor's degree Mechanical Engineering – Project-Oriented Applied Programme to offer only specialization modules that in fact can be studied.

3.2 Workload and credit points

The audit team found that the ASIIN-criteria for the award of ECTS credits are met. Nevertheless, they questioned if an evaluation of the actual workload has been conducted in order to assess if the ECTS credits correspond to the actual workload. The peers got the impression that the workload is basically in line with the given ECTS credits and the students are able to finish their studies within the standard period of time. However, it seemed that students have not yet been asked for their actual workload. Therefore, peers recommend collecting data on the workload in order to evaluate if the credit points are allocated accordingly. (see also 6.2)

3.3 Educational methods

The auditors gained the impression that the teaching methods used for implementing the didactical concept are appropriate to support the attainment of the learning objectives. The peers appreciate the student-centred-approach applied at the university. The audit team understood that social skills are not a specialized subject in the curriculum but discussions are part of the lecture as well as in the laboratory. In this regard issues are addressed such as responsibility and other societal aspects regarding the subject.

After having visited the laboratories the peers found out students have sufficient opportunities for practical application in laboratories of what they have learned in theory. In this regard they positively recognized the commitment of the teaching and laboratory staff. Moreover, the auditors saw very enthusiastic students.

3.4 Support and advice

The audit team saw sufficient resources to guarantee support and counselling for students. Based on the provided figures the peers welcome the good tuition ratio. Nevertheless, the peers got the impression that the students do rather seek for help by fellow students from another semester than by the teaching staff or a mentor (e.g. on advice for choosing the specialization). The peers would therefore find it desirable if a kind of coordinator could be designated that is available for general subject-related questions. The peers would see it as beneficial to enable students to achieve the learning outcomes and complete their degree within the normal period of study.

Re 4 Examinations: system, concept and organisation

The peers gain the impression that type, organisation and distribution of examinations are designed to support the attainment of the intended learning outcomes by the time the degree is completed. They were surprised about the fact that the students are offered five examination periods. As the exams have to be prepared, supervised and graded the audit team assumes a high workload for the teaching staff. (see also 5.1)

According to the regulations the timescale for marking exams facilitates to graduate within the standard period of study.

The form of examination is laid down in the module description for each module. The peers also learned that students are informed at the beginning of the teaching term about the examination requirements.

The peers learned that the university does not see a need for a final thesis in the Bachelor's degree programme – Research and Development programme as students are expected to enrol directly in the Master's degree programme where a final thesis is required. Moreover, due to the curricular structure of the programme there is almost no room left for such a final thesis and students have to take a special course on scientific work. The peers made the university aware of the fact that a final thesis is not necessary but an equivalent where students can carry out an assigned task independently and at the level of the qualification sought. The peers understood that in the degree programme something equivalent is integrated but not explicitly outlined. The peers welcome the approach but consider it necessary that a final thesis or equivalent is integrated in the curriculum.

Regarding the assessment of the final thesis the peers understood that a committee decides on the final grading based on the paper work but also the colloquium. This committee is composed of the chairman and the mentor of the candidate. The members of the committee have to agree on a final grade for the final thesis. The peers took note of the fact that more than half of the students conduct their final thesis in cooperation with industry; however, the mentor is always a professor from the university.

Re 5 Resources

5.1 Staff involved

The peers discussed the personnel resources with the representatives of the university in light of the qualification of the teaching staff. The auditors considered the composition and qualification of the staff to be adequate in order to facilitate the achievement of the objectives of the degree programmes. The auditors assess the staff resources available as sufficient for the successful implementation of the programmes.

The peers discussed with the teaching staff how they assess their workload for preparing up to five examinations for each module. They learned that it is a comparably high workload. The peers got the impression that it also has implications on their time available for support and advice but also research activities. Even though the high number of exam periods supports the student-centred-approach, the peers recommend reducing the number of examination dates offered per subject per year.

From the point of view of the auditors the characteristics of the research and development activities of the teaching staff supported the desired outcome level of the programmes. The peers are of the opinion that sufficient opportunities for research are given.

5.2 Staff development

The auditors took note that the teaching staff members have possibilities for a sabbatical to develop and train their didactic and professional skills, even if only some of them made use of it.

5.3 Institutional environment, financial and physical resources

In the course of the on-site visit, the audit team visited the lecture halls and laboratories. The auditors judged that the teaching equipment and facilities available are appropriate for the implementation of the program. However, the auditors assessed some laboratories rather small. In their view this could have implications on the safety requirements. Moreover, they got the impression that operational safety could be improved, on the one hand, by teaching safety rules and, on the other hand, by offering safety equipment such as safety shoes. Therefore, they recommend obeying safety rules strictly in all laboratories and workshops.

The peers saw that cooperations with other universities are sufficient for the purpose of the degree programmes. However, the students expressed the wish that these could be strengthened and enlarged to improve students' opportunities to spend time at another higher education institution or on an industrial placement abroad.

Re 6 Quality Management: further development of degree programmes

6.1 Quality assurance and further development

With regard to the development and continuous improvement of the aforementioned degree programmes, the auditors considered the quality management concept. During the on-site visit they received a document further specifying the regulations and organisation of the quality management process. The peers welcome the documentation on the functioning of the quality management concept and its processes. It includes that every student has to fill in a questionnaire after the exam (electronically). The cumulated data are then provided to the lecturer. If the evaluation is problematic the dean will discuss it with the teacher and the senate. Moreover, they aspire to get the opinion directly from the students. This quality assurance system basically enables the university to determine any failure to achieve goals and draft suitable measures.

6.2 Instruments, methods & data

The peers found that the quality and quantity of the collected data and its analysis are suitable to provide information about the number of students that complete the programmes in time.

The audit team recognised a comparably high number of drop-outs as presented in the self-assessment report, however, the peers understood that due to the fact that being a student in Slovenia leads to a certain status some students are enrolled but do not attend the lectures and exams. Moreover, the peers learned that moving to the next academic year is only possible for students that have achieved 60 credits. They welcome the university's efforts in offering tutorials and also introduction seminars for physics, mathematics before students start the semester.

The peers saw that the university obviously does not conduct a review of the actual student workload in order to examine whether the given ECTS credits are reflecting the actual workload. Therefore, the peers recommend to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.

Re 7 Documentation and transparency

7.1 Relevant regulations

The peers took note of the regulations made available. They found that the regulations include all the information necessary about the examination and completion of the degree.

7.2 Diploma Supplement and qualification certificate

The auditors took note of the Diploma Supplement. They gained the impression that it provides sufficient information about the nature, level, context, content and status of the studies, the success of the graduate as well as about the composition of the final grade. Moreover, the peers saw that the Diploma Supplement foresees to provide the grading scheme and explanation of the meaning of each grade. In the opinion of the peers this enables the reader to interpret Slovenian grades.

D Additional Information

Before preparing their final recommendation, the auditors ask 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:

Not necessary

E Comment of the HEI (23 October 2012)

With reference to e-mail message from October 12, 2012, sent by ASIIN to Prof. Štok, the Vice-Dean for the Bologna reform of the Faculty of Mechanical Engineering, University of Ljubljana, and therein attached ASIIN Accreditation Report, issued upon the conclusions of the ASIIN audit team visit in Ljubljana, which took place on September 24-26, 2012, we give the following comments and explanations to the issues raised in the ASIIN Accreditation Report.

ASIIN Accreditation Report findings and respective comments of the Faculty:

Re 2: Degree Programme: content concept & implementation

2.1 Objectives of the degree programmes

The peers understood that the objectives as stipulated in the self-assessment report are not yet available for stakeholders (i.e. students, industry representatives, etc.). (see also 2.2)

2.2 Learning outcomes of the degree programmes

However, the peers got the impression that the learning outcomes as described in the self-assessment report are not yet published. Therefore, they recommend that the intended learning

outcomes and objectives for the programme as a whole are accessible to the relevant stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.

In fact, the objectives of the degree programmes are addressed in a very short and concise way in a general description of the Faculty's mission with its vision and strategy given, which is accessible to the public. In full extent, the intended learning outcomes and objectives are accessible to the lecturers via intranet, whereas students can obtain the required information by reading the official brochures on the respective programmes at the Faculty's web site or, as it is the case of the Master's programme, by printed material issued intentionally to give further information to the students of the first degree programmes.

2.3 Learning outcomes of the modules/module objectives

The peers positively emphasise the module descriptions for the degree programmes which contain all necessary information. The only aspect the peers consider to be improved is the taxonomy of the learning outcomes at module level. The auditors discuss with the programme coordinators Bloom's taxonomy that foresees six levels of learning outcomes which they believe is useful for describing the learning outcomes, also to improve the comparability of learning outcomes for students that aspire to spend a semester abroad. The peers are convinced that the students gain in fact the knowledge, skills and competences required in the degree programmes under scrutiny. Nevertheless, the auditors recommend revising the learning outcomes of the modules, in particular using a common taxonomy.

The reason why Bloom's taxonomy is not included explicitly in the modules' description is rather simple. When applying for the accreditation in the Republic of Slovenia we had to strictly follow the requests given and formulated in the official forms, prepared by the National Agency of Higher Education. Unfortunately, although possibly addressed implicitly, in those forms no such explicit levelling as given by Bloom's taxonomy was foreseen. We fully agree that following Bloom's taxonomy from the very beginning would certainly improve and strengthen our didactical approach in general, including all the staff involved in education. At the moment, Bloom's taxonomy is implemented in the education according to a teacher's understanding and experience.

Considering the auditors recommendations we will focus our future education on explicit levelling by Bloom's taxonomy.

The peers discovered that the module descriptions as presented seem not to be available for students or other persons interested in the degree programmes. The auditors understood that the first lecture is used by the teacher to inform the students on all the details given in the module description. Nevertheless, they recommend making the module descriptions available for relevant stakeholders – particularly students and lecturers – for consultation, e.g. to facilitate or support the decision which specialisation or module to choose.

The complete module descriptions are available to the lecturers via intranet, whereas students can obtain the information on the content of each module by reading the official brochures on the respective programmes at the Faculty's web site. Information

incorporated in those brochures is prescribed by the National Agency of Higher Education.

2.5 Admissions and entry requirements

The peers made the university aware of the fact that the regulations on the recognition of exams abroad are less flexible as it is in fact handled.

In our opinion, the regulations on the recognition of exams abroad have to be, irrespective of what is the degree of imposed demands, tackled with care and flexibility, when needed. This is, above all, because diversity of different approaches practiced and possibly different subject contents given when studying elsewhere, must not prevent students of living new experience and acquiring knowledge, which may possibly differ from the one taught at its home faculty. The latter is actually among the key reasons to motivate and encourage students' mobility. In order to attain such objective, the purpose and subjects to be studied by a student abroad are carefully coordinated by his mentor.

Re 3: Degree programme: structures, methods and implementation

3.1 Structure and modularity

As already mentioned above, the peers took note of the procedure regarding the possibility to spend some time abroad without loss of time, i.e. the recognition of qualifications gained abroad. The audit team assesses the process as clear and well organized. Nevertheless, the peers got the impression that the university is not explicitly encouraging students to spend some time of their studies abroad. In the discussion with the students they saw that some of them already have been abroad for one semester. In this regard, the peers positively recognized the enthusiasm and high motivation of students, not only to go abroad but also regarding their studies in general. Therefore, the peers recommend strengthening and enlarging co-operations within Europe to improve students' opportunities to spent time at another higher education institution or on an industrial placement abroad.

Students are fully aware of their possibility to study abroad for a certain time (one or two semesters). This is officially recognized and let known to students. Initiative and decision to spend some time abroad is usually on a student's side, but there are several cases, in particular at the Master's degree, that most advanced and promising students are sent by their mentor abroad to fulfil a specified programme on a particular HEI.

The peers discussed with the representatives of the university the numerous specializations in the degree programmes. They appreciate the university's objective to enable the students to focus their area of interest and also to meet the demand from industry by offering a large number of choices. However, they understood that a specialisation is only conducted if 15 students choose it which in particular might be difficult for the Master's degree programme as well as for the Bachelor's degree – Project-Oriented Applied Programme. From the discussion with the students the peers learned that so far not all of the specialisations offered were in fact conducted. The peers could follow the argumentation that at least 15 students are required for each specialisation as this has implications on the funding. However, the peers recommend for the Master's degree programme Mechanical Engineering and Bachelor's degree Mechanical

Engineering – Project-Oriented Applied Programme to offer only specialization modules that in fact can be studied.

In order to ensure economic sustainability of the programmes' execution corresponding measures have been implemented by the Faculty's Senate, according to which a programme field specialization is conducted only when a sufficient number of students is met. At the present moment the targeted number is fifteen (15), but it is foreseen to be changed as soon as governmental funding will allow that. However, for better understanding it has to be taken into account that this measure is applied only for interdisciplinary field specializations in the Master's programme and sub-field specializations in the Bachelor's degree – Project-Oriented Applied Programme.

In the case of insufficient number of enrolled students the foreseen sub-field specializations in the POA programme (Year 3) are correspondingly combined to obtain optimal impact regarding the students professional education within the chosen field specialization. In the case of insufficient number of students, interested in an interdisciplinary field specialization in the Master's programme, the respective field specialization (Year 1) is not offered and students can not be enrolled in it. In this regard it should be however emphasized, that a particular procedure is applied in order to find out actual interest of potential students of the Master's programme. Namely, in the process of preliminary evidence, which is performed several months prior to official enrolment, students are asked for their professional orientation specifying two choices, primary and secondary one. It is mandatory that one of those choices is linked to a so-called core field specialization. The described procedure ensures that core field specializations are offered and executed every year, whereas interdisciplinary field specializations are executed only if interest for its enrolment is demonstrated by enough students. Once students are enrolled in an interdisciplinary field specialization its two-year execution and regular completion of the programme is guaranteed regardless of the number of students passing from Year 1 to Year 2.

3.2 Workload and credit points

The audit team found that the ASIIN-criteria for the award of ECTS credits are met. Nevertheless, they questioned if an evaluation of the actual workload has been conducted in order to assess if the ECTS credits correspond to the actual workload. The peers got the impression that the workload is basically in line with the given ECTS credits and the students are able to finish their studies within the standard period of time. However, it seemed that students have not yet been asked for their actual workload. Therefore, peers recommend collecting data on the workload in order to evaluate if the credit points are allocated accordingly. (see also 6.2)

The Faculty is fully aware that the ECTS credits, as specified in the Programmes' curricula, are only an estimation of the actual workload. Although in the stage of the Programmes building much effort had been devoted to establish appropriate basis and measures for adequate workload assessment, aiming that at least comparatively the ECTS credits are allocated reasonably between the modules, the feedback, measured directly by asking students for the actual workload required to carry out all the modules' obligations, has not been considered yet. We agree with the peers' recommendation that collecting data on the actual workload is of great significance in evaluating whether the credit points are allocated adequately. In this regard, we will take measures to collect in future also data related to

students' actual workload.

3.4 Support and advice

The audit team saw sufficient resources to guarantee support and counselling for students. Based on the provided figures the peers welcome the good tuition ratio. Nevertheless, the peers got the impression that the students do rather seek for help by fellow students from another semester than by the teaching staff or a mentor (e.g. on advice for choosing the specialization). The peers would therefore find it desirable if a kind of coordinator could be designated that is available for general subject-related questions. The peers would see it as beneficial to enable students to achieve the learning outcomes and complete their degree within the normal period of study.

Although not always a sound and reliable information is obtained, students usually prefer seeking additional information and help by older fellow students. This can be judged as rather logical since it is not influenced by possible bias of the teaching staff. Apart from that, from the Faculty's side continuous support and counselling is ensured by mentor-coordinators, who are selected each year among the teaching staff involved in execution of the actual study process (per Programme, per Field specialization, per Year of study). The role of the mentor-coordinators is to support students both on purely study-related issues as well as on issues of general nature. To accomplish this task responsibly the most experienced teachers are selected for the mentor-coordinators.

Re 4 Examinations: system, concept and organisation

The peers gain the impression that type, organisation and distribution of examinations are designed to support the attainment of the intended learning outcomes by the time the degree is completed. They were surprised about the fact that the students are offered five examination periods. As the exams have to be prepared, supervised and graded the audit team assumes a high workload for the teaching staff. (see also 5.1)

The peers' statement regarding a high workload of the teaching staff associated with the excessive number of examinations per module, and consequences for the teaching staff, is correct. The fact is that the Faculty is continuously trying to improve efficiency of the pedagogical process. In this regard, rather intense on-going student testing during the actual course of the module are practiced, thus facilitating continuity of the learning outcomes acquisition and accelerating completion of the required study obligations. We believe that along with those actions also students' approach to study will change with time, which would eventually allow reducing the number of examinations.

The peers learned that the university does not see a need for a final thesis in the Bachelor's degree programme – Research and Development programme as students are expected to enrol directly in the Master's degree programme where a final thesis is required. Moreover, due to the curricular structure of the programme there is almost no room left for such a final thesis and students have to take a special course on scientific work. The peers made the university aware of the fact that a final thesis is not necessary but an equivalent where students can carry out an assigned task independently and at the level of the qualification sought. The peers understood

that in the degree programme something equivalent is integrated but not explicitly outlined. The peers welcome the approach but consider it necessary that a final thesis or equivalent is integrated in the curriculum.

The Bachelor's degree programme – Research and Development programme is conceived intentionally as a programme, which is to be followed by a corresponding master's programme. Accordingly, the main objective of the programme is to provide the emphasised building up of a strong fundamental and rather basic professional knowledge, thus enabling the programme's graduates to make their acquaintance with and understand a wide range of mechanical engineering problems and to obtain, at the same time, a large amount of interdisciplinary knowledge. With those prerequisites the graduates are encouraged to continue their education on the masters' level with the research and development-oriented study emphasized.

Considering the above stated programme's framework no final thesis is explicitly foreseen for completion of the programme, which is fully in accordance with Slovene legislation on higher education. However, among the actual study activities performed by the students in Year 3, in particular considering compulsory modules Numerical Modelling Methods, Measurement Techniques and Design Methodology, there are individually assigned tasks, which could be easily considered as an equivalent to the final thesis. This can be justified both with respect to individual specification of such a task and student's activity needed to solve the assigned task independently and in accordance with the expected qualification level.

Regarding the assessment of the final thesis the peers understood that a committee decides on the final grading based on the paper work but also the colloquium. This committee is composed of the chairman and the mentor of the candidate. The members of the committee have to agree on a final grade for the final thesis. The peers took note of the fact that more than half of the students conduct their final thesis in cooperation with industry; however, the mentor is always a professor from the university.

The committee for the assessment of the final thesis is not composed just of the chairman and candidate's mentor, but of the chairman and all mentors, whose candidates are defending their thesis in the same thesis defence period.

Re 5 Resources

5.1 Staff involved

The peers discussed with the teaching staff how they assess their workload for preparing up to five examinations for each module. They learned that it is a comparably high workload. The peers got the impression that it also has implications on their time available for support and advice but also research activities. Even though the high number of exam periods supports the student-centred-approach, the peers recommend reducing the number of examination dates offered per subject per year.

The peers' recommendation is greatly acknowledged. Actions described in the Faculty's answer to the peers' findings under Re 4 Examinations will be continuously intensified, aiming at reducing the number of examination dates.

5.3 Institutional environment, financial and physical resources

In the course of the on-site visit, the audit team visited the lecture halls and laboratories. The auditors judged that the teaching equipment and facilities available are appropriate for the implementation of the program. However, the auditors assessed some laboratories rather small. In their view this could have implications on the safety requirements. Moreover, they got the impression that operational safety could be improved, on the one hand, by teaching safety rules and, on the other hand, by offering safety equipment such as safety shoes. Therefore, they recommend obeying safety rules strictly in all laboratories and workshops.

The peers' findings are correct. Some of laboratories are indeed rather small. In this regard it is expected that the laboratory space will enlarge significantly by a new faculty building, which is under construction. We accept the criticism of the peers regarding operational safety and respecting of the safety rules. Our immediate action to the peers' finding is that all safety measures, including acquisition of the safety prerequisites, have been already realized.

The peers saw that cooperations with other universities are sufficient for the purpose of the degree programmes. However, the students expressed the wish that these could be strengthened and enlarged to improve students' opportunities to spend time at another higher education institution or on an industrial placement abroad.

The comment on the students wishes regarding external cooperation is given in the Faculty's answer to the peers' findings under **Re 3 Degree programme 3.1 Structure and modularity**.

6.2 Instruments, methods & data

The peers saw that the university obviously does not conduct a review of the actual student workload in order to examine whether the given ECTS credits are reflecting the actual workload. Therefore, the peers recommend to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.

The comment on collecting the actual student workload is given in the Faculty's answer to the peers' findings under **Re 3 Degree programme 3.2 Workload and credit points**.

Professor Boris Štok

Professor Jožef Duhovnik

Vice-Dean for Bologna Reform

Dean of the Faculty of Mechanical Engineering

Ljubljana, October 23, 2012

F Final Assessment of the peers (01 November 2012)

The auditors gained an overall positive impression of the degree programmes offered by University of Ljubljana.

In particular, they find the following aspects to be very **positive**: Enthusiasm of the students, large number of choices which are offered to students, commitment of the teaching and laboratory staff and the student-centered approach.

Areas for **improvement** are mentioned in the requirements and recommendations.

The peers welcome the **comments** given by University of Ljubljana and assess them as follows:

- Regarding the publication of the objectives and learning outcomes of the degree programmes the peers welcome that these are available for students and lecturers in the intranet. According to the auditors the mentioned printed material (brochures) is available on the internet for the public but it only describes learning outcomes on a module level but not on the level of the degree programme as such. The peers welcome that the diploma supplement provides information on the objectives and learning outcomes to the relevant stakeholders, here in particular from industry. However, this is only available to the students after they have graduated. Therefore the envisaged recommendation is still relevant.
- The peers appreciate the intention of the Faculty to revise the learning outcomes in the module descriptions according to a common taxonomy. As it is not yet implemented the revision should be reviewed in the framework of the reaccreditation. Therefore, the peers consider the foreseen recommendation as still relevant.
- With respect to the publication of the module description to the relevant stakeholders the peers welcome that the content of each module is available. However, the peers do not only refer to the content of the module but also other information but all other information that is provided in the each of the module description (such as learning outcomes, type of exam, reading material, etc.). The peers understood that the module descriptions as presented in the self-assessment report are not available to stakeholders such as applicants and or industry representatives. They come to the conclusion that in particular prospective students are not able to consult the module description in detail in advance of their application and industry representatives neither can inform themselves about, for example, the learning outcomes of modules they are interested in. Therefore, the peers still consider the envisaged requirement as necessary.
- The peers welcome the efforts done by the Faculty to inform students on possibilities for spending a semester at another Higher Education Institution abroad. They are also aware of the fact that students themselves have to take the initiative to do so. However, the peers referred to the fact that - on a long term basis - opportunities for a semester abroad should be increased by strengthening and enlarging Faculty's cooperation in particular with relevant institutions (industry and higher education) in Europe. Therefore they still see relevance for the envisaged recommendation in order to review the development in the framework of the reaccreditation process.

- The peers can follow the argumentation of the university regarding the minimum number of students that has to be enrolled in a module due to economic implications which also depends on the government funding. The audit team also understands that difficulties in offering the modules only refers to interdisciplinary field specializations in the Master's degree programme and sub-field specializations in the Bachelor's degree – Project-Oriented Applied Programme. Nevertheless, the peers assume that students apply for these programmes due to the published (and therefore advertised) specifications. According to the peers students should be able to rely on the specifications offered at the moment they enrol in these programmes. In the discussion with the students during the visit, they understood that this was not always the case. The peers welcome the effort made by the Faculty to minimise the risk for those students by combining the sub-field specifications in the Bachelor's degree programme and the preliminary survey regarding the actual interest of the students. However, the peers do not see a guarantee for students that all offered specialisations are conducted. Therefore, they regard the foreseen recommendation as still relevant.
- The audit team is convinced and appreciates the Faculty's efforts by estimating the work load of students before allocating the ECTS points. They welcome the intention of the Faculty to evaluate the actual workload and if necessary to adapt the given ECTS points accordingly. The peers are aware of the fact that it is a long-term task which also implies each module would have been conducted at least once.
- Regarding the number of exam periods the auditors appreciate the student-centered approach by offering continuously exams. However, as discussed before the work load for teachers should be compared and be on an expectable level. The Faculty assumes that a reduction of the number of exam periods might occur due to a change of the requirements of the students. In order to review the issue during the reaccreditation process the peers suggest maintaining the recommendation.
- The peers can basically follow the comments of the Faculty regarding the equivalent for the Bachelor's thesis in the Bachelor's degree programme – Research and Development programme. According to the peers is the idea behind the final thesis and/or equivalent to proof the ability of the graduate to work independently on an assigned task in the field and on the academic level envisaged. The peers see the necessity for such a final task in order to provide evidence that the graduates have achieved the minimum requirements for enrolling to the Master's degree programme. This also includes a certain knowledge and understanding as well as capability and competence to work scientifically. The peers still miss some kind of concept or module description that lays down the learning outcomes, the process how it will be conducted, how it is assessed and marked, etc. Therefore, they still consider the envisaged requirement as necessary.
- The peers take note of the correction regarding the composition of the committee for the assessment of the final thesis.
- The peers welcome the efforts made and foreseen regarding the laboratory. In order to review the improvements in five years, they suggest keeping the relevant recommendation.

Based on the self-report, the onsite discussions and the comments of the university, the peers recommend the award of the requested seals as described hereafter:

Degree Programme	ASIIN-seal	Subject-Specific label ²	Accreditation valid until (max.)
Ba Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE [®]	30.09.2018
Ma Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE [®]	30.09.2018
Ba Mechanical Engineering - Project Oriented Applied Programme	with requirements for one year	EUR-ACE [®]	30.09.2018

Requirements and recommendations for the requested seals and labels

Requirements

For all degree programmes

1. The module descriptions have to be available for relevant stakeholders – particularly students and lecturers – for consultation.

For the Bachelor's degree programmes Mechanical Engineering – Research and Development Programme

2. The degree programme has to end with a final thesis or equivalent that guarantees that students can carry out an assigned task independently and at the level of the qualification sought.

Recommendations

For all degree programmes

1. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.
2. It is recommended to revise the learning outcomes of the modules using a common taxonomy.
3. It is recommended that the intended learning outcomes and objectives for the programme as a whole are accessible to the relevant

ASIIN criterion
2.3
4
ASIIN criterion
6.1 6.2
2.3
2.1 2.2

² Requirements, recommendations and accreditation dates for subject-related labels correspond to ASIIN Label.

stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.	
4. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.	2.1 2.2
5. It is recommended to strengthen and enlarge co-operations within Europe to improve students' opportunities to spend time at another higher education institution or on an industrial placement abroad.	5.3 3.1
6. It is recommended to obey safety rules strictly in all laboratories and workshops.	5.3
7. It is recommended to reduce the number of examination dates offered per subject per year.	4 5.1
<u>For the Master's degree programme and Bachelor's degree Mechanical Engineering – Project-Oriented Applied Programme</u>	
8. It is recommended to offer only specialization modules that in fact can be studied.	3.1

G Comments of the Technical Committee 01 – Mechanical Engineering (22 November 2012)

The Technical Committee discusses the procedures taking into account the accreditation report, curricula, objective matrices and summary. The Technical Committee considers the issue addressed in recommendation 2 as less crucial concerning the accreditation as outlined by the audit team.

The Technical Committee discusses the procedures taking into account the accreditation report, curricula, objective matrices and summary. The Technical Committee considers the issue addressed in recommendation 2 as less crucial concerning the accreditation as outlined by the audit team.

The Technical Committee discusses the specialization "Engineering Pedagogy" of the Master's degree programme for which as a result the degree "Master Professor in Mechanical Engineering" will be awarded. Taking into account the EUR-ACE Framework Standards for the Accreditation of Engineering Programmes for Second Cycle programmes, the Technical Committee discusses to what extent students enrolled in the specialization "Engineering Pedagogy" do meet the EUR-ACE competencies in "Engineering Practice", "Engineering Design" and "Engineering Analysis". It is argued that the curriculum consists of seven modules in pedagogy and social sciences, three elective modules which also can be chosen from the

field of pedagogy and four subject-related modules which also take into account pedagogical aspects. According to the Technical Committee only six compulsory modules address the competencies of a Mechanical Engineer as such. In addition, these six modules seem to be chosen randomly. The Technical Committee has difficulties to identify a certain profile which the graduate can achieve. In contrast to this, the Technical Committee considers the EUR-ACE programme outcomes “Knowledge and Understanding” and “Transferable Skills” as definitely achieved. These competences seem to be even overrepresented.

The Technical Committee comes to the conclusion that only two of the five required programme outcomes according to the EUR-ACE Framework Standards can be achieved entirely.

Based on the discussion above the Technical Committee recommends to the Accreditation Commission for degree programmes to award the following Labels:

Degree Programme	ASIIN-seal	Subject-Specific label³	Accreditation valid until (max.)
Ba Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE [®]	30.09.2018
Ma Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE [®] , excluding the specialization “Engineering Pedagogy”	30.09.2018
Ba Mechanical Engineering - Project Oriented Applied Programme	with requirements for one year	EUR-ACE [®]	30.09.2018

Requirements and recommendations for the requested seals and labels

Requirements

For all degree programmes

1. The module descriptions have to be available for relevant stakeholders – particularly students and lecturers – for consultation.

For the Bachelor’s degree programmes Mechanical Engineering – Research and Development Programme

2. The degree programme has to end with a final thesis or equivalent that guarantees that students can carry out an assigned task independently

ASIIN criterion
2.3
4

³ Requirements, recommendations and accreditation dates for subject-related labels correspond to ASIIN Label.

and at the level of the qualification sought.

Recommendations

For all degree programmes

1. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.
2. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.
3. It is recommended that the intended learning outcomes and objectives for the programme as a whole are accessible to the relevant stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.
4. It is recommended to strengthen and enlarge co-operations within Europe to improve students' opportunities to spend time at another higher education institution or on an industrial placement abroad.
5. It is recommended to obey safety rules strictly in all laboratories and workshops.
6. It is recommended to reduce the number of examination dates offered per subject per year.

For the Master's degree programme and Bachelor's degree Mechanical Engineering – Project-Oriented Applied Programme

7. It is recommended to offer only specialization modules that in fact can be studied.

	ASIIN criterion
1. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.	6.1 6.2
2. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.	2.1 2.2
3. It is recommended that the intended learning outcomes and objectives for the programme as a whole are accessible to the relevant stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.	2.1 2.2
4. It is recommended to strengthen and enlarge co-operations within Europe to improve students' opportunities to spend time at another higher education institution or on an industrial placement abroad.	5.3 3.1
5. It is recommended to obey safety rules strictly in all laboratories and workshops.	5.3
6. It is recommended to reduce the number of examination dates offered per subject per year.	4 5.1
7. It is recommended to offer only specialization modules that in fact can be studied.	3.1

H Decision of the Accreditation Commission (07 December 2012)

The Accreditation Commission for Degree Programmes discusses the procedure. It follows the assessment of Technical Committee 01 – Mechanical Engineering/Process Engineering regarding the EUR-ACE label. Moreover, the Accreditation Commission shares the opinion of the Technical Committee considering the peer's recommendation 2 and therefore decides to omit it. Apart from this the Accreditation Commission follows the peers and the Technical Committee.

The Accreditation Commission for Degree Programmes decides to award the following labels:

Degree Programme	ASIIN-seal	Subject-Specific label⁴	Accreditation valid until (max.)
Ba Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE®	30.09.2018
Ma Mechanical Engineering - Research and Development Programme	with requirements for one year	EUR-ACE®, excluding the specialization "Engineering Pedagogy"	30.09.2018
Ba Mechanical Engineering - Project Oriented Applied Programme	with requirements for one year	EUR-ACE®	30.09.2018

Requirements

For all degree programmes

1. The module descriptions have to be available for relevant stakeholders – particularly students and lecturers – for consultation.

For the Bachelor's degree programmes Mechanical Engineering – Research and Development Programme

2. The degree programme has to end with a final thesis or equivalent that guarantees that students can carry out an assigned task independently and at the level of the qualification sought.

Recommendations

For all degree programmes

1. It is recommended to further implement the quality management concept and to use the data collected for continuous improvement. The collection of data should also include the actual workload.
2. It is recommended that the intended learning outcomes and objectives for the programme as a whole are accessible to the relevant stakeholders - particularly lecturers and students - in a way that students are able to appeal to them for example in the scope of the internal quality assurance system.
3. It is recommended to strengthen and enlarge co-operations within Europe to improve students' opportunities to spend time at another

ASIIN criterion
2.3
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ASIIN criterion
6.1 6.2
2.1 2.2
5.3 3.1

⁴ Requirements, recommendations and accreditation dates for subject-related labels correspond to ASIIN Label.

higher education institution or on an industrial placement abroad.

4. It is recommended to obey safety rules strictly in all laboratories and workshops.

5. It is recommended to reduce the number of examination dates offered per subject per year.

For the Master's degree programme and Bachelor's degree Mechanical Engineering – Project-Oriented Applied Programme

6. It is recommended to offer only specialization modules that in fact can be studied.

5.3
4 5.1
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