University of Niš
Faculty of Mechanical Engineering in Niš

DOCUMENTATION
FOR THE ACCREDITATION OF THE STUDY PROGRAMME OF DOCTORAL ACADEMIC STUDIES
Mechanical Engineering

CONTENTS:

- COURSE DIRECTORY
- STAFF DIRECTORY
- MENTOR DIRECTORY

Niš, January 2020

INTRODUCTION:

Study programme title	**Mechanical Engineering**
Name of the institution with which a joint study programme is organized (if the study programme is conducted by more than one institution)	
Higher education institution at which the study programme is conducted	**Faculty of Mechanical Engineering, University of Niš**
Educational-scientific/educational-artistic field	**Engineering Sciences and Technology**
Scientific or artistic area	**Mechanical Engineering**
Volume of studies expressed in ECTS credits	**180 ECTS**
Title of the degree	**Doctor of Science in Mechanical Engineering**
Duration of studies	**3 years; 6 semesters**
Year in which the study programme was first conducted	**2009**
Year in which the study programme will be first conducted (if the programme is new)	
Accredited number of students at this study programme	**25**
Planned number of students to be admitted to the first year of studies (total number first x 3) of this study programme	**25 students to be admitted to the first year of studies (total number up to 75 to be admitted to the all year of studies)**
Date when the programme was approved by the authorized body (state which)	**21/01/2020 Faculty Board of the Faculty of Mechanical Engineering in Niš** **28/01/2020 Senate of the University of Niš**
Language in which the study programme is conducted	**Serbian and English**
Year of the accreditation of the programme	**The first accreditation: 2009** **The second accreditation: 2014**
Web address at which the information on the study programme is located	**http://www.masfak.ni.ac.rs**

Special standard: Competence of the higher education institution for conducting doctoral studies
The higher education institution attests its readiness to conduct doctoral studies on the basis of the indicators that are related to scientific research.

The Faculty of Mechanical Engineering in Niš today represents a top educational and scientific research institution, which successfully follows the development of mechanical engineering sciences and technologies in the world and forms a basis for modern economy within the technological development of our country in the 21st century.

Since the establishment of the Faculty of Mechanical Engineering in Niš, 164 doctoral dissertations have been defended at the Faculty (Table P.1A).

Table P.7 provides a list of professors who are still employed full-time, and who have served as doctoral advisors.

In the academic year 2019/2020, the professors and assistants of the Faculty of Mechanical Engineering in Niš participate in the implementation of 24 projects (Table P.3) within the areas of:

- fundamental research (a total of 8 projects, 2 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),
- integrated and interdisciplinary research (a total of 6 projects, 2 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),
- technological development (a total of 10 projects, 6 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),

within the Research Programme of the Ministry of Education, Science, and Technological Development of the Republic of Serbia.

Furthermore, in the calendar year 2019, the professors and assistants of the Faculty of Mechanical Engineering in Niš (Table P.3) participate in the implementation of 2 projects of the Ministry of Education, Science, and Technological Development within the Development of Higher Education Programme, as well as 2 innovation projects funded by the Innovation Fund.

Special attention in the scientific research activity is paid to the participation in international projects (Table P.3). Currently, 6 international projects are being implemented at the Faculty (3 projects within the HORIZON 2020 programme, 2 projects within the ERASMUS+ programme, and 1 project within the programme of bilateral cooperation with the Federal Republic of Germany). This is how the Faculty intensifies the cooperation with other faculties and universities abroad.

At the moment, there are 99 Faculty professors, assistants, and associates who participate in the implementation of domestic and international projects (Table P.4).

The Faculty organizes and co-organizes a number of renowned international conferences (MASING, RAILCON, SIMTERM, SAUM), which provides a direct support to Faculty professors, assistants, and associates for the publication of their scientific research results in the proceedings from the above conferences.

The Faculty also provides material support to young assistants for the participation in scientific and professional gatherings in the country and abroad.

The number of published papers in the M10 and M20 categories in the previous 5 years, whose authors or co-authors are Faculty professors, assistants, and associates, is 486 (Table P.1B).

The ratio between the SCI-indexed papers (M21a, M21, M22, M23), published in the previous five years, and the total number of professors and assistants at the Faculty of Mechanical Engineering in Niš is 373/99 = 3.77.

In the previous calendar year 2018, Faculty professors, assistants, and associates issued 4 publications in the M10 category, 81 publications in the M20 category, 171 publications in the M30 category, 3

publications in the M40 category, 29 publications in the M50 category, 6 publications in the M60 category, 6 publications in the M70 category, and 1 publication in the M90 category (Table P.5).

In the period from 2014 to date, 46 doctoral dissertations have been defended at the Faculty, with a large number of appropriate publications in peer-reviewed journals that present the results of the candidates' doctoral dissertations.

Appendix P.1 provides the Scientific Research Programme of the Faculty for the period 2016-2020.

Appendix P.2 provides the Decision on the Accreditation of the Faculty of Mechanical Engineering in Niš as a scientific research institution.

Appendix P.6 provides a list of institutions in the country and abroad with which the Faculty cooperates.

Tables and appendices attached to the Special standard:

Table P.1 A summary of defended theses and issued publications

Table P.1A A list of defended doctoral dissertations at the Faculty of Mechanical Engineering in Niš

Table P.1B The number and list of SCI-indexed papers per year for the previous five-year period

Table P.3 A list of scientific research projects currently being implemented at the higher education institution

Table P.4 A list of the higher education institution staff participating in scientific research and artistic research projects

Table P.5 A summary of scientific research results in the institution in the previous calendar year

Table P.6 A list of institutions in the country and abroad with which the higher education institution cooperates

Table P.7 A list of full-time employed professors who have served as doctoral advisors

Appendix P.1 Scientific Research Programme

Appendix P.2 Decision on the Accreditation of the Scientific Research Organization

Standard 1. Study programme structure

Doctoral studies are equivalent to at least 180 ECTS credits, with the previously achieved volume of studies of at least 300 ECTS credits in undergraduate and graduate academic studies, or 360 ECTS credits in integrated undergraduate and graduate academic studies within medical sciences. The doctoral dissertation is the final part of the study programme of doctoral studies, except for a doctorate in arts which is an arts programme.

The study programme of doctoral academic studies in **Mechanical Engineering** contains all of the elements prescribed by the Law on Higher Education of the Republic of Serbia and the Statute of the Faculty of Mechanical Engineering in Niš (Appendix 1.2).

The study programme of doctoral academic studies in **Mechanical Engineering** belongs to the field of **engineering sciences and technology** and it is categorized under the scientific and professional area of **Mechanical Engineering**. The study programme **lasts for 3 years**, i.e. 6 semesters, and it is **equivalent to 180 ECTS credits**. Each year of studies is equivalent to 60 ECTS credits. The doctoral dissertation is the final part of the study programme of doctoral studies.

The study programme of doctoral academic studies in **Mechanical Engineering** comprises **core** and **elective** courses, whose completion grants necessary academic knowledge and skills for acquiring the scientific degree of **Doctor of Science in Mechanical Engineering**, for the specialized scientific fields of: Production Systems and Technologies; Mechatronics; Automatic Control and Robotics; Theoretical and Applied Fluid Mechanics; Mechanical Design; Transport Engineering and Logistics; Thermal Engineering, Thermoenergetics, and Process Engineering; ICE and Motor Vehicles; Theoretical and Applied Mechanics; Traffic Engineering; Information Systems and Technologies in Mechanical Engineering; Biomedical Engineering; Materials in Mechanical Engineering; Industrial Management. This degree corresponds to the degree of **Doctor of Philosophy (Ph.D.)**, which is awarded by foreign higher education institutions. The Diploma Supplement provides the date of admission, the specialized scientific field, a list of passed exams, data on conducted lectures, data on published papers in international journals and project participation, the defence date, the title of the defended doctoral dissertation, the name of the advisor, as well as the names of the members of the doctoral dissertation defence committee.

Study programme admission requirements and other most important elements of the study programme and the mode of study are prescribed by the Statute of the Faculty (Appendix 1.2), the Rulebook on Student Admission to Study Programmes of the University of Niš (Appendix 1.4), and the Rulebook on Doctoral Academic Studies of the Faculty of Mechanical Engineering in Niš (Appendix 1.5).

The requirements for the admission of a candidate to the study programme of doctoral academic studies in **Mechanical Engineering** are the completed undergraduate and master academic studies within the field of engineering sciences and technology, with the previously achieved volume of studies of at least 300 ECTS credits. Upon admission a student chooses a specialized scientific field.

The study programme of doctoral academic studies in **Mechanical Engineering**, which admits the maximum of **25 students**, comprises 3 core courses, 5 elective courses (chosen by the students from the offered elective blocks), and 4 guided independent research papers that are directly linked to the preparation of the doctoral dissertation. Upon admission students choose the elective courses that they would like to attend and take an exam in.

Requirements for choosing the courses are provided in the Course Directory of doctoral academic studies in **Mechanical Engineering** (Appendix 1.3). Student choose one of the offered courses from an elective block within the selected specialized scientific field.

The full involvement of a student in completing the study programme of doctoral studies comprises active teaching (lectures and guided independent research), self-study, and exams. A student covers

a part of the total number of classes in certain courses, which are intended for independent research, by working in a laboratory, preparing for the research within the doctoral dissertation, participating in scientific and professional seminars, conferences, gatherings, doing scientific research, and compulsory publishing of papers.

A detailed description of the forms of activities in active teaching classes is given in the Course Directory of doctoral academic studies in **Mechanical Engineering** (Appendix 1.3).

All forms of active teaching, as well as consultations with professors, are conducted in line with the annual Work Calendar.

A schematic of the study programme structure, with basic characteristics, is given in Table 1.1.

Appendix 1.1 provides a detailed description of the structure of doctoral academic studies in **Mechanical Engineering**, and it is available to the public in the electronic form at the address: http://www.masfak.ni.ac.rs/akreditacija.

Tables and appendices attached to Standard 1:

Table 1.1 A schematic of the structure of the study programme of doctoral academic studies in Mechanical Engineering

Appendix 1.1 Institution publication (in the printed or electronic form, institution website)

Appendix 1.2 Statute of the Faculty of Mechanical Engineering in Niš

Appendix 1.3 Course Directory of doctoral academic studies in **Mechanical Engineering**

Appendix 1.4 Rulebook on Student Admission to Study Programmes of the University of Niš

Appendix 1.5 Rulebook on Doctoral Academic Studies of the Faculty of Mechanical Engineering in Niš

Standard 2. Study programme purpose

The study programme of doctoral academic studies has a clearly defined and presented purpose and role in the educational system.

The study programme of doctoral academic studies in **Mechanical Engineering** represents an extension of acquired fundamental knowledge and skills from general and specialized courses in undergraduate and master academic studies at the Faculty of Mechanical Engineering in Niš.

The purpose of the study programme of doctoral studies in Mechanical Engineering is the education of human resources in the scientific and professional area of Mechanical Engineering within the field of engineering sciences and technology, who will be able to:

- independently lead original and scientifically relevant research,
- develop new technologies and procedures that contribute to the general improvement of the society,
- develop the specialized scientific field and science in general,
- critically assess the research done by the others,
- actively follow global and particularly European trends in higher education and industry development.

The study programme of doctoral studies in Mechanical Engineering enables students to acquire scientific knowledge, develop research skills, develop the ability of critical thinking and drawing conclusions, do independent and teamwork. Research activities allow students to develop a systematic and analytical approach to problem solving, which is primarily based on the study and analysis of previous knowledge and achievements within the research fields published in scientific journals, international scientific conference proceedings, and other sources of scientific information including the world reference scientific databases. Doctoral students are expected to carry out independent research, write and publish scientific research papers, participate and present research results at domestic and international scientific conferences.

The contents of the study programme of doctoral studies in Mechanical Engineering contribute to:

- getting closer to the needs of a global society such as the European Union,
- acquiring degrees and qualifications in accordance with the European standards,
- continuing the education of bachelors and masters of science in mechanical engineering,
- assuring admission to the study programmes of other higher education institutions in Serbia and abroad, in line with the Bologna Declaration.

The Faculty of Mechanical Engineering, University of Niš, is an independent, state-owned educational and scientific institution, which, pursuant to the Law on Higher Education, and within the educational-scientific field of engineering sciences and technology and scientific areas of mechanical and industrial engineering, organizes and conducts academic studies of:

- the first level – undergraduate academic studies within the study programmes of **Mechanical Engineering** and **Engineering Management**,
- the second level – master academic studies within the study programmes of **Mechanical Engineering** and **Engineering Management**,
- the third level – three-year doctoral academic studies within the study programme of **Mechanical Engineering**.

The mission and vision of the Faculty of Mechanical Engineering in Niš define the fundamental tasks and objectives for the purpose of educating highly competent human resources in the fields of mechanical and industrial engineering within the educational-scientific field of engineering sciences and technology. The purpose of the study programme of doctoral academic studies in **Mechanical Engineering** is completely in accordance with the abovementioned tasks and objectives of the Faculty of Mechanical Engineering.

The implementation of thus conceived study programme educates doctors of engineering sciences within the field of mechanical engineering who possess competence on the European and global scale.
Appendix 2.1 provides a detailed purpose of the study programme of doctoral academic studies in Mechanical Engineering, which is available to the public in the electronic form at the address: http://www.masfak.ni.ac.rs/akreditacija.

Appendices attached to Standard 2:

Appendix 2.1 Institution publication (in the printed or electronic form, institution website)

Standard 3. Study programme objectives
The study programme of doctoral studies possesses defined objectives.

Basic objectives of the study programme of doctoral academic studies in **Mechanical Engineering** are:

- students should acquire knowledge and skills that correspond to the scientific degree of doctor of philosophy,
- students should be able to apply the acquired knowledge and skills in the scientific and professional field of mechanical engineering,
- students should develop analytical abilities, a critical manner of thinking, and leadership,
- students should develop a scientific research approach in solving complex theoretical phenomena and practical problems,
- students should be trained to plan independently and in a team, and carry out scientific research,
- students should be trained to publish their scientific results publicly,
- students should be trained to participate actively in domestic and international research and development projects,
- students should gain competence in courses defined by the course directory.

By completing the core courses of the study programme of doctoral academic studies, a student acquires fundamental knowledge of the following areas: Advanced Mathematics, Numerical Methods, Methods and Organization of Scientific Research.

By completing the elective courses of the study programme of doctoral academic studies, a student acquires applied professional-applicative knowledge and skills in one of the selected specialized scientific fields: Production Systems and Technologies; Mechatronics; Automatic Control and Robotics; Theoretical and Applied Fluid Mechanics; Mechanical Design; Transport Engineering and Logistics; Thermal Engineering, Thermoenergetics, and Process Engineering; ICE and Motor Vehicles; Theoretical and Applied Mechanics; Traffic Engineering; Information Systems and Technologies in Mechanical Engineering; Biomedical Engineering; Materials in Mechanical Engineering; Industrial Management.

The Course Directory (Appendix 3.2) describes the objectives of all courses of the study programme of doctoral academic studies in Mechanical Engineering.

Appendix 3.1 provides a detailed description of the objectives of the study programme of doctoral academic studies in Mechanical Engineering, and it is available to the public in the electronic form at the address: http://www.masfak.ni.ac.rs/akreditacija.

Appendices attached to Standard 3:

Appendix 3.1 Institution publication (in the printed or electronic form, institution website)

Appendix 3.2 Course Directory of doctoral academic studies in Mechanical Engineering

Standard 4: Competence of graduates

By completing the study programme of doctoral academic studies, a student gains general and specific abilities that facilitate a quality performance of professional, scientific, and artistic activities.

A doctor of engineering sciences within the field of mechanical engineering is capable of identifying, formulating, analysing, and solving problems in the selected specialized scientific area of mechanical engineering (Production Systems and Technologies; Mechatronics; Automatic Control and Robotics; Theoretical and Applied Fluid Mechanics; Mechanical Design; Transport Engineering and Logistics; Thermal Engineering, Thermoenergetics, and Process Engineering; ICE and Motor Vehicles; Theoretical and Applied Mechanics; Traffic Engineering; Information Systems and Technologies in Mechanical Engineering; Biomedical Engineering; Materials in Mechanical Engineering; Industrial Management), on the basis of the acquired fundamental, applicative, and scientific research knowledge and skills, following the engineering ethics and using the standards in mechanical engineering, calculation, design, and construction methods, as well as modern engineering tools.

By completing this study programme, students of doctoral academic studies:

- acquire thorough knowledge and understanding of the disciplines of their profession,
- possess the knowledge to independently solve theoretical and practical problems by using scientific methods and procedures,
- are capable of connecting the fundamental knowledge of various areas and applying them,
- know the practical elements of mechanical engineering,
- are capable of following state-of-the-art achievements in the specialized scientific field,
- can participate in the implementation of domestic and international scientific projects,
- are capable of organizing and carrying out developmental and scientific research,
- can develop new technologies and procedures within the scope of their profession,
- are capable of communicating at a professional level when presenting scientific research results,
- are capable of presenting results in scientific conferences, publishing them in scientific journals, through patents and new technical solutions,
- are capable of using modern information and communication technologies and scientific and professional literature with the aim of improving the knowledge of their field,
- are capable of applying domestic and international standards in mechanical engineering,
- are capable of contributing to the development of the scientific discipline and science in general.

The Course Directory of doctoral academic studies (Appendix 4.2) provides a detailed description of the outcome of courses, i.e. course-specific abilities gained by students.

The Diploma Supplement (Appendix 4.1) provides a list of attended and completed courses within the study programme, in Serbian (Appendix 4.1A) and English (Appendix 4.1B).

Appendices attached to Standard 4:

Appendix 4.1 Diploma Supplement (contained within Appendices 4.1A, B)

Appendix 4.1A Diploma Supplement in Serbian

Appendix 4.1B Diploma Supplement in English

Appendix 4.2 Course Directory of doctoral academic studies in Mechanical Engineering

Standard 5: Curriculum

The curriculum contains a list and structure of core and elective courses and modules with descriptions, and the doctoral dissertation as the final part of the study programme of doctoral studies, except for a doctorate in arts which is an arts programme.

The study programme of doctoral academic studies in **Mechanical Engineering** contains 3 core and 5 elective courses (chosen by a student from the offered elective blocks). Each course lasts for a single semester, has at least 6 active teaching classes per week, and is equivalent to 10 ECTS.

Study programme admission requirements and other most important elements of the study programme and the mode of study (year enrolment requirements, requirements for the proposal of the doctoral dissertation, requirements for transferring from other study programmes within the same or related scientific field, etc.) are prescribed by the Statute of the Faculty (Appendix 5.1) and the Rulebook on Doctoral Academic Studies (Appendix 5.3). Upon admission a student chooses a specialized scientific field.

A student chooses all elective courses in agreement with a professor (a potential advisor) who is appointed by the Department in charge of the specialized scientific field. The verification of elected courses is performed by the Department in charge. Here exists a possibility of choosing one of the courses from the list of courses offered by the other faculties in the Republic of Serbia from the same or related specialized scientific field, under the condition that it is equivalent to at least 10 ECTS.

The specifications of courses of the study programme of doctoral studies are shown in Table 5.1, while Table 5.2 shows the schedule of courses per semester and year of studies.

The list of courses of the study programme of doctoral studies is given in Table 5.4.

The Course Directory of doctoral academic studies (Appendix 5.2) provides a description of all courses of the study programme. Apart from lectures, a part of active teaching in courses is conducted in the manner of guided independent research, which prepares students for theoretical, experimental, and simulation research within their doctoral dissertations and for the publication of their research results, as well as for conducting scientific research. The evaluation of scientific research is determined by the Rulebook on Doctoral Academic Studies (Appendix 5.3).

The doctoral dissertation, as an independent scientific work of a student, represents the final part of the study programme of doctoral academic studies. The requirements related to the preparation and defence of the doctoral dissertation within specialized scientific fields of the study programme of Mechanical Engineering are shown in Table 5.3. The procedure for submitting the proposal, writing, assessing, and defending the doctoral dissertation is defined by the Statute of the Faculty of Mechanical Engineering in Niš (Appendix 5.1) and the Rulebook on Doctoral Academic Studies (Appendix 5.3). A student whose topic of the doctoral dissertation is accepted can submit the doctoral dissertation for evaluation after publishing at least one paper (or having one paper accepted for publication) in a journal of a world-renowned publisher or a leading international journal within the field of the doctoral dissertation topic with an impact factor on the SCI list.

The total number of active teaching classes in the first, second, and third year of doctoral academic studies in Mechanical Engineering is 600 classes during an academic year, i.e. 20 classes per week.

Out of the total number of active teaching classes at the study programme of doctoral academic studies (120 classes), 25% are lectures (a total of 30 classes of lectures in relation to the total of 120 active teaching classes).

The active teaching classes during the final (third) year of doctoral academic studies comprise only guided independent research that is directly related to the preparation of the doctoral dissertation.

The doctoral dissertation is the final part of doctoral academic studies. The preparation of the doctoral dissertation is shown only through ECTS credits. The number of credits that relate to the completion of the doctoral dissertation is 100 ECTS (30 + 30 + 30 + 10 = 100), which comprises 55.6% in relation to the total number of ECTS credits of the study programme (100 / 180 = 0.556).

Appendix 5.4 provides the copies of the decisions on adopting the study programme by the Faculty Board of the Faculty of Mechanical Engineering in Niš, that is, the Senate of the University of Niš.

Tables and appendices attached to Standard 5:

Table 5.1 Specifications of courses of the study programme of doctoral studies

Table 5.2 Schedule of courses per semester and year of studies

Table 5.3 Requirements related to the preparation of the doctoral dissertation

Table 5.4 List of courses at doctoral studies

Appendix 5.1 Statute of the Faculty of Mechanical Engineering in Niš

Appendix 5.2 Rulebook on Doctoral Academic Studies

Appendix 5.3 Course Directory of doctoral academic studies

Appendix 5.4 Decisions on adopting the study programmes

Standard 6: Quality, currency, and international compatibility of the study programme
The study programme follows modern global trends and state of profession and science within the appropriate educational-scientific, i.e. educational-artistic field, and it is comparable to similar programmes in foreign higher education institutions within the European educational area.

The study programme of doctoral academic studies in **Mechanical Engineering** at the Faculty of Mechanical Engineering in Niš is comparable with the corresponding study programmes of foreign higher education institutions. For the sake of comparison, the following study programmes of Mechanical Engineering are used:

- Faculty of Mechanical Engineering, Technical University of Prague (Czech Republic), which lasts for 3 years and is equivalent to 180 ECTS credits; information on this study programme can be found on the web page http://www.fs.cvut.cz/web/; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1A;
- Faculty of Mechanical Engineering in Slavonski Brod, University of Osijek (Croatia), which lasts for 3 years and is equivalent to 180 ECTS credits; information on this study programme can be found on the web page http://www.sfsb.unios.hr/; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1B;
- Faculty of Mechanical Engineering, Braunschweig University of Technology (Germany), which lasts for 3 to 5 years and is equivalent to 180 ECTS credits; information on this study programme can be found on the web page https://www.tu-braunschweig.de/fmb/promotion; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1C;
- Department of Mechanical Engineering, Hacettepe University (Turkey), which lasts for 3 years and is equivalent to 180 ECTS credits; information on this study programme can be found on the web page https://www.hacettepe.edu.tr/english/; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1D;
- Faculty of Mechanical Engineering, University of Aveiro (Portugal), which lasts for 4 years and is equivalent to 240 ECTS credits; information on this study programme can be found on the web page https://www.ua.pt/en/course/237; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1E;
- Faculty of Science and Engineering, Linköping University (Sweden), which lasts for 3 to 4 years and is equivalent to 240 ECTS credits; information on this study programme can be found on the web page https://liu.se/en; a more detailed comparison between the courses of the two study programmes is given in Appendix 6.1F.

On the basis of the abovementioned, it can be stated that the study programme of doctoral academic studies in **Mechanical Engineering** at the Faculty of Mechanical Engineering in Niš is fully compatible with the corresponding study programmes of foreign higher education institutions.

Appendices attached to Standard 6:

Appendix 6.1A Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***Czech Technical University of Prague, Faculty of Mechanical Engineering***

Appendix 6.1B Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***University of Osijek, Faculty of Mechanical Engineering in Slavonski Brod***

Appendix 6.1C Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***Braunschweig University of Technology, Faculty of Mechanical Engineering***

Appendix 6.1D Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***Hacettepe University, Department of Mechanical Engineering***

Appendix 6.1E Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***University of Aveiro, Mechanical Engineering***

Appendix 6.1F Documentation on at least three accredited foreign programmes, with which this programme is compatible (programme copies or institution web pages) – ***Linköping University, Faculty of Science and Engineering***

Standard 7: Student admission

The higher education institution admits students to the study programme of doctoral academic studies in accordance with the social needs and the requirements for the development of science, education, and culture, and in line with its own resources.

Student admission is performed in accordance with the Statute of the Faculty of Mechanical Engineering in Niš (Appendix 7.3A), the Rulebook on Student Admission to Study Programmes of the University of Niš (Appendix 7.3B) and the Rulebook on Doctoral Academic Studies of the Faculty of Mechanical Engineering in Niš (Appendix 7.3C).

The study programme of doctoral academic studies in Mechanical Engineering can admit:

- persons who have completed graduate academic studies, i.e. integrated studies, earned at least 300 ECTS credits during the previous education, and achieved the general average grade of at least 8 (eight) at undergraduate and master academic studies,
- persons who have the academic degree of magister of science, if they have not submitted the proposal for the topic of their doctoral dissertation,
- persons who have acquired, or will acquire the VII-1 level according to the regulations valid prior to the enactment of the Law on Higher Education from 2008, under the condition that they have completed their undergraduate studies with the average grade of at least 8 (eight),

with all of the completed previous levels of studies within the educational-scientific field of engineering sciences and technology.

Students who have completed the previous levels of studies within the scientific or professional field of **Mechanical Engineering** acquire the right to be directly admitted to the study programme of doctoral academic studies in Mechanical Engineering.

The Faculty Collegium, on the basis of the recommendation by the Committee for admission to doctoral academic studies, reaches a decision on the need for a separate qualifying exam in Mathematics, Mechanics and/or the selected specialized scientific field for each applied candidate, who has completed the previous levels of studies within other scientific or professional areas in the educational-scientific field of engineering sciences and technology.

Students of postgraduate magister's studies, admitted in accordance with the regulations valid prior to the enactment of the Law on Higher Education, can transfer to the study programme of doctoral studies during the course of their studies, within the same or related study areas, under the conditions prescribed by Article 176 of the Statute of the Faculty (Appendix 7.3A) and the Rulebook on the coordination of the acquired professional, academic, or scientific degrees of the Faculty (Appendix 7.4).

Admission to doctoral studies requires the knowledge of at least one foreign language.

The type of knowledge, affinities, and abilities assessed upon admission to doctoral studies, as well as the manner of that assessment, are announced in the Contest.

The study programme of doctoral academic studies in **Mechanical Engineering** will admit the maximum of **25 students**, which the human resources, facilities, and technical-technological capacities of the Faculty of Mechanical Engineering, University of Niš, can support without any limitations (Table 7.1). Appendix 7.5 shows the relation between the surface area of facilities and the number of students considering other study programmes conducted at the Faculty at undergraduate, master, and doctoral academic studies.

Table 7.2A shows the overview of the number of students admitted to the study programmes of the Faculty of Mechanical Engineering in Niš in the academic year 2017/18, 2018/19 and 2019/20, while Table 7.2B shows the overview of the number of students admitted to the study programmes of the Faculty of Mechanical Engineering in Niš per year of studies in the academic year 2017/18, 2018/19 and 2019/20.

Appendix 7.1 provides the admission contests for the academic year 2019/20.

Appendix 7.2 provides the decisions on the appointment of the Student Admission Committee in the academic year 2019/20.

Tables and appendices attached to Standard 7:

Table 7.1. Number of students admitted to the given study programme (from the Accreditation Application)

Table 7.2A Overview of the number of students admitted to the study programmes of the Faculty of Mechanical Engineering in Niš in the academic year 2017/18, 2018/19 and 2019/20

Table 7.2B Overview of the number of students admitted to the study programmes of the Faculty of Mechanical Engineering in Niš per year of studies in the academic year 2017/18, 2018/19 and 2019/20

Appendix 7.1 Admission contests for the academic year 2019/20

Appendix 7.2 Decision on the appointment of the Student Admission Committee

Appendix 7.3 Student admission requirements (an excerpt from the Statute of the institution, or other document) (contained within Appendices 7.3A, B)

Appendix 7.3A Statute of the Faculty of Mechanical Engineering in Niš

Appendix 7.3B Rulebook on Student Admission to Study Programmes of the University of Niš

Appendix 7.3C Rulebook on Doctoral Academic Studies of the Faculty of Mechanical Engineering in Niš

Appendix 7.4 Rulebook on the coordination of the acquired professional, academic, or scientific degrees valid prior to the enactment of the Law on Higher Education

Appendix 7.5 Relation between the total surface area and the number of students in all study programmes that are accredited or in the process of accreditation

Standard 8: Student evaluation and improvement

The evaluation of students is performed through continuous monitoring of student activities and on the basis of points achieved by completing pre-exam obligations and passing exams. The doctoral dissertation is evaluated on the basis of the indicators of its scientific or artistic contribution.

The manner of taking exams and exam evaluation are closely regulated by the Statute of the Faculty of Mechanical Engineering in Niš (Appendix 8.3A), the Rulebook on Doctoral Academic Studies of the Faculty of Mechanical Engineering in Niš (Appendix 8.3B) and the Rulebook on taking exams and exam evaluation of the University of Niš (Appendix 8.3C).

The success of a student in an exam is expressed in grades:

10 – excellent (91-100 points);
9 – outstandingly good (81-90 points);
8 – very good (71-80 points);
7 – good (61-70 points);
6 – sufficient (51-60 points);
5 – failed (to 50 points).

A grade is based on the total number of points earned by a student in fulfilling pre-exam obligations and passing the final exam, and in accordance with the quality of acquired knowledge and skills.

The full involvement of students in completing the study programme of doctoral studies comprises active teaching (lectures and guided independent research), self-study, and exams.

The doctoral dissertation is the final part of the study programme of doctoral studies.

A student covers a part of the total number of classes in certain courses, which are intended for independent research, by working in a laboratory, preparing for the research within the doctoral dissertation, participating in scientific and professional seminars, conferences, and gatherings, doing scientific research, and compulsory publishing of papers. A detailed description of the form of activities in active teaching classes is given in the Course Directory of doctoral studies (Appendix 8.4).

Active teaching in the fourth, fifth, and sixth semester is conducted only in the manner of guided independent research, which prepares students for theoretical, experimental, and simulation research within their doctoral dissertations and for the publication of their research results, as well as for conducting scientific research.

The number of ECTS credits earned by a doctoral student is determined in the following manner:

- by passing core and elective courses, with guided independent research within courses, a student can earn the maximum of 80 ECTS credits;
- on the basis of the guided independent research (scientific research, participation in projects, publication of papers, participation in scientific seminars, conferences, and gatherings, the proposal of the topic, writing and defence of the doctoral dissertation), a student can earn at least 100 ECTS credits.

On the basis of scientific research, a student has to earn at least 40 ECTS credits in the following manner:

- student participation in a scientific seminar, conference, gathering within the area of doctoral studies is equivalent to 2 ECTS credits – this way a maximum of 4 ECTS credits can be earned,
- student participation in the implementation of scientific research projects is equivalent to a maximum of 5 ECTS credits,
- a paper presented at a conference of national importance (R73 – M64 category) within the field of the doctoral dissertation, published as a summary, is equivalent to 3 ECTS credits – this way a maximum of 6 ECTS credits can be earned, regardless of the number of such

papers,

- a paper presented at a conference of international importance (R72 – M34 category) within the field of the doctoral dissertation, published as a summary, is equivalent to 4 ECTS credits – this way a maximum of 8 ECTS credits can be earned, regardless of the number of such papers,
- a paper presented at a conference of national importance (R65 – M63 category) within the field of the doctoral dissertation, published in its entirety, is equivalent to 5 ECTS credits – this way a maximum of 10 ECTS credits can be earned, regardless of the number of such papers,
- a paper presented at a conference of international importance (R54 – M33 category) within the field of the doctoral dissertation, published in its entirety, is equivalent to 7 ECTS credits – this way a maximum of 14 ECTS credits can be earned, regardless of the number of such papers,
- a paper published in a journal of national importance (R62 – M52 category) within the field of the doctoral dissertation is equivalent to 6 ECTS credits – this way a maximum of 12 ECTS credits can be earned, regardless of the number of such papers,
- a paper published in a leading journal of national importance (R61 – M51 category) within the field of the doctoral dissertation is equivalent to 8 ECTS credits – this way a maximum of 16 ECTS credits can be earned, regardless of the number of such papers,
- a paper published in a journal of international importance (R52 – M23 category) within the field of the doctoral dissertation is equivalent to 10 ECTS credits,
- a paper published in a leading journal of international importance (R51b – M22 category) within the field of the doctoral dissertation is equivalent to 15 ECTS credits,
- a paper published in a prestigious leading journal of international importance (R51a – M21 category) within the field of the doctoral dissertation is equivalent to 20 ECTS credits.

The maximum number of ECTS credits that a candidate can earn on the basis of items 2.1-2.8 is 30 ECTS credits.

If the number of authors is greater than three, the number of ECTS credits that a candidate can earn is calculated by dividing the number of ECTS credits from items 2.9-2.10 with n-2, where n is the number of authors.

The work on the preparation of the proposal of the doctoral dissertation topic, including the presentation of its contents to the members of the Department in charge, is equivalent to the maximum of 20 ECTS credits.

Theoretical, experimental, and simulation part of the research within the doctoral dissertation and the work on the text of the dissertation is equivalent to the maximum of 20 ECTS credits.

The work on the preparation for the defence and the oral public defence of the doctoral dissertation are equivalent to the maximum of 20 ECTS credits.

At the end of the current academic year, doctoral students submit a Report on the scientific research results in that year to the Department in charge, with a list of presented and published papers with their M coefficients. After the adoption of the Report at the Department Board meeting, a potential advisor verifies the number of ECTS credits earned on the basis of the guided independent research by signing the student's transcript.

The Course Directory of doctoral academic studies (Appendix 8.4) provides the specifications for all courses, which include: the title of the study programme, type and level of studies, course title, professor's first name and surname, course code, semester and year in which the course is taught, course status, number of ECTS credits, course selection requirements, course objective, outcome, and contents, recommended literature, number of active teaching classes, teaching methods, manner of knowledge assessment and evaluation, and student obligations.

Table 8.1 provides a list of defended doctoral dissertations at the Faculty of Mechanical Engineering in Niš in the previous three years, with the results that have been published or accepted for publication in peer-reviewed journals.

Appendix 8.1 provides an excerpt from the Statute of the Faculty of Mechanical Engineering in Niš that relates to doctoral academic studies.

Appendix 8.2 provides an excerpt from the Rulebook on doctoral academic studies that relates to the evaluation of the doctoral dissertation (Appendix 8.2A) and the Rulebook on the procedure for the preparation and conditions for the defence of the doctoral dissertation of the University of Niš (Appendix 8.2B).

Tables and appendices attached to Standard 8:

Table 8.1. List of defended doctoral dissertations at the institution in the previous three academic years with the results that have been published or accepted for publication

Appendix 8.1 Statute of the Faculty of Mechanical Engineering in Niš (the part that relates to doctoral studies)

Appendix 8.2 Rulebook of the institution on the evaluation of the doctoral dissertation (contained within Appendices 8.2A, B)

Appendix 8.2A Excerpt from the Rulebook on doctoral academic studies that relates to the evaluation of the doctoral dissertation

Appendix 8.2B Rulebook on the procedure for the preparation and conditions for the defence of the doctoral dissertation of the University of Niš

Appendix 8.3A Evaluation – an excerpt from the Statute of the Faculty of Mechanical Engineering in Niš

Appendix 8.3B Rulebook on doctoral academic studies of the Faculty of Mechanical Engineering in Niš

Appendix 8.3C Rulebook on taking exams and exam evaluation of the University of Niš

Appendix 8.4 Course Directory of the study programme of doctoral academic studies in Mechanical Engineering

Standard 9: Teaching staff

The teaching staff with the necessary scientific capabilities is engaged in conducting the study programme of doctoral studies.

The Faculty of Mechanical Engineering in Niš employs professors, researchers, and assistants who can ensure the accomplishment of the Faculty mission and vision through educational and scientific research activities, or by cooperating with the industry within the Institute of Mechanical Engineering.

Table 9.0A (Professors' teaching load at the level of the institution) and Table 9.0B (Assistants' teaching load at the level of the institution) provide the complete data on the teaching staff of the Faculty of Mechanical Engineering in Niš (an excerpt from the NAT 2019 software). Taking into consideration all study programmes of the Faculty of Mechanical Engineering in Niš, which are already accredited or in the process of accreditation, the total average load for professors employed at the Faculty is 5.04, while the total average load for assistants employed at the Faculty is 8.43. The vast majority (94.23%) of active teaching classes held by professors, are taught by the professors employed full-time (employed at the Faculty with 100% of working hours).

Doctoral academic studies in Mechanical Engineering are conducted by:

- 68 professors with full-time employment (23 full professors, 19 associate professors, 26 assistant professors), (Table 9.1)
- 2 professors with part-time (split) employment (1 full professor and 1 associate professor), (Table 9.2)
- 2 professors from other higher education institutions employed on the contractual work basis (2 associate professors). (Table 9.3)

According to the Report on the Study Programme Parameters:

- to conduct doctoral studies in Mechanical Engineering the minimum of 2.75 professors is required,
- the average load of a professor per this study programme amounts to 0.32,
- the percentage of lectures held by the professors with 100% of working hours is 96.77%.

Based on the number of engaged professors and assistants and the Report on the Study Programme Parameters, it can be concluded that all of the Standard 9 requirements that deal with the sufficient number of professors and active teaching load are fulfilled.

Table 9.4 provides a list of 68 professors of doctoral academic studies in Mechanical Engineering which are engaged in the implementation of domestic or international scientific research projects.

Table 9.6 provides scientific and professional qualifications of professors and teaching obligations. All professors of doctoral academic studies in Mechanical Engineering are competent, since they all have at least one paper published in a journal on the SCI list.

Table 9.7A provides a list of professors who can be engaged as advisors at doctoral academic studies in Mechanical Engineering.

Table 9.7B provides a list of advisors, i.e. a list of professors of doctoral academic studies in Mechanical Engineering who have served as advisors in the preparation of doctoral dissertations in the previous three academic years. Appendix 9.11 provides the decisions of the authorized body – the Expert Board for Engineering Sciences and Technology – on the appointment of advisors in the previous three academic years.

Table 9.8 provides scientific and professional qualifications of advisors. All advisors at doctoral academic studies in Mechanical Engineering are competent, since they all have at least 5 papers published in journals on the SCI list. The number of advisors (67) allows for the admission of the total of 67x5/3 = 111 students to doctoral studies, which is significantly more than the planned number of 25 students to be admitted to doctoral academic studies in Mechanical Engineering.

Appendix 9.5 provides the rulebooks on the election of the teaching staff at the Faculty of Mechanical

Engineering in Niš, as follows: the Rulebook on the procedure of acquiring ranks and entering into employment for professors at the University of Niš (Appendix 9.5A), the Detailed criteria on the election to professor ranks at the University of Niš (Appendix 9.5B), and the Rulebook on the procedure of acquiring ranks and entering into employment for assistants and assistants outside of employment, and the conditions for acquiring assistant ranks at the Faculty of Mechanical Engineering in Niš (Appendix 9.5C).

The defined criteria for the election to professor ranks contained in these rulebooks are in line with the recommendation of the National Council for Higher Education.

Appendix 9.1 provides signed and stamped excerpts from the electronic database (EDB) of the Tax Administration of the Republic of Serbia (TARS).

Appendix 9.2 provides employment contracts, elections to ranks, diplomas, MA and M1/M2 of professors employed full-time at all study programmes of the Faculty of Mechanical Engineering in Niš.

Appendix 9.3 provides employment contracts, elections to ranks, diplomas, MA and M1/M2 of professors employed part-time at all study programmes of the Faculty of Mechanical Engineering in Niš.

Appendix 9.4 provides temporary service agreements, elections to ranks, diplomas, approvals and statements by professors from other higher education institutions, employed on the teaching contract basis, at all study programmes of the Faculty of Mechanical Engineering in Niš.

Tables and appendices attached to Standard 9:

Table 9.0 Complete data on the teaching staff of the institution (an excerpt from the NAT 2019 software)

Table 9.0A Professors' teaching load at the level of the institution

Table 9.0B Assistants' teaching load at the level of the institution

Table 9.1 List of professors engaged full-time in conducting doctoral studies

Table 9.2 List of professors engaged part-time in conducting doctoral studies

Table 9.3 List of professors engaged in conducting the given study programme of doctoral studies – contractual work

Table 9.4 List of professors participating in scientific research projects

Table 9.6 Competence of professors

Table 9.7A List of advisors engaged in conducting doctoral studies

Table 9.7B List of professors who served as advisors in the preparation of doctoral dissertations in the previous three academic years

Table 9.8 Competence of advisors

Report on the Study Programme Parameters

Appendix 9.1 Excerpt from the electronic database (EDB) of the Tax Administration of the Republic of Serbia

Appendix 9.2 Employment contracts, elections to ranks, diplomas, MA and M1/M2 – professors employed full-time at the study programme of doctoral studies

Appendix 9.3 Employment contracts, elections to ranks, diplomas, MA and M1/M2 – professors employed part-time at the study programme of doctoral studies

Appendix 9.4 Temporary service agreements, elections to ranks, diplomas, approvals and statements – professors from other higher education institutions engaged in the study programme of doctoral studies

Appendix 9.5 Rulebook on the teaching staff election at the Institution (contained within Appendices 9.5A, B and C)

Appendix 9.5A Rulebook on the procedure of acquiring ranks and entering into employment for professors at the University of Niš

Appendix 9.5B Detailed criteria on the election to professor ranks at the University of Niš

Appendix 9.5C Rulebook on the procedure of acquiring ranks and entering into employment for assistants and assistants outside of employment, and the conditions for acquiring assistant ranks at the Faculty of Mechanical Engineering in Niš

Appendix 9.11 Decision of the authorized body – the Expert Board for Engineering Sciences and Technology – on the appointment of advisors

Note: A separate folder contains the tables and appendices from the documentation for the accreditation of the Faculty of Mechanical Engineering in Niš as a higher education institution, as follows: **Standard 6**. Teaching staff (Tables 6.1–6.7 and Appendices 6.3–6.8).

Standard 10: Organizational and material resources

Adequate human, spatial, technical-technological, library, and other resources are provided to conduct the study programme. These resources are in accordance with the character of the doctoral study programme and the number of admitted students.

The entire surface area of the Faculty of Mechanical Engineering in Niš registered in the Certificate of Title no. 2708 and shown in the Copy of Plan no. 953-1/2007-1530, represents a part of the building of the Faculty of Mechanical Engineering and the Faculty of Civil Engineering and Architecture that is located at the address: 14 Aleksandra Medvedeva street, 18000 Niš (Appendix 10.4).

Currently, the Faculty possesses the surface area of around 7815 m^2, out of which the working area comprises: classrooms (2561 m^2), amphitheatres (360 m^2), laboratories (1237 m^2), computer laboratories with classrooms (700 m^2), a library with a reading room (175 m^2), offices for professors and assistants (918.5 m^2), a student parliament room, administration offices, a conference hall, a computer centre and the Institute for Mechanical Engineering facilities.

The Faculty also uses other rooms, such as: the main hall (as the exhibition area; for seminars and conferences), clubs for professors and students, various types of workshops, warehouses, rooms for communication equipment, and other secondary rooms (hallways, ...), as well as the District Heating Plant that provides its services to the Faculty of Mechanical Engineering, the Faculty of Civil Engineering and Architecture, the Faculty of Electronic Engineering, the Student Dormitory, and the neighbouring residential buildings.

The total available surface area of the classroom and laboratory facilities specified in Table 10.2 and used to conduct teaching at all levels of studies is 3798 m^2. The total number of seats in the above area is 1787.

The total gross surface area of all facilities of the Faculty of Mechanical Engineering in Niš amounts to around 7815 m^2, while the Faculty has accredited or submitted for the process of accreditation the total of ten study programmes that can admit the maximum of 1835 students. The Faculty of Mechanical Engineering fully meets the requirements related to the necessary area (7815 m^2 / 1835 = 4.26 m^2 per student), as stated in Appendix 10.5.

The area of the Faculty used for the purposes of teaching and administration satisfies the corresponding urban planning, technical, technological, and sanitary requirements.

A list of more valuable equipment, with 142 items, which is used in the education activity and scientific research is given in Table 10.1. A complete list of laboratory and computer equipment as part of the list of basic resources is given in Appendix 10.6A.

The Faculty relies heavily on the IT infrastructure in its everyday activities (Appendix 10.7) and it possesses around 530 stationary and mobile computers, 49 video projectors and over 120 printers, scanners and multifunctional devices. The Faculty has nine computer classrooms where students have over 129 computers at their disposal. All of the computers are connected into a network whose main links are established through optical fibre cables, while the access to the network and the Internet is enabled via several wireless access points.

The library of the Faculty of Mechanical Engineering in Niš possesses over 175 m^2 of working, storage, and reading space. Two senior library expert and technical associates provide services for library users. Primary library users are students at all levels of studies and the Faculty staff, while library resources are also accessible through inter-library borrowing. The library satisfies the needs of the study programmes of the Faculty by assuring that the courses are covered by textbooks and other literature. The library fund is available in the electronic form and it can be browsed over the web portal of the Faculty.

The library possesses 22090 library items, as follows:

- 16807 books (11883 books in Serbian, 4924 books in foreign languages), out of which: 9789 textbooks (8274 textbooks in Serbian, 1509 textbooks in foreign languages) and 382 monographs (352 monographs in Serbian, monographs in foreign languages),
- 187 journals (57 journals in Serbian, 130 journals in foreign languages),
- 5096 other library items (doctoral theses, magister's theses, specialist theses, graduate theses, master's theses, collections of papers, standards).

Appendix 10.6B provides an excerpt from the Library Inventory of the Faculty of Mechanical Engineering in Niš: a list of 2238 titles from the total of 22090 library items.

Table 10.3 provides a list of library items relevant for the study programme: a total of 359 library items relevant for the study programme of doctoral academic studies in Mechanical Engineering.

The library of the Faculty of Mechanical Engineering in Niš possesses domestic and international journals and literature (Appendix 10.3) fully available to doctoral students. Furthermore, the Faculty library is part of the Serbian Library Consortium for Coordinated Acquisition (KoBSON). By using the faculty (university) network, or by remote access from their home, doctoral students can use electronic books, electronic journals, and databases available at the KoBSON web page http://kobson.nb.rs/kobson.82.html (Appendix 10.3).

Appendix 10.1 provides a plan and budget allocated for scientific research, as follows: the Scientific Research Programme for the period 2020–2024 (Appendix 10.1A), the Report on the financial operations of the Faculty in 2018 (Appendix 10.1B), the Financial plan of income, expenses, and expenditures of the Faculty for the fiscal year 2019 (Appendix 10.1C).

The Report on the financial operations of the Faculty in 2018 (Appendix 10.1B) provides the data on the total income of the Faculty:

- 62 875 097 dinars for scientific research from the Ministry of Education, Science, and Technological Development for: the implementation of TD, FR, IIR, DHE and IP projects; doctoral student researchers holding a scholarship; material costs; organization of scientific conferences; costs of final preparation of a doctoral dissertation; co-funding of research visits abroad,
- 4 571 922 dinars for scientific research in international projects.

The Financial plan of income, expenses, and expenditures of the Faculty for the fiscal year 2020 (Appendix 10.1C) provides the data on the planned Faculty income:

- 71 600 000 dinars for scientific research from the Ministry of Education, Science, and Technological Development,
- 8 000 000 dinars for scientific research in international projects.

During the academic year 2018/19, professors and assistants of the Faculty of Mechanical Engineering in Niš participate in the implementation of 28 projects within the areas of:

- fundamental research (a total of 8 projects, 2 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),
- integrated and interdisciplinary research (a total of 6 projects, 2 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),
- technological development (a total of 10 projects, 6 of which are managed by the members of the Faculty of Mechanical Engineering in Niš),
- development of higher education (a total of 2 projects),
- innovation projects (a total of 2 projects),

within the Research Programme of the Ministry of Education, Science, and Technological Development of the Republic of Serbia.

Special attention in the scientific research activity is paid to the participation in international projects (H2020, ERASMUS, FP7, TEMPUS, bilateral projects). Currently, 6 international projects are being implemented at the Faculty within the (3) H2020, (2) ERASMUS and (1) bilateral cooperation programme. This is how the Faculty intensifies the cooperation with other faculties and universities abroad.

Appendix 10.2A provides cooperation agreements with other higher education institutions and accredited institutes and international organizations on the implementation of the abovementioned projects.

Appendix 10.2B provides a list of universities with which the University of Niš has signed agreement contracts.

Tables and appendices attached to Standard 10:

Table 10.1 List of equipment used in scientific research

Table 10.2 Area for conducting teaching at doctoral studies and the appropriate laboratory facilities necessary for experimental work

Table 10.3 List of library items relevant for the study programme

Appendix 10.1 Plan and budget allocated for conducting scientific research (contained within Appendices 10.1A, B, C)

Appendix 10.1A Scientific Research Programme for the period 2016–2020

Appendix 10.1B Report on financial operations of the Faculty in 2018

Appendix 10.1C Financial Plan of income, expenses, and expenditures of the Faculty for the fiscal year 2020

Appendix 10.2 Cooperation agreements with other higher education institutions and accredited institutes and international organizations

Appendix 10.2A Cooperation agreements with other higher education institutions and accredited institutes and international organizations on project implementation

Appendix 10.2B List of universities with which the University of Niš has signed cooperation agreements

Appendix 10.3 Appendix on available databases and library resources

Appendix 10.4 Certificate of title

Appendix 10.5 Relation between the total surface area and the number of students in all accredited study programmes

Appendix 10.6 Excerpt from the Inventory

Appendix 10.6A Excerpt from the Inventory – a list of laboratory and computer equipment within the list of basic resources

Appendix 10.6B Excerpt from the Library Inventory of the Faculty of Mechanical Engineering in Niš

Appendix 10.7 Certificate of title for information technology, number of Internet ports, etc**.**

Note: A separate folder contains the tables and appendices from the documentation for the accreditation of the Faculty of Mechanical Engineering in Niš as a higher education institution, as follows: **Standard 9**. Facilities and equipment (Tables 9.1–9.3 and Appendices 9.1–9.2).

Standard 11: Quality control

Study programme quality control is performed regularly and systematically through self-evaluation and external quality assessment.

One of the proclaimed missions of the Faculty of Mechanical Engineering in Niš is the constant improvement and development of the quality of teaching and study programmes by offering more diverse study programmes and continuous coordination of study programmes and teaching with similar higher education institutions in the world.

Self-evaluation of study programmes at all levels of studies is performed within the self-evaluation of the Faculty of Mechanical Engineering as an accredited institution, thus the Report on Self-evaluation of the Faculty of Mechanical Engineering in Niš (Appendix 11.1) includes all elements of the quality of the study programme of doctoral academic studies in **Mechanical Engineering** for which the accreditation is sought, including the participation of students in self-evaluation and quality assessment.

The Faculty provides conditions and infrastructure for regular, systematic collection and processing of data necessary for quality assessment in all areas subject to self-evaluation. Student assessments of teaching quality in courses of all study programmes are performed systematically by conducting surveys, and the results of such assessments are used by professors and assistants of the Faculty with the aim of improving the quality of teaching. Appendix 11.1A provides a comparative report on the collective results of student assessments of study programmes, teaching and working conditions, and student assessments of the pedagogical work of professors and assistants for the academic year 2017/18 and 2018/19, which has been adopted by the Faculty Board upon the recommendation of the Committee for conducting student assessments of teaching quality (Table 11.1).

Three groups of questionnaires are defined:

- a questionnaire for evaluating the teaching process quality per course (for students at all levels of studies),
- a questionnaire for evaluating the study programme quality at the higher education institution (for final-year students of undergraduate and master academic studies),
- a questionnaire for evaluating the study programme quality at the higher education institution (for doctoral students).

The questionnaire for evaluating the teaching process quality (Appendix 11.1A1) per course contains four groups of questions:

- statements on the teaching quality in the course,
- statements on the teaching material quality,
- statements on grading objectivity,
- statements on the teaching staff quality (separately filled in for each professor and assistant teaching the course).

The questionnaire for evaluating the study programme quality at the higher education institution (Appendix 11.1A2, Appendix 11.1A3) contains five groups of questions:

- statements on learning outcomes and the teaching process quality,
- statements on the quality of textbooks, literature, library and IT resources,
- statements on the faculty management quality and the non-teaching support

quality,
- statements on the quality of facilities and equipment,
- the role of students in self-evaluation and quality assessment.

Student assessments of the pedagogical work of professors and assistants show an increase in the average grade in the student survey for both professors and assistants.

Appendix 11.1B provides opinions of graduates on the study programme quality and achieved outcomes through a survey taken by the students who have graduated in the last year and a half. Graduates answer the following questions (Appendix 11.1B1):

- When did you enrol and when did you complete the studies at the Faculty of Mechanical Engineering in Niš?
- Which level of studies, which study programme, and which profile (specialization) did you complete?
- What was your average grade during the course of studies at the Faculty?
- Are you still a student of the Faculty (if yes, please state the level of studies)?
- Are you employed (if yes, please state where)?
- If you are employed, what jobs do you perform?
- Do you think that you have graduated from the Faculty of Mechanical Engineering in Niš with the expected degree of competence, skills, general education, social skills, communication abilities, knowledge of a foreign language, use of computer tools, perseverance, and working discipline?
- Will you have the need for further improvement (types of lifelong learning) at the Faculty of Mechanical Engineering in Niš in the coming period?
- In which area would you like to further improve at the Faculty?
- Do you think that the graduates from our Faculty deserve to have an advantage upon employment in comparison to the graduates from the other faculties because of their quality?
- Would you recommend studying at the Faculty of Mechanical Engineering in Niš to others?
- Please evaluate the quality of the study programme that you have completed with a grade of 1-10.
- Please evaluate the complete studying conditions at the Faculty with a grade of 1-10.
- Please evaluate your general opinion of the Faculty with a grade of 1-10.
- Suggestions and comments (for example, on the quality of Faculty graduates, on the studying conditions at the Faculty, on the quantum of necessary knowledge and skills that should be possessed by graduates, etc.).

Appendix 11.2 contains the report on the self-evaluation results of the study programme of doctoral academic studies in Mechanical Engineering.

Through its Quality Assurance Strategy (Appendix 11.3), the Faculty of Mechanical Engineering determines quality assurance as one of the basic elements of the reformation of the higher education in Serbia and its integration into the unique European education area. The Quality Assurance Strategy determines the Faculty orientation toward constant and systematic work on the improvement of the quality of its study programmes, with a clear definition of the measures for quality assurance and selection of the subjects of quality assurance, their rights and obligations in this procedure. The Strategy determines the areas of quality assurance by acknowledging

the connection between the educational, scientific research, and professional activity. This document contains all of the elements prescribed by this standard and it is available to the public at the Faculty website.

Appendix 11.4A provides the Rulebook on textbooks and other teaching literature of the Faculty of Mechanical Engineering, University of Niš. This Rulebook fully regulates the preparation, approval, publication, and use of textbooks and other teaching literature, their monitoring and evaluation during their exploitation in teaching, and other issues of importance in this area. This Rulebook is in line with the Rulebook on textbooks of the University of Niš (Appendix 11.4B).

For the purpose of stimulating the publishing activity at the Faculty, the Dean of the Faculty has passed a special decision (Appendix 11.4C), which allows for the payment of financial resources as aid in funding scientific and professional publications (books, textbooks, workbooks, monographs, etc.) whose authors are the professors and assistants of the Faculty, in the amount of 30% of the printing costs for the publication in question, under the condition that the Faculty keeps 20% of the entire circulation.

Article 74 of the Statute of the Faculty of Mechanical Engineering (Chapter 6.3.4) defines a Board for Quality as one of the permanent committees and boards of the Faculty Board (Appendix 11.5). The Rulebook on the Board for Quality of the Faculty of Mechanical Engineering in Niš (Appendix 11.5A) prescribes the type and scope of work, authority, composition, rights, obligations, and responsibilities of the Board, for the purpose of preparation, recommendation, monitoring, and reporting on the Quality Assurance Strategy of the Faculty of Mechanical Engineering, Quality Assurance Standards and Procedures for teaching and study programmes of the Faculty of Mechanical Engineering, and coordination with the Rulebooks on the standards for self-evaluation and quality assessment of a higher education institution, for the accreditation of higher education institutions and study programmes of the National Council for Higher Education. This Rulebook determines the activity of the Board, as follows: working activities, organizational structure and management, working documentation, working confidentiality (trade secret), and other activities of importance for the area in which the Board operates.

The Board for Quality is formed by the Faculty Board of the Faculty of Mechanical Engineering as a permanent working body of the Faculty Board, comprising the representatives of professors, assistants, non-teaching staff, and students. Apart from the members appointed by the Faculty Board of the Faculty of Mechanical Engineering in Niš (Table 11.2), the permanent members of the Board for Quality are:
- Vice Dean for academic affairs, as the representative of the Faculty quality management,
- Vice Dean for scientific research,
- Vice Dean for finances,
- Director of the Institute for Mechanical Engineering,
- Associate for quality, standardization, and metrology of the Centre for Quality, Standardization, and Metrology of the Institute for Mechanical Engineering, who at the same time serves as Board secretary.

Tables and appendices attached to Standard 11:

Table 11. 1 List of members of the Committee for conducting student assessments of

teaching quality

Table 11.2 List of the Board for Quality members

Appendix 11.1 Report on the self-evaluation results of the higher education institution

Appendix 11.1A Conducted surveys – a comparative report on the collective results of student assessments of study programmes, teaching and working conditions, and student assessments of the pedagogical work of professors and assistants for 2017/18 and 2018/19

Appendix 11.1A1 Questionnaire for evaluating the teaching process quality per course (for students at all levels of studies)

Appendix 11.1A2 Questionnaire for evaluating the study programme quality at the higher education institution (for final-year students of undergraduate and master academic studies)

Appendix 11.1A3 Questionnaire for evaluating the study programme quality at the higher education institution (for doctoral students)

Appendix 11.1B Opinions of graduates on the quality of study programmes and achieved outcomes

Appendix 11.1B1 Survey for graduates of the Faculty of Mechanical Engineering in Niš

Appendix 11.2 Report on the self-evaluation results of the study programme of doctoral academic studies in Mechanical Engineering

Appendix 11.3 Publicly issued document – Quality Assurance Policy

Appendix 11.4 Rulebook on Textbooks (contained within Appendices 11.A, B, C)

Appendix 11.4A Rulebook on textbooks and other teaching literature of the Faculty of Mechanical Engineering, University of Niš

Appendix 11.4B Rulebook on textbooks of the University of Niš

Appendix 11.4C Decision on co-funding the printing of scientific and professional publications

Appendix 11.5 Excerpt from the Statute of the institution that regulates the establishment and scope of work of the Board for Quality

Appendix 11.5A Rulebook on the activity of the Board for Quality of the Faculty of Mechanical Engineering in Niš

Standard 12. Transparency

The higher education institution ensures the public availability of the study programme and the doctoral dissertation as the final part of doctoral studies.

The Faculty of Mechanical Engineering in Niš possesses a digital repository in which electronic versions of defended doctoral dissertations are permanently stored, together with the report of the committee on the dissertation evaluation, the information on the advisor and members of the committee, and the information on the candidate's scientific papers whose publication served as a requirement for the defence.

All of this data is publicly available on the web pages listed in Appendix 12.1.

Appendix 12.2 provides the information on advisors, together with the information on their competence and previous doctoral supervision, which is all available to the public in the electronic form at the address: http://www.masfak.ni.ac.rs/akreditacija.

Appendices attached to Standard 12:

Appendix 12.1 Digital repository

Appendix 12.2 Information on advisors

Standard 13: Studies in a world language

The higher education institution can organize the study programme of doctoral studies in a world language for each area and each educational-scientific field if it possesses the human and material resources that allow for the teaching activities to be conducted in line with the standards.

The study programme of doctoral academic studies in **Mechanical Engineering** is accredited to be conducted both in Serbian and English.

The Faculty professors possess the necessary competence for teaching this study programme in English as well. Appendix 13.2 provides the certificates that confirm the language competence of professors in line with the requirements of this Standard.

The employees of the Faculty office for student affairs are also capable of providing services in English. Public documents, certificates and diploma supplements are issued in both Serbian and English.

Appendix 13.3 provides a list of library items relevant for the study programme in English: a total of 120 library items in English relevant for the study programme of doctoral academic studies in Mechanical Engineering.

By using the faculty (university) network, or by remote access from their home, doctoral students can use electronic books, electronic journals, and databases in English available at the KoBSON web page http://kobson.nb.rs/kobson.82.html

The Faculty web page provides necessary information to foreign students in English. The staff directory and the course directory are available on the web page in both Serbian and English.

Appendix 13.1 provides the relevant documentation in English, as follows: descriptions of all the standards in English (Appendix 13.1A), the diploma supplement in English (Appendix 13.1B), the course directory in English (Appendix 13.1C), the staff directory in English (Appendix 13.1D), and the advisor directory in English (Appendix 13.1E).

Appendices attached to Standard 13:

Appendix 13.1 Documentation in English

- **Appendix 13.1A** Descriptions of all the standards in English
- **Appendix 13.1B** Diploma supplement in English
- **Appendix 13.1C** Course directory in English
- **Appendix 13.1D** Staff directory in English
- **Appendix 13.1E** Advisor directory in English

Appendix 13.2 Proof of appropriate competence of professors and assistants for conducting teaching activities in English

Appendix 13.3 List of library items relevant for the study programme in English