University of Belgrade

Faculty of Mechanical Engineering

Academic Studies

GUIDE

B.Sc.
M.Sc.
Ph.D.

National Commission for Accreditation and Quality Assurance (CAQA, КАПК in Serbian, http://www.kapk.org/):
Certificates for Higher Education Institution and for all Study Programmes (BSc, MSc, PhD) – Mechanical Engineering, in Serbian and in English, 2008-2024
Certificate for Study Programme of Bachelor Academic Studies – Information Technologies in Mechanical Engineering, in Serbian, 2019-2026
Certificate for Study Programme of Master Academic Studies – Industry 4.0, in Serbian, 2019-2026

ASIIN (Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik e.V, Deutschland - Accreditation Agency for Degree Programmes in Engineering, Informatics, Natural Sciences and Mathematics e.V, Germany, http://www.asiin.de/):
Accreditation Certificates for study programmes in Mechanical Engineering, of Bachelor (Undergraduate) Academic Studies and Master (Graduate) Academic Studies, 2013-2025

ENAEE (European Network for Accreditation of Engineering Education, http://www.enaee.eu/) through ASIIN:
Designations of study programmes as European-Accredited Engineering Bachelor and Master Programmes in Mechanical Engineering, (EUR-ACE labels), 2013-2025

RINA (The Royal Institution of Naval Architects, United Kingdom, http://www.rina.org.uk/):
Accreditation Certificates of the MSc in Mechanical Engineering Programme – Naval Architecture Module, 2009-2022

Belgrade, March 2022

UNIVERSITY OF BELGRADE • FACULTY OF MECHANICAL ENGINEERING

ASIIN

Accredited Degree Programme

2018-2025

Република Србија
КОМИСИЈА ЗА АКРЕДИТАЦИЈУ И ПРОВЕРУ КВАЛИТЕТА
Број: 612-00-01439/2007-04
Датум: 09.05.2008. године
Београд, Бул. Михајла Пупина 2

Комисија за акредитацију и проверу квалитета, на својој XXXVII седници, одржаној 12. априла 2008. године, утврдила је да су испуњени сви услови прописани чланом 16. Закона о високом образовању („Сл. гласник РС", бр. 76 од 02. септембра 2005. године) и на основу наведеног издаје

УВЕРЕЊЕ О АКРЕДИТАЦИЈИ

МАШИНСКОМ ФАКУЛТЕТУ
УНИВЕРЗИТЕТА У БЕОГРАДУ,
са седиштем у Београду, Краљице Марије 16.

М.П.

ПРЕДСЕДНИК
Проф. др Слободан Арсенијевић

Print:
PLANETA print
Igora Vasiljeva 33r
11000 Belgrade
Tel / Fax: +381.11.6506564

Publisher:
University of Belgrade, Faculty of Mechanical Engineering
Kraljice Marije 16
11120 Belgrade 35, Serbia
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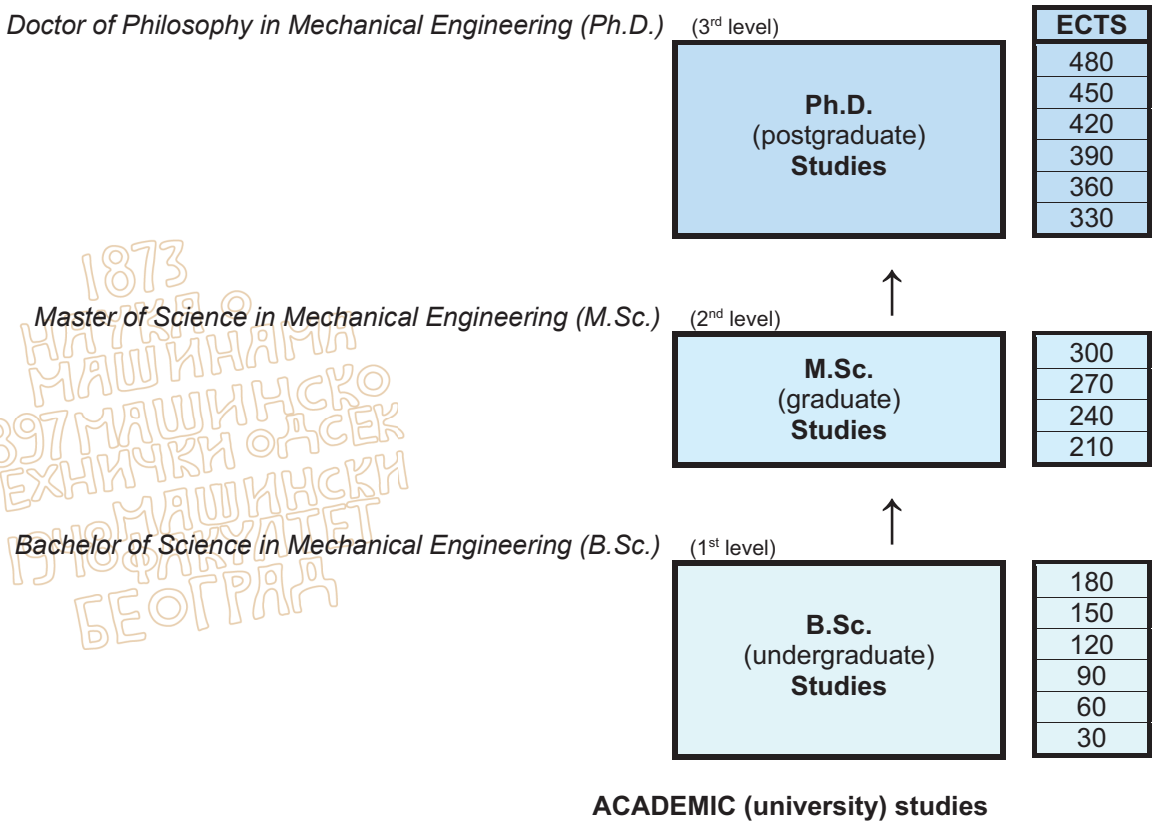
University of Belgrade, Faculty of Mechanical Engineering, Academic Studies Guide – B.Sc., M.Sc., Ph.D.

Version 6 – 03/2022
Circulation: 250 copies
Free publication

For publisher: Dean Prof.Dr. Vladimir Popović

A new system of studies at the Faculty of Mechanical Engineering has been introduced since 1st October 2005:



ACADEMIC (university) studies

Title **Bachelor of Science** (B.Sc. from the Latin Baccalaureus Scientiæ) will be stated in Diploma certificate of Bachelor studies (ECTS 180)**.** A Diploma Supplement will contain a list of courses the student has attended and passed exams in. Abbreviations: B.Sc.ME or BSc ME.

Title **Master of Science** (M.Sc. from the Latin Magister Scientiæ) will be stated in Diploma certificate of Master studies (ECTS 120). A Diploma Supplement will contain a list of courses the student has attended and passed exams in, as well as the name of the obligatory specialization module from a certain department he/she has taken and completed. Abbreviations: M.Sc.ME or MSc ME.

Title **Doctor of Philosophy** (Ph.D. from the Latin Philosophiæ Doctor) will be stated in Diploma certificate of Doctoral studies. A Diploma Supplement will contain date of enrollment, specialization area, a list of courses the student has attended and passed exams in, the data on student's teaching experience, papers published and projects' participation, and finally, the date of Ph.D. thesis defense, thesis title, name of Supervisor, and names of Ph.D. committee members. Abbreviations: Ph.D.ME or PhD ME.

The school year begins on 1st October. Applications for studies taught in English at any academic level are accepted throughout the calendar year (no time limit). Applicants who submit their applications by 1st July, will be enrolled in the new school year which begins on 1st October. For applicants who apply for enrollment after 1st July, the Faculty will initiate the process of registration, but cannot guarantee that the administrative procedure will be finished right on time. Following the spirit of Lisbon Convention, the Faculty accepts for further studies students from foreign universities and recognizes ECTS credits already gained by the student.

International guest students can also apply to study for one semester at the Faculty of Mechanical Engineering without being part of a specific exchange program. After consultation with the department in question, guest students can attend courses and lectures and acquire credit points. To apply as a guest student, student has to be enrolled in a program at his/her home university and a faculty member in a comparable program at the Faculty of Mechanical Engineering must act as his supervisor for the duration of stay.

Guest students cannot attain a degree from the Faculty of Mechanical Engineering at University of Belgrade.

University of Belgrade
Faculty of Mechanical Engineering

1st level of studies
B.Sc. (undergraduate) Academic Studies – Mechanical Engineering
ECTS 180

<table>
<tr><th rowspan="2">Hours weekly</th><th colspan="2">1st year</th><th colspan="2">2nd year</th><th colspan="2">3rd year</th></tr>
<tr><th>1st semester</th><th>2nd semester</th><th>3rd semester</th><th>4th semester</th><th>5th semester</th><th>6th semester</th></tr>
<tr><td>1</td><td rowspan="5">Mathematics 1</td><td rowspan="5">Mathematics 2</td><td rowspan="5">Mathematics 3</td><td rowspan="5">Thermodynamics B</td><td rowspan="5">Fluid mechanics B</td><td rowspan="5">Electrical engineering</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td></tr>
<tr><td>6</td><td rowspan="5">Mechanics 1</td><td rowspan="5">Fundamentals of strength of structures</td><td rowspan="5">Mechanics 2</td><td rowspan="5">Mechanics 3</td><td rowspan="5">Numerical methods</td><td rowspan="5">Fundamentals of control engineering</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td></tr>
<tr><td>9</td></tr>
<tr><td>10</td></tr>
<tr><td>11</td><td rowspan="2">Constructive geometry and graphics</td><td rowspan="4">Engineering graphics</td><td rowspan="4">Machine elements 1</td><td rowspan="4">Machine elements 2</td><td rowspan="4">Manufacturing technology</td><td rowspan="6">Elective course 6.3.5</td></tr>
<tr><td>12</td></tr>
<tr><td>13</td><td rowspan="3">Strength of materials</td></tr>
<tr><td>14</td></tr>
<tr><td>15</td></tr>
<tr><td>16</td><td rowspan="5">Physics and measurements</td><td>Engineering materials 1</td><td rowspan="5">Engineering materials 2</td><td rowspan="5">Elective course 4.4.5</td><td rowspan="5">Elective course 5.4.5</td></tr>
<tr><td>17</td></tr>
<tr><td>18</td><td rowspan="4">Engineering management and economy</td><td rowspan="5">Elective course 6.4.5</td></tr>
<tr><td>19</td></tr>
<tr><td>20</td></tr>
<tr><td>21</td><td rowspan="2">English 1</td><td rowspan="2">English 2</td><td rowspan="5">Elective course 3.5.5</td><td rowspan="4">Mechanical engineering praxis</td><td rowspan="5">Elective course 5.5.5</td><td rowspan="5">B.Sc. work 6.5.5</td></tr>
<tr><td>22</td></tr>
<tr><td>23</td><td rowspan="3">Programming in C</td><td rowspan="3">Computational tools</td></tr>
<tr><td>24</td></tr>
<tr><td>25</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Skill praxis B 4.5</td><td></td><td></td></tr>
</table>

Legend: white boxes – obligatory courses, colored boxes – elective courses.

Generally, each course lasts one semester with 5 hours per week, which equals ECTS 6 (ECTS – European Credit Transfer System[1]). A course with 3 teaching hours corresponds to ECTS 4, and a course with 2 teaching hours corresponds to ECTS 2

Exceptions: **Skill praxis B** – 90 hours, executed through student's independent work, equals ECTS 1; **Mechanical engineering praxis** – 75 hours, equals ECTS 5; **B.Sc. work** – as all other courses, however, knowledge check is done through the project or seminar work.

For reference, the courses are coded according to their position:
1. the first digit is the number of the semester (vertical, column);
2. the second digit is the number of the full-course box in a semester (horizontal, row);
3. the third digit is the number of weekly hours.

[1] European Commission: ECTS Users' Guide, Brussels, Feb 2009.

Learning outcomes of the Bachelor study programme in Mechanical Engineering

The Faculty of Mechanical Engineering University of Belgrade (UB-FME) systematically and effectively plans, carries out, supervises, evaluates and upgrades the quality of its study programme in mechanical engineering at Bachelor of Science (BSc) level.

The BSc (undergraduate) study programme in mechanical engineering lasts three years of study with 180 ECTS and fully complies with the basic tasks and objectives in mechanical engineering.

Following the EUR-ACE framework standards of engineering programmes[2], the qualifications which students get when they complete UB-FME BSc studies are:

1. Knowledge and understanding of the scientific and mathematical principles of general mechanical engineering, as well as its key aspects and concepts. Bachelors will have the ability to demonstrate knowledge and understanding of the basics of fundamental and engineering sciences, such as:
    a. Mathematics, including differential and integral calculus, linear algebra, numerical methods, programming and computational tools;
    b. Mechanics, solid and fluid, thermodynamics, as well as physics and measurements;
    c. Material science and strength of materials, with machine elements and manufacturing technology;
    d. Electrical and control engineering;
    e. Elements of general operation of common machines: engines, vehicles, pumps, fans, turbines, tractors, material handling machines, etc. for which courses are elective;

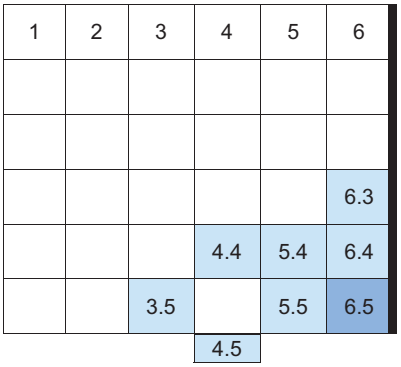
    and ability to further use professional literature and continue studies.
2. Ability of basic engineering analysis by application of their knowledge and understanding to identify, analyse, formulate and solve engineering problems using relevant analytic (mass, energy and thermodynamic balances, efficiency of systems, etc.), empirical and experimental methods.
3. Ability to carry out simple engineering design of machine components to meet defined and specified requirements using knowledge and understanding of design methodologies and computer-aided design tools.
4. Ability to do simple investigations, as to conduct searches of literature, to use data bases and other sources of information, to design and conduct appropriate simple experiments by being elementary trained in workshop and laboratory skills, to collect and interpret the data and draw conclusions.
5. Basic experience in engineering practice, with the ability to select and use appropriate mechanical equipment, tools and methods; to combine theory and practice to solve engineering problems; to understand of applicability and limitations of certain techniques and methods and to have awareness of the nontechnical implications of engineering practice.
6. Possession of basic transferable skills in order to function as an individual and as a member of a team, to communicate effectively with the engineering community, to have awareness of wider multidisciplinary context of engineering (responsibility, environment, health, safety, social, ethical and legal issues), to demonstrate awareness of project management and business practices.

Schedule of lessons and lecture attendance

1st year	2nd year		Monday	Tuesday	Wednesday	Thursday	Friday
8.00-8.45	14.00-14.45	1st class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
9.00-9.45	15.00-15.45	2nd class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
10.00-10.45	16.00-16.45	3rd class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
11.00-11.45	17.00-17.45	4th class hour	Course 1	Course 2	Course 3	Course 4	Course 5
		Break					
12.00-12.45	18.00-18.45	5th class hour	Course 1	Course 2	Course 3	Course 4	Course 5

Attendance of lectures is obligatory for students, as well as the lecturer's record-keeping on it. In order to gain pre-exam points, a knowledge check is obligatory during class-hours. In such a way, parts of the exam are passed earlier, and so the final exam includes only the remaining topics. Final exam check is possible only at additional two times during the same academic year. If failed to pass, the student has to repeat the study of the same academic year without the possibility of state budget financing. The student has to take the final exam even if he/she may not want to collect additional points.

[2] OECD (2011), "A Tuning-AHELO Conceptual Framework of Expected Desired/Learning Outcomes in Engineering", *OECD Education Working Papers*, No. 60, OECD Publishing. http://dx.doi.org/10.1787/5kghtchn8mbn-en, pp.35 and 48-54.



Elective courses

At the beginning of a school year, a **student has to choose** elective courses (subjects) that he/she wants to attend and pass exams in. For each semester, as well as **for each position** of a course in a certain semester, a separate list (menu) of courses exists. However, the following conditions must be borne in mind:

All the elective courses on a certain list for one of the positions are in competition and the student can choose only one course from the list. The course has the nominated lecturer (if it is run only for one group, which is the default situation) or the list of other possible lecturers if it is organized for several groups. The course is launched only for a group of minimum 10 interested students. During the process of choosing, the priority is given to the students with higher average grades. When the group for one lecturer is full to the maximum number of students in a group allowed by accreditation rules, then the student has to choose the same course given by another lecturer (if offered), or a different course. The same course can not be offered in two positions within the same study program. Every professor has the possibility to offer a course with a certain contents and appropriate printed material for which he/she presumes that students will show interest.

The course **"Skill Praxis B"** (hereinafter: Skill Praxis) forms an integral part of the teaching process at the level of Bachelor academic studies at the Faculty of Mechanical Engineering, University of Belgrade and it is defined by the Rulebook on Skill Praxis. The student of Bachelor academic studies is referred to skill praxis in order to enrich theoretical and academic knowledge and gain practical knowledge and experience necessary for engaging in professional engineering activities.

Skill praxis may be performed with one or more legal entities, whose activity is in accordance with the study programme and with which the Faculty has signed a cooperation agreement. The student is referred to the skill praxis in the duration and periods defined by the study programme. The minimum number of hours of professional practice is 90 hours per year. Out of that, 80 hours or 10 days are envisaged for conducting skill praxis, while 10 hours are reserved for writing a report and defending it. Skill praxis is not included in the planned teaching load of the current academic year, but it does carry ECTS points. The Vice Dean for Teaching is in charge of planning the skill praxis, while the Skill Praxis Coordinator is in charge of its organization and implementation. During skill praxis, the student is obliged to keep a Skill Praxis Diary. This document should include the date and place of the conducted skill praxis, the duration of skill praxis and the work tasks encompassed by skill praxis. Upon completion of Skill Praxis B, the student is obliged to submit the Skill Praxis Diary and the Certificate of the completed skill praxis to the Skill Praxis Coordinator. During the skill praxis, the student is obliged to comply with the prescribed work and safety measures of the legal entity in which skill praxis is performed.

Lists of elective courses

List of elective courses at the position 3.5 – 7 courses, 5 teaching hours per week each (6 ECTS)

Fuel, lubricants and industrial water; Fundamentals of aerotechnics; Introduction to weapon systems; Engineering communication; Railway systems; Fundamentals of motor vehicles; Aesthetic design.

List of elective courses at the position 4.4 – 9 courses, 5 teaching hours per week each (6 ECTS)

Computer simulation and artificial intelligence; Introduction to energetics; Classical armament design; Vehicle systems; Aerodynamic constructions; Basic WEB projecting; Computer graphics; Production process optimization; Renewable and secondary resources.

List of elective courses at the position 5.4 – 12 courses, 5 teaching hours per week each (6 ECTS)

Production technology and metrology ; WEB projecting in mechanical engineering; Aerodynamics (2 hours - 2 ECTS) + Computational methods in aeronautics (3 hours - 4 ECTS); Vehicle dynamics; Fundamentals of projectiles propulsion; Buoyancy and stability of ship 1; Production and operations management 1; Tribology; Theory of traction; Mechanics of flight; Introduction to engineering simulations; Combustion B.

List of elective courses at the position 5.5 – 11 course, 5 teaching hours per week each (6 ECTS)

Ship structures 1; CAD/CAM systems; Industrial ergonomics; Information integration of business functions; Flight mechanics of the projectile; Fundamentals of steel structures; Mechanisms design; Theory of elasticity; Vehicles safety; Windturbines; Fundamentals of clinical engineering (2 hours - 2 ECTS) + Biomechanics of locomotor system (3 hours - 4 ECTS).

List of elective courses at the position 6.3 – 10 courses, 5 teaching hours per week each (6 ECTS)

Machine tools; Elements of construction and mining machines; Fundamentals of turbomachinery; Aircraft propulsion and systems; Software engineering 1; Shipbuilding technology; Classical armament design; Structural analysis of flying vehicles; Fundamentals of rail vehicles; Basic technological operations in food industry.

List of elective courses at the position 6.4 – 17 courses, 5 teaching hours per week each (6 ECTS)

Theory of mechanical vibrations; Tools and fixtures; Light and composite structures; Hydraulic and pneumatic mechanisms and installations; Design and technology of airplane manufacture; Missile weapons design; FEM analysis; Heating technique fundamentals; Database design; Material handlig equipment; Vehicle design 1 ; Tribotechnique; Life cycle of railway vehicles; Ship systems (3 hours - 4 ECTS) + Ship equipment (2 hours - 2 ECTS); Maintenance management; Combustion and sustainable development B; Drying and hygrothermal processes.

“B.Sc. work” at the position 6.5

B.Sc. work is to be taken with the supervisor from the pool of professors of either obligatory or elective courses the student has passed or attended. The course has to be in the field of mechanical engineering. Lecturing is performed through instructions for project design or seminar work, and student’s activities in its elaboration, while taking the final exam is obligatorily through student’s printed final work defense (project or seminar work). The course requirements are the same as for other elective courses. The exam in “B.Sc. work” (final work defense) cannot be taken before all exams are passed.

University of Belgrade
Faculty of Mechanical Engineering

2nd level of studies

M.Sc. (graduate) Academic Studies – Mechanical Engineering
ECTS 120

The study programme of Master (Graduate) academic studies is performed through 21 elective modules (specializations) within the same curriculum framework schematically presented below.

Hours weekly	1st year		2nd year	
	1st semester	2nd semester	3rd semester	4th semester
1	COURSE OF ELECTIVE MODULE 1.1.5	COURSE OF ELECTIVE MODULE 2.1.5	COURSE OF ELECTIVE MODULE 3.1.5	Skill praxis M 4.1
2				
3				
4				Optional: Foreign language 4.2
5				
6	COURSE OF ELECTIVE MODULE 1.2.5	COURSE OF ELECTIVE MODULE 2.2.5	COURSE OF ELECTIVE MODULE 3.2.5	M.Sc. thesis 4.3
7				
8				
9				
10				
11	Mechanics M or Fluid mechanics M 1.3.5	COURSE OF ELECTIVE MODULE 2.3.5	COURSE OF ELECTIVE MODULE 3.3.5	
12				
13				
14				
15				
16	Thermodynamics M or Mechatronics 1.4.5	Elective course 2.4.5	Elective course 3.4.5	
17				
18				
19				
20				
21	Elective course 1.5.5	Elective course 2.5.5	Elective course 3.5.5	
22				
23				
24				
25				

Legend: white boxes – obligatory courses, colored boxes – elective courses; numeric code below the course title in this table consists of three digits: the first digit is the number of the semester, the second is the position of the course, and the third one is the number of weekly hours; the duration of each course is one semester with 5 hours per week, and each equals ECTS 6 (ECTS – European Credit Transfer System).

Exceptions: **Skill praxis M** – 90 hours, executed through student's independent work, equals ECTS 4; Non-compulsory course in a **Foreign language** for specific purposes – 30 hours, equals ECTS 2; **M.Sc. thesis** equals ECTS 26.

For accreditation requirements: M.Sc. electiveness 35% = 7 courses (colored boxes).

Learning outcomes of the Master study programme in Mechanical Engineering

The Faculty of Mechanical Engineering University of Belgrade (UB-FME) systematically and effectively plans, carries out, supervises, evaluates and upgrades the quality of its study programme in mechanical engineering at Master of Science (MSc) level.

The MSc (graduate) study programme in mechanical engineering lasts two years of study with 120 ECTS and fully complies with the basic tasks and objectives in mechanical engineering. Admission requirement is a BSc degree in engineering. Minimum demonstration of knowledge in applied sciences (i.e. mathematics, physics) and in basic subjects fundamental to Mechanical Engineering (i.e. mechanics, design, thermodynamics) has to be fulfilled if required by the Committee for enrollment.

Following the EUR-ACE framework standards of engineering programmes[3], the qualifications which students get when they complete UB-FME MSc studies are:

1. Advanced and in-depth knowledge and understanding of the scientific and mathematical principles of mechanical engineering, which supplements the knowledge acquired at the Bachelor academic studies, and provides development of critical thinking and expertise in a certain branch of mechanical engineering (study module). Masters will have the ability to demonstrate in-depth knowledge and understanding of engineering sciences, such as:
    a. Advanced mathematics, ordinary differential equations, advanced numerical methods, programming, computational tools and software engineering;
    b. Advanced mechanics, solid and fluid, as well as thermodynamics and heat transfer;
    c. Mechatronics and automatic control engineering, electronics and measurements;
    d. Advanced machine elements with design procedures of components and systems;
    e. Computer aided design and manufacturing, project management;
    f. Details of operation and design of (elective): Devices in biomedical engineering; Ship structures, resistance, propulsion, equipment; Aerospace machines, with deepening in aerodynamics, elasticity of structures, aircraft design, propulsion and control systems; Product aesthetics, ergo- and eco-designs, decision-making methods; Railway locomotives and cars; Welding structures, structural integrity; Biotechnical (agricultural) systems, tractors, equipment; Industrial (management) methods and organization; IT technologies with optimization techniques; Motor vehicles, gears, brakes and friction systems, equipment; Internal combustion engines, testing, auxiliary systems and equipment; Food industry machines, condition monitoring, manipulating, packaging; Production machines and systems, manufacturing automation, quality management, intelligent systems; Process engineering machines, environment protection, chemical and biochemical reactors, air pollution control and waste treatment; Devices for automatic control, with knowledge of digital and nonlinear systems, object and process dynamics; Weapon systems, missiles, artillery; Steam and gas turbines, boilers and steam generators, thermal power plants; Material handling machines, constructions, conveying machinery, cranes; Refrigerating, heating and air conditioning systems, heat pumps; Hydraulic machinery, pumps, fans, hydraulic turbines, hydraulic torque converters, fluid energy systems, etc;

   and the ability to fulfill requirements for the professional title of Chartered Engineer (as defined by the Engineering Chamber of Serbia), as well as the ability to continue studies further, to a more advanced degree – scientific level of PhD.

2. Ability of advanced engineering analysis by application of their knowledge and understanding to identify, analyse, formulate and solve engineering problems using relevant analytic (mass, energy and thermodynamic balances, efficiency of systems, etc.), empirical and experimental methods.

3. Ability to carry out engineering design of machine components and full systems to meet defined and specified requirements using knowledge and understanding of design methodologies and computer-aided design tools. Masters should be able to propose, design, analyze, and build a mechanical or electromechanical device.

4. Ability to do investigations, as to conduct searches of literature, to use on line libraries and repositories and other sources of information, to design and conduct appropriate experiments to gather data and test theories by being trained in workshop and laboratory skills, to collect and interpret the data and draw conclusions.

5. Experience in engineering practice, with the ability to select and use appropriate mechanical equipment, tools and methods; to combine theory and practice to solve engineering problems; to understand of applicability and limitations of certain techniques and methods and to have awareness of the nontechnical implications of engineering practice.

6. Possession of transferable skills in order to function as an individual and as a member of a team, to communicate effectively with the engineering community in the same-discipline and cross-disciplinary groups with written, oral, and visual means, to have awareness of wider multidisciplinary context of engineering (responsibility, environment, health, safety, social, ethical and legal issues), to demonstrate awareness of project management and business practices, be prepared for a lifetime of continuing education.

[3] OECD (2011), "A Tuning-AHELO Conceptual Framework of Expected Desired/Learning Outcomes in Engineering", *OECD Education Working Papers*, No. 60, OECD Publishing. http://dx.doi.org/10.1787/5kghtchn8mbn-en, pp.35 and 48-54.

All explanations given for B.Sc. studies also apply here. The main differences are:

- **Upon enrollment in Master academic studies the student is required to choose one elective module (department)**.
- The maximum number of students for enrolling in Master academic studies is **416**, and teaching is organized in groups of **maximum 32** students for lectures, **16** for general exercises and **8** for laboratory work. The minimum number of students for elective module activation is 5 (at enrollment, but there is no minimum limit for semester 3), and the maximum is 32. The given numbers of students are defined by the rules of the National Accreditation.
- The student is required to perform and pass the exam in "Skill praxis M" prior to registration for M. Sc. thesis.
- The total average grade is determined from grades from "M.Sc. thesis" and "Skill praxis M" that are united as a single grade by pondering, according to the number of ECTS, and as such, that grade participates in the total average grade with pondering of 25 hours.

"M.Sc. thesis" is to be taken with supervisor from the pool of professors of either obligatory courses of the elective module or elective courses the student has passed, where the menu of such courses is defined by departments leading the module. M.Sc. thesis must contain at least two of the following fields: material on the topic studied and analyzed, self-performed numerical calculation, self-done laboratory work, and/or self-performed mechanical design. Thesis defense cannot be done unless all the exams are passed.

Enrollment procedure is regulated by the Book of Regulations on Teaching at Master studies.

Within special agreements, the study program in English may be adapted to meet the group of students's needs and requirements, where some obligatory courses in the modules may be also elective.

Lists of modules with obligatory courses

1.	2.	3.	4.
1.1.5	2.1.5	3.1.5	4.1
1.2.5	2.2.5	3.2.5	4.3
1.3.5	2.3.5	3.3.5	
1.4.5	2.4.5	3.4.5	
1.5.5	2.5.5	3.5.5	

Biomedical Engineering	
1.1.5	Spectroscopy methods and techniques
1.2.5	Biomedical instrumentation and equipment
2.1.5	Early diagnostics
2.2.3	Biomechanics of tissue and organs
2.2.2	Introduction to nanotechnology
2.3.5	Signal processing
3.1.5	Nanotechnology
3.2.5	Clinical engineering
3.3.5	Nanomedical engineering
4.1	Skill praxis M - BMI
4.3	M.Sc. thesis

Naval Architecture	
1.1.5	Ship resistance
1.2.5	Ship strength 1
2.1.5	Ship propulsion
2.2.5	Buoyancy and stability of ship 2
2.3.5	Ship structures 2
3.1.5	Ship design
3.2.5	Seakeeping
3.3.3	Marine engines
3.3.2	Industrial engineering methods and techniques application in naval architecture
4.1	Skill praxis M - BRO
4.3	M.Sc. thesis

Aerospace Engineering	
1.1.5	Applied aerodynamics
1.2.5	Computational aerodynamics
2.1.5	Structural analysis
2.2.5	Flight dynamics
2.3.5	Composite structures
3.1.5	Aircraft control and systems
3.2.5	Aircraft propulsion
3.3.5	Aircraft design
4.1	Skill praxis M - VAZ
4.3	M.Sc. thesis

Design in Mechanical Engineering	
1.1.5	Structure modelling with calculation
1.2.5	Innovative design of technical systems
2.1.3	Ergonomic design
2.1.2	Bionics in design
2.2.5	Design and construction M
2.3.5	Decision-making methods
3.1.5	Software tools in design in mechanical engineering
3.2.5	Methods of optimization
3.3.5	Eco design
4.1	Skill praxis M - DUM
4.3	M.Sc. thesis

Railway Mechanical Engineering	
1.1.5	Rail vehicles 1
1.2.5	Theory of traction
2.1.5	Locomotive 1
2.2.5	Rail vehicles 2
2.3.5	Brakes of rail vehicles
3.1.5	Locomotive 2
3.2.5	Railway vehicles maintenance
3.3.5	Fundamentals of rail vehicle dynamics
4.1	Skill praxis M - ZEM
4.3	M.Sc. thesis

Welding and Welded Structures	
1.1.3	Engineering materials 3
1.1.2	Fuel, lubricants and industrial water 2
1.2.5	Design of welded structures
2.1.5	Welding metallurgy
2.2.5	Design and construction M
2.3.5	Construction optimization
3.1.5	Welding technology
3.2.5	Reliability of structures
3.3.5	Fracture mechanics and structural integrity
4.1	Skill praxis M - ZZK
4.3	M.Sc. thesis

Engineering of Biotechnical Systems	
1.1.5	Tractors and self-propelled agricultural machines
1.2.5	Refrigeration in food technologies
2.1.5	Design of agricultur machines and equipment
2.2.5	Special techniques and technology of drying process
2.3.5	Processing technology of agricultural products
3.1.5	Geoinformation and remote control of biotechnic systems
3.2.5	Managing food safety and quality
3.3.5	Design of plants and process and energy systems
4.1	Skill praxis M - IBS
4.3	M.Sc. thesis

Industrial Engineering	
1.1.5	Operations research
1.2.5	Engineering statistics
2.1.5	Industrial logistic
2.2.5	Ergonomic designing
2.3.5	Database systems
3.1.5	Production and operations management 2
3.2.5	Organization design
3.3.5	Industrial management
4.1	Skill praxis M - IIE
4.3	M.Sc. thesis

Mechanics	
1.1.5	Analitical mechanics
1.2.5	Continuum mechanics
2.1.5	Theory of elasticity
2.2.5	Fluid mechanics 1
2.3.5	Multiphase flows M
3.1.5	Mechatronic robotics
3.2.5	Computational fluid mechanics
3.3.5	Theory of finite element method
4.1	Skill praxis M - MEH
4.3	M.Sc. thesis

Mechanical Engineering & Information Technology	
1.1.5	C/C++
1.2.5	Object oriented paradigm
2.1.5	Algorithms and data structures
2.2.5	Programmable control systems
2.3.5	Data exquisite in mechanical engineering
3.1.5	Designing software for mechanical engineers
3.2.5	Methods of optimization
3.3.5	Numerical methods in continuum mechanics
4.1	Skill praxis M - MIT
4.3	M.Sc. thesis

Motor Vehicles	
1.1.5	Vehicle design
1.2.5	System effectiveness
2.1.5	Vehicle propulsion and suspension systems
2.2.5	Automotive friction systems
2.3.5	Vehicle mechatronics
3.1.5	Vehicle body structure
3.2.5	Vehicle testing
3.3.5	Vehicle maintenance
4.1	Skill praxis M - MOV
4.3	M.Sc. thesis

Internal Combustion Engines	
1.1.5	Engine working processes
1.2.5	Mixture formation and combustion in IC engines
2.1.5	IC engine design 1
2.2.5	IC engines mechatronics
2.3.5	Supercharging of IC engines
3.1.5	IC engine design 2
3.2.5	IC engine testing
3.3.2	Engine design project
3.3.3	Ecology of mobile power sources
4.1	Skill praxis M - MOT
4.3	M.Sc. thesis

Food Industry Engineering	
1.1.5	Product aestetics
1.2.5	Refrigeration in food technologies
2.1.5	Engineering condition monitoring
2.2.5	Design of mechanisms and manipulators in the food industry
2.3.5	Conveying and material handling machines
3.1.5	Packaging machines
3.2.5	Food processing machines
3.3.5	Plant and process design and energy systems
4.1	Skill praxis M - PRM
4.3	M.Sc. thesis

Production Engineering	
1.1.5	Manufacturing automation
1.2.5	Industrial robots
2.1.5	Manufacturing systems design
2.2.5	Computer integrated manufacturing systems and technology
2.3.5	Production information systems
3.1.5	New technologies
3.2.5	Quality management
3.3.5	Intelligent manufacturing systems
4.1	Skill praxis M - PRO
4.3	M.Sc. thesis

Process Engineering and Environment Protection		Control Engineering	
1.1.5	Transport phenomena in process industry	1.1.5	Computer control
1.2.5	Mechanical and hydromechanical operations and equipment	1.2.5	Automatic control
2.1.5	Heat transfer operations and equipment	2.1.5	Dynamic systems modelling, identification and simulation
2.2.5	Biotechnology	2.2.5	Nonlinear systems 1
2.3.5	Chemical and biochemical operations and reactors	2.3.5	Linear systems synthesis
3.1.5	Design, construction and operation of processing systems	3.1.5	Bioaumatics
3.2.5	Mass transfer operations and equipment	3.2.5	Industrial process control
3.3.2	Air pollution control	3.3.5	Nonlinear systems 2
3.3.3	Waste and wastewater management		
4.1	Skill praxis M - PTH	4.1	Skill praxis M - SAU
4.3	M.Sc. thesis	4.3	M.Sc. thesis

Weapon Systems		Thermal Power Engineering	
1.1.5	Physics of explosive processes	1.1.5	Steam turbines 1
1.2.5	Flight dynamics and aerodynamic of projectiles	1.2.5	Power steam boiler 1
2.1.3	Missile propulsion	2.1.5	Steam turbines 2
2.1.2	Fire control systems		
2.2.3	Interior ballistics	2.2.5	Thermal power plants 1
2.2.2	Automatic weapons		
2.3.2	Missile guidance and control	2.3.5	Gas turbines
2.3.3	Projectile design		
3.1.3	Artillery weapons design	3.1.5	Energy planning
3.1.2	Launching theory		
3.2.5	Missile design and launchers	3.2.5	Themal power plants 2
3.3.3	Terminal ballistics	3.3.5	Steam generators
3.3.2	Optical devices and optoelectronics		
4.1	Skill praxis M - SIN	4.1	Skill praxis M - TEN
4.3	M.Sc. thesis	4.3	M.Sc. thesis

Material Handling, Constructions and Logistics		Thermal Science Engineering	
1.1.5	Facility layout and industrial logistics	1.1.5	Steam boilers elements and equipments
1.2.5	Computer aided design in material handling practice	1.2.5	Refrigeration equipment
2.1.5	Structural and stress analysis	2.1.5	Steam boiler processing
2.2.5	Transport and logistic systems design	2.2.5	Refrigeration systems
2.3.5	Conveying and material handling machines	2.3.5	Air-conditioning fundamentals
3.1.5	Mining and construction machines	3.1.5	Thermal power plants and heat plants
3.2.5	Cranes design	3.2.5	Heat pumps
3.3.5	Eco design	3.3.5	Air conditioning systems
4.1	Skill praxis M - TKL	4.1	Skill praxis M - TTA
4.3	M.Sc. thesis	4.3	M.Sc. thesis

Hydropower Engineering	
1.1.5	Theory of turbomachinery
1.2.5	Pumps
2.1.5	Hydraulic turbines
2.2.5	Machine design of pumps, fans and turbocompressors
2.3.5	Fans and turbocompressors
3.1.5	Hydropower plants and equipment
3.2.5	Hydraulic power transmitters
3.3.5	Hydropower measurements
4.1	Skill praxis M - HEN
4.3	M.Sc. thesis

1.	2.	3.	4.
1.3.5			
1.4.5	2.4.5	3.4.5	
1.5.5	2.5.5	3.5.5	

Lists of elective courses

List of elective courses at the position 1.3 – 2 courses, 5 teaching hours per week each (6 ECTS)

Mechanics M; Fluid mechanics M.

List of elective courses at the position 1.4 – 2 courses, 5 teaching hours per week each (6 ECTS)

Thermodynamics M; Mechatronics.

List of elective courses at the position 1.5 – 16 courses, 5 teaching hours per week each (6 ECTS)

Nuclear reactors; Central heating systems; Pipeline fluid flow; Management information systems; Sheet-metal processing tools; Coordinate measuring machines; Internal combustion engines - M; Combustion for propulsion systems; Numerical simulation of IC engines processes - Basic approach; Computer networks; Buoyancy and stability of ship 1M; Ship structures 1M; Maintenance of machinery and equipment; Helicopters; Basics of the phenomenon of transmission and drying techniques; Rocket motors.

List of elective courses at the position 2.4 – 16 courses, 5 teaching hours per week each (6 ECTS)

Theory of mechanical vibrations; Mechanics of robots; High speed aerodynamics; Wind turbines 2; Environmental protection in thermal power engineering; Risk management in terotechnology; Mechanical engineering measurements and sensors; Distributed systems in mechanical engineering; Combustion and sustainable development M; Sensors and computer based measurements; Ship equipment M (2 hours - 2 ECTS) + Ship systems M (3 hours - 4 ECTS); Combustion M; Mechatronics systems; Computational fluid mechanics; Additive manufacturing technologies; Conformity, compliance and product warranty.

List of elective courses at the position 2.5 – 17 courses, 5 teaching hours per week each (6 ECTS)

Gas dynamics; Two-phase flows with phase transition; New generation of machine tools and robots; Design of logistic and warehouse systems; Ship strength 2; Tribotechnique; Computer simulation in manufacturing Automation; Industrial automation; Biofuels in combustion processes ; Vehicles and environment; Basics of composite materials mechanics ; Design of construction and mining machines subsystems; Model based development of automotive software; Avionics; Aircraft performance; Fixture design; Embedded systems and IoT in mechanical engineering.

List of elective courses at the position 3.4 – 18 courses, 5 teaching hours per week each (6 ECTS)

Technical regulations and standards; Project management & air regulation; Aircraft maintenance; Ship manoeuvring (2 hours - 2 ECTS) + Software application in ship design (3 hours - 4 ECTS); Tribology; Machine tools M; Urban and special rail vehicles; Fundamentals of mining and construction machines dynamics; Ecology of combustion; Intelligent vehicle systems; Building energy certification; Renewable energy resources - small hydropower plants; Hybrid technical systems; Selected topics in IC engines 1; Assembly systems; Techno-economic analysis and project management; Steam turbines 3; Computer graphics and virtual reality.

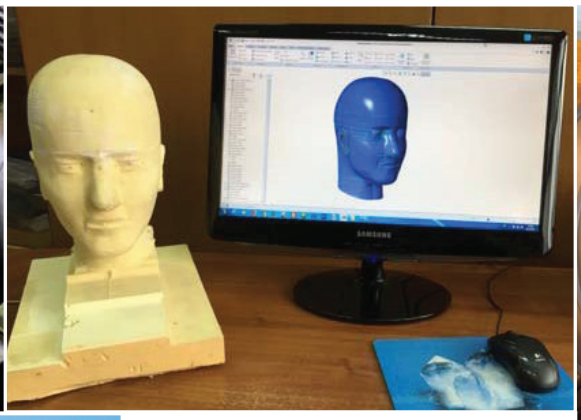
List of elective courses at the position 3.5 – 18 courses, 5 teaching hours per week each (6 ECTS)

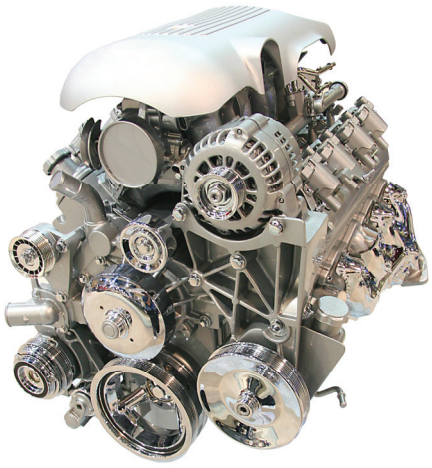
Computer simulations of thermalhydraulic processes and CFD; Turbocompressors; Aircraft armement systems; Man - machine system design (3 hours - 4 ECTS) + Quality improvement in production processes - Lean six sigma (2 hours - 2 ECTS); Forensic engineering; International maritime regulations; Tribological systems;

Information technology projects evaluation; Micro manufacturing and characterization; Intelligent buildings; Aeroelasticity; Combustion appliances; Microfluidics and nanofluidics; Selected topics in IC engines 2; Intelligent control systems; Computer control and monitoring in manufacturing automation; Multiphase flow; Missile navigation, guidance and control algorithms.

List of elective courses (subjects offered only in English, without strictly defined position) - 56 courses, 5 teaching hours per week each (6 ECTS)

Manufacturing technologies; Numerical methods; Computer aided design; Structure analysis; Gas dynamics and CFD; Propulsion systems; Solid propellant motor design; Airframe structure analysis; Project management; Dynamics of structures; Wind tunnel testing; Quality assurance and tests; Fatigue of thin walled structures; Actuating systems; Control and testing; Discrete event simulation; Nozzle flow analysis and thrust vector control systems; Skill praxis M; Principles of warhead mechanisms; Introduction to optical system design; Aberration theory and image analysis; Digital image processing; Advanced optical system design; Applied optimization theory in optical system design; Solid - state lasers; Infrared detectors; Fiber optical data transfer; Missile system integration (SIN); Assembly automation; Production planning and control; Analytic methods for engineering design; Automatic control; Introduction to CFD; Advanced missile guidance and control; Combustion physics; Fundamentals of guided missiles navigation systems; Introduction to neural networks and fuzzy systems; Matlab and simulink for engineering applications; Numerical methods in heat and mass transfer; Seekers; Advanced interior ballistics; Maintenance management M; Production and operations management 1 – M; Design and analysis of composite structures; Numerical analysis in warhead design; Pyrotechnic security; Warhead design and terminal ballistics; Modern quality approache; Advanced aerospace propulsion systems; Design of logistic and warehouse systems; Electric aircraft propulsion; Industrial logistic; Multidisciplinary optimization in aerospace engineering; Weapon mechanics; Advanced nuclear reactors; Infrared detectors; Nuclear power plants safety


РЕПУБЛИКА СРБИЈА
КОМИСИЈА ЗА АКРЕДИТАЦИЈУ И
ПРОВЕРУ КВАЛИТЕТА
Број: 612-00-01119/2017-06
26.05.2017. године
Београд

У В Е Р Е Њ Е
О АКРЕДИТАЦИЈИ СТУДИЈСКОГ ПРОГРАМА
ОСНОВНИХ АКАДЕМСКИХ СТУДИЈА

УНИВЕРЗИТЕТ У БЕОГРАДУ – МАШИНСКИ ФАКУЛТЕТ са седиштем у Краљице Марије 16, Београд, ПИБ: 100209517, Матични број: 07032501, испунио је стандарде прописане Правилником о стандардима и поступку за акредитацију високошколских установа и студијских програма („Службени гласник РС“ број 106/06, 112/08, 70/11, 101/12-I-25, 101/12-I-26, 13/14), за акредитацију студијског програма **основне академске студије – МАШИНСКО ИНЖЕЊЕРСТВО** у оквиру поља техничко-технолошких наука и то за упис 720 (седамстодвадесет) студената у седишту Установе.

О утврђеној акредитацији из става 1. ове одлуке Комисија за акредитацију и проверу квалитета издаје Уверење.

Ово уверење издаје се на основу члана 16. став 5. тачка 1) Закона о високом образовању („Службени гласник РС“ број 76/05, 100/07, 97/08, 44/10, 93/12, 99/14, 45/15, 68/15).

Достављено:
- високошколској установи
- архиви КАПК

ПРЕДСЕДНИК
Проф. др Ђемал Долићанин

РЕПУБЛИКА СРБИЈА
КОМИСИЈА ЗА АКРЕДИТАЦИЈУ И
ПРОВЕРУ КВАЛИТЕТА
Број: 612-00-01119/2017-06
30.06.2017. године
Београд

У В Е Р Е Њ Е
О АКРЕДИТАЦИЈИ СТУДИЈСКОГ ПРОГРАМА
МАСТЕР АКАДЕМСКИХ СТУДИЈА

УНИВЕРЗИТЕТ У БЕОГРАДУ – МАШИНСКИ ФАКУЛТЕТ са седиштем у Краљице Марије 16, Београд, ПИБ: 100209517, Матични број: 07032501, испунио је стандарде прописане Правилником о стандардима и поступку за акредитацију високошколских установа и студијских програма („Службени гласник РС“ број 106/06, 112/08, 70/11, 101/12-I-25, 101/12-I-26, 13/14), за акредитацију студијског програма **мастер академске студије – МАШИНСКО ИНЖЕЊЕРСТВО** у оквиру поља техничко-технолошких наука и то за упис 416 (четристошеснаест) студената у седишту Установе.

О утврђеној акредитацији из става 1. ове одлуке Комисија за акредитацију и проверу квалитета издаје Уверење.

Ово уверење издаје се на основу члана 16. став 5. тачка 1) Закона о високом образовању („Службени гласник РС“ број 76/05, 100/07, 97/08, 44/10, 93/12, 99/14, 45/15, 68/15).

Достављено:
- високошколској установи
- архиви КАПК

ПРЕДСЕДНИК
Проф. др Ђемал Долићанин

РЕПУБЛИКА СРБИЈА
КОМИСИЈА ЗА АКРЕДИТАЦИЈУ И
ПРОВЕРУ КВАЛИТЕТА
Број: 612-00-01119/2017-06
30.06.2017. године
Београд

У В Е Р Е Њ Е
О АКРЕДИТАЦИЈИ СТУДИЈСКОГ ПРОГРАМА
ДОКТОРСКИХ СТУДИЈА

УНИВЕРЗИТЕТ У БЕОГРАДУ – МАШИНСКИ ФАКУЛТЕТ са седиштем у Краљице Марије 16, Београд, ПИБ: 100209517, Матични број: 07032501, испунио је стандарде прописане Правилником о стандардима и поступку за акредитацију високошколских установа и студијских програма („Службени гласник РС“ број 106/06, 112/08, 70/11, 101/12-I-25, 101/12-I-26, 13/14), за акредитацију студијског програма **докторске студије – МАШИНСКО ИНЖЕЊЕРСТВО** у оквиру поља техничко-технолошких наука и то за упис 50 (педесет) студената у седишту Установе.

О утврђеној акредитацији из става 1. ове одлуке Комисија за акредитацију и проверу квалитета издаје Уверење.

Ово уверење издаје се на основу члана 16. став 5. тачка 1) Закона о високом образовању („Службени гласник РС“ број 76/05, 100/07, 97/08, 44/10, 93/12, 99/14, 45/15, 68/15).

Достављено:
- високошколској установи
- архиви КАПК

ПРЕДСЕДНИК
Проф. др Ђемал Долићанин

THE ROYAL INSTITUTION
OF NAVAL ARCHITECTS

This is to certify

that the

MSc in Mechanical Engineering

spec. module:

Naval Architecture

at

UNIVERSITY of BELGRADE

has been accredited by the

Royal Institution of Naval Architects

and satisfies the academic requirements for

Corporate membership of the Institution

Chief Executive
The Royal Institution of Naval Architects

2018 – 2022

ASIIN

Accreditation Certificate

for the

degree programme
„Mechanical Engineering“
(Bachelor of Science)
at the
University of Belgrade

The award of the subject-based ASIIN seal is valid from 01 October 2018 and limited until 30 September 2025.

The degree programme includes the following options: full time.

The degree programme is aligned to Level 6 of the European Qualifications Framework for Life-long Learning (EQF LLL).

April 6th 2020

Prof. Dr. Kathrin Lehmann
Vorsitzende der Akkreditierungskommission für Studiengänge

Prof. Dr. Kurt-Ulrich Witt

Dr. Iring Wasser
Geschäftsführer

The ASIIN seal is awarded to a degree programme which fulfills the requirements of academia and professional life in the respective disciplines on a high level. At the same time it confirms that the conditions for good teaching and successful learning are provided. The award of the label is based on recognized learning-outcome oriented subject-specific standards aligned with the European Qualifications Framework and the „European Standards and Guidelines“.

ASIIN

Accreditation Certificate

for the

degree programme
„Mechanical Engineering“
(Master of Science)
at the
University of Belgrade

The award of the subject-based ASIIN seal is valid from 01 October 2018 and limited until 30 September 2025.

The degree programme includes the following options: full time.

The degree programme is aligned to Level 7 of the European Qualifications Framework for Life-long Learning (EQF LLL).

April 6th 2020

Prof. Dr. Kathrin Lehmann
Vorsitzende der Akkreditierungskommission für Studiengänge

Prof. Dr. Kurt-Ulrich Witt

Dr. Iring Wasser
Geschäftsführer

The ASIIN seal is awarded to a degree programme which fulfills the requirements of academia and professional life in the respective disciplines on a high level. At the same time it confirms that the conditions for good teaching and successful learning are provided. The award of the label is based on recognized learning-outcome oriented subject-specific standards aligned with the European Qualifications Framework and the „European Standards and Guidelines“.

European Accreditation of Engineering Programmes
EUR-ACE®

This is to certify that the engineering degree programme

Bachelor of Science
Mechanical Engineering

provided by
University of Belgrade

accredited by
ASIIN e.V.

on 01 October 2018 until 30 September 2025

satisfies the criteria for Bachelor degree programmes specified in the EUR-ACE® Framework Standards for the Accreditation of Engineering Programmes, and therefore for the above period of accreditation is designated as a

EUROPEAN-ACCREDITED ENGINEERING
BACHELOR DEGREE PROGRAMME.

certificate

ENAEE — For the European Network for Accreditation of Engineering Education (ENAEE)

The President
Mr. Damien OWENS

Brussels, April 6th 2020

ASIIN — For ASIIN

The Chairwoman of the Accreditation Commission
Prof. Dr. Kathrin Lehmann

Düsseldorf, April 6th 2020

A graduate of this programme may define him/herself "EUR-ACE® Bachelor/Master" as appropriate.

European Accreditation of Engineering Programmes
EUR-ACE®

This is to certify that the engineering degree programme

Master of Science
Mechanical Engineering

provided by
University of Belgrade

accredited by
ASIIN e.V.

on 01 October 2018 until 30 September 2025

satisfies the criteria for Master degree programmes specified in the EUR-ACE® Framework Standards for the Accreditation of Engineering Programmes, and therefore for the above period of accreditation is designated as a

EUROPEAN-ACCREDITED ENGINEERING
MASTER DEGREE PROGRAMME.

certificate

ENAEE — For the European Network for Accreditation of Engineering Education (ENAEE)

The President
Mr. Damien OWENS

Brussels, April 6th 2020

ASIIN — For ASIIN

The Chairwoman of the Accreditation Commission
Prof. Dr. Kathrin Lehmann

Düsseldorf, April 6th 2020

A graduate of this programme may define him/herself "EUR-ACE® Bachelor/Master" as appropriate.

ASIIN Accreditation and EUR-ACE Certificates 2018-2025

University of Belgrade
Faculty of Mechanical Engineering

3rd level of studies
Doctoral (Ph.D.) studies – Mechanical Engineering
ECTS 180

The study programme of Doctoral (Postgraduate) academic studies is performed within the curriculum framework schematically presented below.

<table>
<tr><td rowspan="2">ECTS</td><td colspan="2">1st year</td><td colspan="2">2nd year</td><td colspan="2">3rd year</td></tr>
<tr><td>1st semester</td><td>2nd semester</td><td>3rd semester</td><td>4th semester</td><td>5th semester</td><td>6th semester</td></tr>
<tr><td>5</td><td>Advanced course in mathematics
1.1.5</td><td>Selected topics in mechanics or Selected topics in fluid mechanics
2.1.5</td><td>Elective course
3.1.5</td><td rowspan="2">Research & publication - IV
4.1.8</td><td rowspan="6" colspan="2">Ph.D. thesis
5.60</td></tr>
<tr><td>5</td><td>Numerical methods
1.2.5</td><td>Elective course
2.2.5</td><td>Elective course
3.2.5</td></tr>
<tr><td>5</td><td>OMSR and communication
1.3.5</td><td>Elective course
2.3.5</td><td rowspan="3">Research & publication - III
3.3.20</td><td rowspan="3">Elaboration of Ph.D. thesis proposal
4.2.22</td></tr>
<tr><td>5</td><td>Elective course
1.4.5</td><td rowspan="2">Research & publication - II
2.4.15</td></tr>
<tr><td>10</td><td>Research & publication - I
1.5.10</td></tr>
</table>

Enrollment requirements for Doctoral studies are defined by Article 7 and the enrollment procedure by Article 11, Regulations for Doctoral Studies of the Faculty of Mechanical Engineering (available only in Serbian language). Maximum number of graduates enrolled in Doctoral studies is **50**, according to the National Accreditation.

Doctoral studies have got ECTS 180, and have to be finished within maximum 6 years, including the PhD thesis defense. They comprise attending and sitting the exams in 4 obligatory courses (subjects) and 5 elective ones from the list of offered courses, where the selection of courses is not bound to its position. White boxes – obligatory courses, colored boxes – elective courses. Numeric code below the course title in this table consists of three digits: the first digit is the number of the semester, the second is the position of the course, and the third is the number of ECTS credit points.

Each course lasts one semester, equals ECTS 5 and has **35 lecture hours** of active teaching with additional consultations and knowledge tests as arranged with the subject teacher. Percent of points assigned to courses is (9x5=45) 45/180=25%. **Students are not allowed to choose any elective course without the advice of their potential supervisor**. Students are eligible to attend maximum 3 courses taught by one professor. Besides, apart from the maximum of 3 courses, **students may choose courses not offered by the Faculty of Mechanical Engineering** but courses from the lists offered by other technical faculties of Belgrade University.

Exams results and accomplished research and publication of its findings, including the Project of conception for writing a dissertation which shall be done under the phase of elaboration of Ph.D. thesis proposal (position 4.2.22), are assessed and verified by a corresponding exam application form. Research and publication (I-IV) and the Project of conception for writing a dissertation are a preparation for creating a doctoral dissertation, totaling ECTS 75, i.e. 10+15+20+8+22=75.

Potential supervisor submits a brief report (not longer than one page), along with the exam application form with a registered grade, specifying doctoral candidate's research and professional activities followed by a corresponding number of credit points, whose sum equals the foreseen number of ECTS credit points for a corresponding box in the table provided. The report on defended Project of conception for writing a dissertation (one-page long) is signed by three members of the Committee with an exam application form attached. In the reports on doctoral candidate's research and publication activities, the number of ECTS credit points is used to evaluate:

- Laboratory investigations related to a preliminary subject of doctoral dissertation as presented in the research plan. Work on projects and other research-scientific activities within the field of advanced training. A descriptive title of performed laboratory work and/or investigation is provided with assessed number of ECTS credit points.

- Papers published in international scientific journals or proceedings of international conferences. Categorization of scientific publications, as well as their impacts which is used for corresponding allocation of ECTS, is defined by the acts of the national Ministry for education, science and technological development.

Paper category	M21	M22	M23	M24	M51	M52	M33	M34
Explanation	Paper published in leading international journal	Paper published in distinguished international journal	Paper published in international journal	Paper published in international journal verified by a special decision	Paper published in leading national journal	Paper published in national journal	Presented paper published as a whole in proceedings of an international conference	Presented paper published as an extract in proceedings of an international conference
ECTS	15	14	13	10	10	8	6	4

The list of international journals can be accessed by using Kobson database at:
http://kobson.nb.rs/servisi/pretrazivanje_casopisa.84.html

If the paper has more than one author, the number of credit points is divided by n-1, where n is the number of authors. The total number of credit points gained for this activity cannot exceed, in sum, 40 points in all four reports, irrespective of the number of papers. The report must contain the title of the paper with all references and the number of credit points assigned.

- Teaching at undergraduate and graduate studies equals ECTS 1 per hour weekly and per semester (2 hours weekly during one semester equal ECTS 2). This activity, registered in all four reports, can bring ECTS 30 in total, regardless of the number of hours taught. The reports must also include the course title and its curriculum position as well as its ID number in the Course Catalog, number of hours taught, and number of ECTS credit points.

The average grade is calculated as an arithmetic mean of all grades for activities as assessed by exam application form.

Enrollment in the second study year is allowed if the student passes exams in three obligatory courses and gains the number of ECTS credit points pursuant to the Law.

Enrollment in the third study year is allowed if the student passes exams in all courses and gains the number of required ECTS credit points pursuant to the Law.

Submission of application for creating a dissertation is not allowed unless the student gains ECTS 120 from the first two study years, including the defended Project of conception (elaboration) for writing a dissertation.

Submission of dissertation to the supervisor for reading and reviewing (and subsequent defense) is allowed after the student has published the results of his/her research in at least one international journal of an impact factor (IF) cited on the ISI-JCR-SCI list, where the student is the first or the only author without a doctoral degree, otherwise several papers of this kind are required.

In addition to above mentioned tasks and duties, a doctoral candidate is **obliged to participate in scientific-professional projects** that provide education for industrial environment (application of the course in Organization and Methods of Scientific Research) – PhD title owner must also be a leader in knowledge dissemination). The time period for this type of activity is an agreement with the supervisor.

OBLIGATORY COURSES

1.1 Advanced course in mathematics
- Partial differential equations
- Linear algebra

1.2 Numerical methods
1.3 Organization and methods of scientific research (OMSR) and communication
2.1 Selected topics in mechanics or Selected topics in fluid mechanics

ELECTIVE COURSES

List of elective courses at the position 1.4 – 37 courses

Analitical mechanics; Epistemology of science and technique ; Tensor calculus ; Experimental data acquisition and processing; Ship dynamics; Explosive applications; Management of production; Theory of hydrodynamic stability; Oscillations of mechanical systems; The dynamics of a viscous incompressible fluid; Boundary layer theory; Modelling of thermalhydraulic transients; Fuels and selected topics in combustion; Surface engineering; Management of innovation; Structure testing methods; Computational modeling in mechanical engineering; Decision theory; Synthesis of mechanisms; The integration of aeronautical systems and avionics; Selected topics in wind turbines; Artificial intelligence of motor vehicles; Load distribution - analysis and synthesis - 1; Load distribution - analysis and synthesis - 2; Theory of elasticity; Computer based measurements; Basic principles of fracture mechanics; Ecodesign and sustainable logistics; Optimization of thermal power plants; Aircraft flight dynamics; Selected topics in bionics; Selected topics in aircraft composite structures; Airfoils and lifting surfaces of aircraft; Selected chapters of biomechanics of tissue and organs; Stress and strain measurement; Nanomechanical characterization of materials; Turbulent flow measurements.

List of elective courses at positions 2.2 – 37 courses

Vehicle mechatronics - special chapters; Anisotropic plates and shells; Ship waves; Maintenance and quality management system; Dynamics of a system of rigid bodies; Power transmission of locomotives - control and optimization; Contemporary trends in ship structural design; Turbomachinery flow phenomena - design of cascades and impeller blades; Product development in mechanical engineering; Intelligent automation; Numerical simulation of welding processes; Biofluid mechanics – advanced course; Mass, momentum and energy transport phenomena; Aeronautical maintenance and support; Modern combustion appliances; Structural analysis of material handling machines; Analytical methods for engineering design; Mechanics of locomotor system; Special algorithms of mechatronic; CAD/CAM systems and integration of product and manufacturing design; Machine dynamics; Selected topics in aircraft armement systems; Adaptive structures; Selected topis in structural analysis of flying vehicles; Selected topics in machine elements - A ; Selected topics in machine elements - B; Finite element method; Selected topics of terminal ballistics; Advanced linear systems; Numerical simulation of IC engines processes - advanced approach; Regimes and energy efficiency of thermal power plants; Integrated technical systems - actuators; Special topics in applied aerodynamics; Selected topics of strength of constructions; Composite materials mechanics; Aerodynamics and flight mechanics for autopilot and guidance system design; Biologically inspired optimization algorithms.

List of elective courses at positions 2.3 – 36 courses

Modelling, optimisation and forecasting in industrial engineering; Stability of motion of a system; Propulsion of projectiles; Man - machine interface; Thin-walled structures; Mathematical methods in fluid mechanics; Advanced thermal power cycles; Structural integrity and life; Specific topics in ship hydrodynamics; Non-linear strength problems of rail vehicles; Combustion modeling; Lubrication theories; Dynamics and strength of mining and construction machines; Cutting theory; Autonomous systems and machine learning; Selected chapters of mechanics of robots; Environmental aspects of combustion; Technical legislation - directives and standards; Operating systems in mechatronics; Quality engineering techniques; Substitution of manual tasks in food industry; Helicopter rotor aerodynamics; Selected topics in computational aerodynamics; Optimization of aerospace structures; Selected topics in aeroelasticity; Computer modeling and structure calculation ; Advance techniques in IC engines – selected topics; Lubrication theory; Advanced fuzzy control systems; Fractional calculus with applications in engineering; Mechanics of variable mass systems; Special chapters from the flight dynamics of the aircraft; Selected topics in machine elements V; Thrust vector control systems; Guided missiles navigational systems; End-of-life vehicles.

List of elective courses at positions 3.1 – 42 courses

Model and prototype testing of hydraulic machinery; Turbulent flows; Aero-hydrodynamics of sailing yachts; Numerical methods in ship hydrodynamics; Rehabilitation biomechanics; Multiphase flows D; Advanced methods for maintenance of railway vehicles; Systems of artificial neural networks; Intelligent industrial robots; Continuum mechanics; Wave induced loads on ships; Microchannel fluid flow; Computational multi-fluid dynamics; Energy efficiency in buildings; Testing and optimization of machine tools; Industrial robots modelling and simulations; Optimization methods of mechanical systems; Aircraft production technology; CFD in combustion; Failure diagnostic; Dynamics of material handling and conveying machines; Efficiency and reliability of weapon; Sliding and rolling bearings; Computation theory; Production planning and control systems; Mechatronic systems design; Selected topics from propulsion; Aerodynamic shape optimization; Fatigue and life estimation of aeronautical stuctures; Selected topics in fluid structure interaction; Advanced techniques in IC engine testing; Selected topics in design and construction - A; Application of fracture mechanics to structural integrity; Thermoelasticity; Mechanics of ballistic systems; Mechanics of bipedal gait; Digital processing of non-stationary signals; Experimental aerodynamics; Inverse analysis in material characterization; Optimal control of mechanical systems; Risk management; Isogeometric analysis.

List of elective courses at positions 3.2– 46 courses

Performance analysis of manufacturing systems; Magnetohydrodynamic flows; Modeling of turbulent flows; Advanced course in numerical methods for ship strength analyses; Turbomachinery flow phenomena - computational fluid dynamics; Water waves; Aerodynamics of thermal turbomachinery; Mechatronics systems and adaptronics; High speed crafts; Dynamic problems of rail vehicles; Selected topics in operations research; Measurement techniques in combustion; Numerical structural analysis; Power transmission units reliability and dynamics; Selected topics in material handling, constructions and logistics; Digital forensics; Mechanics of nonholonomic systems; Impact mechanics; Theory of gyroscopes; Theory and simulation of the machining process; CAI models; Advanced robotics-selected chapters; Especial chapters of theory of machines and mechanisms; Integration of smart actuators and sensors; Computational fluid dynamics of buildings and vehicles; Quantitative research methods in aviation; Planetary gear train; Selected topics in design and construction - B; Tribology of machine elements; Computational fracture mechanics; IC engines dynamic problems; Selected topics in projectile design; Advanced systems in intelligent buildings; Cognitive robotics; Stochastic dynamics; Selected topics in aerodynamics; Modern concepts of organizations; Modelling of composite material micromechanics; Advanced topics of missile guidance; Special topics in computational aerodynamics; Advanced gasdynamics; Alternative vehicle drives; Thermal comfort and indoor environmental quality in buildings; Non linear finite element methods; Advanced intelligent control systems; Selected topics in missile design and launchers.

List of elective courses (subjects offered only in English, without strictly defined position) - 48 courses

Planning, performing & controlling projects; Research and development methodology; Advanced numerical methods; Analytic methods for engineering design; Finite elements methods in applications; Software tools for project management; Engineering management; Industrial design; Artificial intelligence & machine learning; Advanced manufacturing systems; Advanced gas dynamics; Computational fluid dynamics; Fatigue of thin walled structures; Queuing systems - theory and applications; Competitive manufacturing management; Engineering anthropometry; Human - machine interface 1; Introduction to operations research; Nonplanar lifting surfaces; Advanced computer aided design; Design of aerospace structures; Advanced airframe structural analysis; Actuating systems - selected topics; Aerodynamics of turbocompressors; Combined cycles with gas turbines & steam turbines; Design of steam turbines; Gas turbines - selected topics; Information management; Neural networks and fuzzy systems; Statistical process control; Steam turbines - advanced course; Thermal power plant engineering; Thrust vector control systems - selected topics; Topics in thermodynamics of thermal energy conversion; Advanced course in pumps, fans and turbocompressors; Advanced course of hydromechanical equipment in hydro-energy systems; Advanced topics in warhead design; Fluid measurements; Measurements in hydro-energy systems; Missile guidance control systems; Selected topics in programming tools; Strapdown inertial navigation systems; Turbulence in turbomachinery; Advanced nuclear reactors; Gas-liquid two-phase flow and heat transfer; Methods of energy planning; Nuclear power plants safety; Thermal-hydraulics of steam generators;

University of Belgrade
Faculty of Mechanical Engineering

1st level of studies

B.Sc. (undergraduate) Academic Studies – Information Technologies in Mechanical Engineering
180 ECTS

<table>
<tr><th rowspan="2">Hours weekly</th><th colspan="2">1st year</th><th colspan="2">2nd year</th><th colspan="2">3rd year</th></tr>
<tr><th>1st semester</th><th>2nd semester</th><th>3rd semester</th><th>4th semester</th><th>5th semester</th><th>6th semester</th></tr>
<tr><td>1</td><td rowspan="8">1.1
Programming
(10 ECTS)</td><td rowspan="8">2.1
Data structures
(10 ECTS)</td><td rowspan="4">3.1
Fundamentals of algorithms
(5 ECTS)</td><td rowspan="4">4.1
Introduction to operating systems
(6 ECTS)</td><td rowspan="4">5.1
Object-oriented paradigm
(5 ECTS)</td><td rowspan="4">6.1
Database systems
(5 ECTS)</td></tr>
<tr><td>2</td></tr>
<tr><td>3</td></tr>
<tr><td>4</td></tr>
<tr><td>5</td><td rowspan="4">3.2
Discrete mathematics
(5 ECTS)</td></tr>
<tr><td>6</td><td rowspan="4">4.2
Numerical analysis
(6 ECTS)</td><td rowspan="3">5.2
Elective course 4
(5 ECTS)</td><td rowspan="3">6.2
Elective course 5
(5 ECTS)</td></tr>
<tr><td>7</td></tr>
<tr><td>8</td></tr>
<tr><td>9</td><td rowspan="6">1.2
Algebra and linear algebra
(8 ECTS)</td><td rowspan="6">2.2
Calculus
(8 ECTS)</td><td rowspan="3">3.3
Elective course 3
(5 ECTS)</td></tr>
<tr><td>10</td><td rowspan="3">5.3
Fundamentals of thermodynamics and heat transfer
(5 ECTS)</td><td rowspan="3">6.3
Fundamentals of control engineering
(5 ECTS)</td></tr>
<tr><td>11</td><td rowspan="3">4.3
Basics of mechanics 3
(6 ECTS)</td></tr>
<tr><td>12</td></tr>
<tr><td>13</td><td rowspan="3">3.4
Basics of mechanics 2
(5 ECTS)</td></tr>
<tr><td>14</td><td rowspan="4">5.4
Fundamentals of fluid mechanics
(5 ECTS)</td><td rowspan="4">6.4
Manufacturing technology
(5 ECTS)</td></tr>
<tr><td>15</td><td rowspan="3">1.3
Elective course 1
(4 ECTS)</td><td rowspan="3">2.3
Basics of mechanics 1
(3 ECTS)</td><td rowspan="5">4.4
Machine elements computer modelling
(6 ECTS)</td></tr>
<tr><td>16</td></tr>
<tr><td>17</td><td rowspan="4">3.5
Mechanical materials
(5 ECTS)</td></tr>
<tr><td>18</td><td rowspan="3">1.4
Basics of computing systems
(4 ECTS)</td><td rowspan="3">2.4
Intro into the electrical engineering fundamentals (4 ECTS)</td><td rowspan="3">5.5
Elective course of section 6
(5 ECTS)</td><td rowspan="3">6.5
Elective course of section 7
(5 ECTS)</td></tr>
<tr><td>19</td></tr>
<tr><td>20</td></tr>
<tr><td>21</td><td rowspan="3">1.5
English 1
(2 ECTS)</td><td rowspan="3">2.5
Software application in elementary physics
(3 ECTS)</td><td rowspan="5">4.5
Praxis
(6 ECTS)</td></tr>
<tr><td>22</td><td rowspan="4">3.6
Mechanical materials
(5 ECTS)</td><td rowspan="3">5.6
Elective course of section 8
(5 ECTS)</td><td rowspan="3">6.6
B.Sc. work
(5 ECTS)</td></tr>
<tr><td>23</td></tr>
<tr><td>24</td><td rowspan="2">1.6
Elective course 2
(2 ECTS)</td><td rowspan="2">2.6
Engineering economics
(2 ECTS)</td></tr>
<tr><td>25</td></tr>
</table>

Starting from October 1st, 2019, a new nationally accredited study programme of Bachelor Academic Studies – Information Technologies in Mechanical Engineering has been implemented. The Diploma certificate of this study programme will contain the professional title of a **Bachelor of Science** (B.Sc. from the Latin Baccalaureus Scientiæ), and in the Diploma Supplement **Information Technology.** A Diploma Supplement will contain a list of courses the student has attended and passed exams in. Abbreviations: B.Sc.ME or BSc ME.

All the courses last for one semester. **B.Sc. work** is like all other courses; however, knowledge-check is done through a project or seminar paper. For reference, the courses are coded according to their position:

1. the first digit is the number of the semester (vertical column);
2. the second digit is the number of the full-course box in the semester (horizontal row).

The maximum number of students enrolled in the study programme of Bachelor Academic Studies – Information Technologies in Mechanical Engineering is **60**, and classes are delivered in groups of up to **60 students for lectures**, **60 for auditory practice** and **20 for laboratory practice.** Attendance of lectures is obligatory for students, as well as the lecturer's record-keeping on it. In order to gain pre-exam points, a knowledge check is obligatory during class-hours. In such a way, parts of the exam are passed earlier, and so the final exam includes only the remaining topics. Final exam may be taken right away and only two more times during the same academic year. If the exam has not been passed, the student has to repeat the study of the same academic year without the possibility of state budget financing. The student has to take the final exam even if he/she does not want to gain additional points. The Rulebook on Teaching at the Bachelor Academic Studies sets out in more detail the forms of teaching, informing students about the way of organizing all forms of teaching, the rules of studying, knowledge checks and assessment, as well as the other issues related to teaching.

Elective courses

At the beginning of each year, **the student chooses** the elective courses for that year of study that he or she wants to attend and pass. There is a separate list of courses for each semester, as well as for **each course position** in the semester. However, the following conditions have to be borne in mind:

All the elective courses in the list for a certain position are mutually competing with each other and the student can choose only one course from the list. There has to be a minimum of 10 students enrolled in the course for the course to be taught. In the process of choosing the course, priority is given to students with a higher grade point average. Every teacher has the option to offer a course with the appropriate content and literature for which he/she presumes that will be of interest to students.

Lists of elective courses in the school year 2021/2022.

List of elective courses at the position 1.3 – 2 courses, each with 3 classes per week (4 ECTS)

Internet of things; Basics of technical communication.

List of elective courses at the position 1.6 – 2 courses, each with 2 classes per week (2 ECTS)

Engineering ethics and innovation; English 2.

List of elective courses at the position 3.3 – 2 courses, each with 4 classes per week (5 ECTS)

Animations and simulations in graphics; Interdisciplinary scientific visualization.

List of elective courses at the position 5.2 – 3 courses, each with 4 classes per week (5 ECTS)

Databases design; Statistic - R; Computer based measurements.

List of elective courses at the position 5.5 – 3 courses, each with 4 classes per week (5 ECTS)

Computational fluid dynamics; WEB projecting in mechanical engineering; Numerical simulations of powertrain systems.

List of elective courses at the position 5.6 – 3 courses, each with 4 classes per week (5 ECTS)

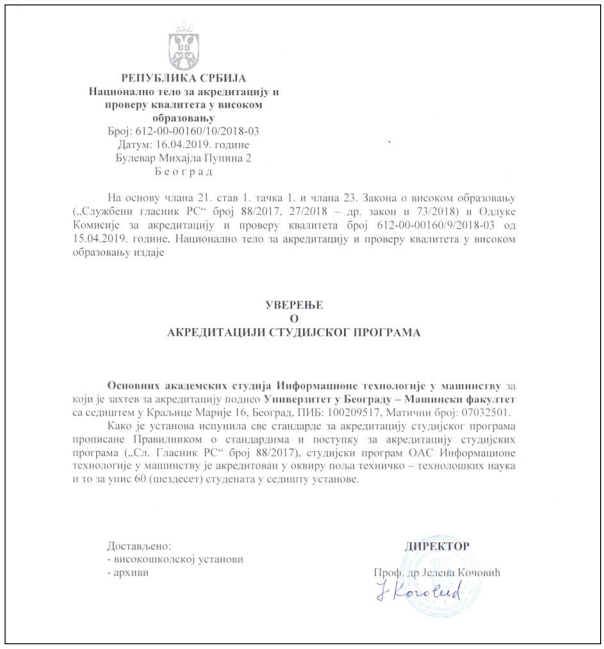
Introduction to finitel element method; Software engineering; Fundamentals of IC engine mechatronics.

List of elective courses at the position 6.2 – 3 courses, each with 4 classes per week (5 ECTS)

Object-oriented programming; Basics of risk theory; Computer based measurements.

List of elective courses at the position 6.5 – 3 courses, each with 4 classes per week (5 ECTS)

Statistical computing for biomedical data analytics; Interactive modelling and design; Model based automotive software development.



РЕПУБЛИКА СРБИЈА
Национално тело за акредитацију и проверу квалитета у високом образовању
Број: 612-00-00160/10/2018-03
Датум: 16.04.2019. године
Булевар Михајла Пупина 2
Београд

На основу члана 21. став 1. тачка 1. и члана 23. Закона о високом образовању („Службени гласник РС“ број 88/2017, 27/2018 – др. закон и 73/2018) и Одлуке Комисије за акредитацију и проверу квалитета број 612-00-00160/9/2018-03 од 15.04.2019. године, Национално тело за акредитацију и проверу квалитета у високом образовању издаје

УВЕРЕЊЕ
О
АКРЕДИТАЦИЈИ СТУДИЈСКОГ ПРОГРАМА

Основних академских студија Информационе технологије у машинству за који је захтев за акредитацију поднео **Универзитет у Београду – Машински факултет** са седиштем у Краљице Марије 16, Београд, ПИБ: 100209517, Матични број: 07032501.

Како је установа испунила све стандарде за акредитацију студијског програма прописане Правилником о стандардима и поступку за акредитацију студијских програма („Сл. Гласник РС“ број 88/2017), студијски програм ОАС Информационе технологије у машинству је акредитован у оквиру поља техничко – технолошких наука и то за упис 60 (шездесет) студената у седишту установе.

Достављено:
- високошколској установи
- архиви

ДИРЕКТОР
Проф. др Јелена Кочовић

National Accreditation Certificate for the Study Programme of Bachelor Academic Studies – Information Technologies in Mechanical Engineering 2019-2026

University of Belgrade
Faculty of Mechanical Engineering and the Faculty of Mathematics

2nd level
Master Academic Studies
Industry 4.0
120 ECTS

Hours weekly	1st year		2nd year	
	1st semester	2nd semester	3rd semester	4th semester
1	1.1 Introduction to production systems	2.1 Designing business models in industry 4.0	3.1 Interfaces for interoperability in industry 4.0	4.1 Elective courses group M4
2				
3				
4				
5				
6	1.2 Contemporary management and network organizations	2.2 Machine learning of intelligent robotic systems	3.2 Elective courses group R1	4.2 Internship, 2nd part
7				
8				
9				
10				
11	1.3 Statistics for automated data analysis	2.3 Cyber physical systems	3.3 Elective courses group M2	4.3 M.Sc. thesis – research work
12				
13				
14				
15				
16	1.4 Robotics and artificial intelligence	2.4 Elective courses group M1	3.4 Elective courses group M3	
17				
18				
19				
20				
21	1.5 Algorithms and data structures	2.5 Elective courses group R1	3.5 Internship, 1st part	4.4 M.Sc. thesis – defense
22				
23				
24				
25				

University of Belgrade – Faculty of Mechanical Engineering and University of Belgrade – Faculty of Mathematics jointly conduct a multidisciplinary **study programme of Master Academic Studies** called **Industry 4.0**, whereby the lead institution in the programme is the Faculty of Mechanical Engineering. The title **MASTER OF SCIENCE IN MECHANICAL ENGINEERING AND INFORMATICS** (M.Sc.) will be stated in the Diploma certificate of Master studies (120 ECTS). In international terms, this title corresponds to the title of the Master of Science (**M.Sc**. – in Latin, Magister Scientiæ). The study programme of Master Academic Studies Industry 4.0 is a **multidisciplinary** programme designed to educate a new generation of engineers who possess the knowledge, skills and competences necessary for the implementation of modern technologies brought about by the fourth industrial revolution – Industry 4.0.

Faculty of Mechanical Engineering
Faculty of Mathematics
Internship and Master thesis

All courses last for one semester.
For reference, the courses are coded according to their position:
1. the first digit is the number of the semester (vertical, column);
2. the second digit is the number of the full-course box in a semester (horizontal, row).

Eligible for enrolment into the programme of Master Academic Studies - Industry 4.0 are the students who have completed the Bachelor Academic Studies at one of the faculties from the group of technical and technological sciences, natural sciences and mathematics or the group of information technology sciences. Students who have completed the Basic Applied Studies at a college can enrol in the Bachelor Academic Studies programme (they do not have the right to directly enrol in the Master Academic Studies programme).

The maximum number of students for enrolling in Master Academic studies is **35**, and teaching is organized in groups of maximum 25 students for lectures, 15 for general exercises and up to 10 students for laboratory work.

"Master thesis" is to be taken with the supervisor from the pool of professors of either the compulsory courses or elective courses the student has passed. The Master thesis must contain at least two of the following fields: material on the topic studied and analysed, self-performed numerical calculation, self-done laboratory work, and/or self-performed mechanical design. Thesis defence cannot be conducted until all the exams have been passed. The curriculum stipulates that the Master thesis should be the result of practical research and closely related to internship; it is written under the joint supervision of the Master thesis supervisor and the mentor assigned by the company.

Two student internships serve as a special added value to the programme. The first part of internship (Internship, part 1) is conducted throughout the entire semester, one day a week, for a total of 15 days, while the second part of the internship (Internship, Part 2) is conducted in the fourth semester with a total duration of 40 working days. More than 20 companies have recognized the potential of the proposed study programme and supported it through providing a statement of intent to organise student internship.

Elective courses

At the beginning of a school year, **a student has to choose** elective courses for that particular year of studies that he/she wants to attend and pass exams in. For each semester, as well as for **each position of a course** in a certain semester, there is a separate list of courses. The following conditions must be borne in mind: all the elective courses on the list for one of the positions are mutually competing and the student can choose only one course from the list. The course is launched only for a group of minimum 5 interested students. During the process of choosing, the priority is given to the students with higher average grades

Lists of elective courses in the school year 2021/2022.

List of elective courses at the position 2.4 – 2 courses, 5 teaching hours per week each (6 ECTS)

Distributed systems in mechanical engineering; Digital measuring systems.

List of elective courses at the position 2.5 – 2 courses, 5 teaching hours per week each (6 ECTS)

Introduction to bioinformatics; Data mining.

List of elective courses at the position 3.2 – 2 courses, 5 teaching hours per week each (6 ECTS)

Machine learning; Computational intelligence.

List of elective courses at the position 3.3 – 3 courses, 5 teaching hours per week each (6 ECTS)

Virtual reality; Quality and risk management in industry 4.0; Industrial internet of things and cyber security.

List of elective courses at the position 3.4 – 2 courses, 5 teaching hours per week each (6 ECTS)

Data exquisite; Scheduling of manufacturing systems and processes.

List of elective courses at the position 4.1 – 2 courses, 5 teaching hours per week each (6 ECTS)

Business intelligence and business analytics; Flexible and reconfigurable manufacturing systems.

РЕПУБЛИКА СРБИЈА
Национално тело за акредитацију и проверу квалитета у високом образовању
Број: 612-00-00332/6/2019-03
Датум: 04.10.2019. године
Булевар Михајла Пупина 2
Београд

На основу члана 23. став 8. тачка 1. Закона о високом образовању („Сл. гласник РС" број 88/2017, 27/2018 – др. закон и 73/2018) и Одлуке Комисије за акредитацију и проверу квалитета број 612-00-00332/5/2019-03 од 03.10.2019. године, Национално тело за акредитацију и проверу квалитета у високом образовању издаје

У В Е Р Е Њ Е
о акредитацији студијског програма мастер академских студија

Универзитет у Београду – Машински факултет са седиштем у Краљице Марије 16, Београд, ПИБ: 100209517, Матични број: 07032501, испунио је стандарде прописане Правилником о стандардима и поступку за акредитацију студијских програма ("Службени гласник РС", број 13/2019), за акредитацију, ИМТ (интердисциплинарне, мултидисциплинарне и трансдисциплинарне студије) студијског програма **мастер академских студија – Индустрија 4.0** у оквиру интердисциплинарних студија (Машинско инжењерство и Рачунарске науке), за упис 35 (тридесетпет) студената у седишту установе.

Достављено:
- високошколској установи
- архиви

ДИРЕКТОР
Проф. др Јелена Кочовић

National Accreditation Certificate for the Study Programme of Master Academic Studies - Industry 4.0 2019-2026

Visiting Professors

Prof. Dr.-Ing. Konstantinos-Dionysios Bouzakis
Aristoteles University, Thessaloniki

Univ.-Prof. Dr. Hans-Joachim Bungartz
TU München, Fakultät für Infromatik

Prof. Dr.-Ing. Harald Meerkam
Friedrich-Alexander-Universität, Lehrstuhl für Konstruktionstechnik

Prof. Kornel F. Ehmann, Ph.D.
Northwestern University, Evanston, Illinois (UB-FME Alumni)

Prof. Dr. Vojislav Novakovic
Norwegian University of Science and Technology (NTNU Trondheim)

Prof. Dr. Niko Samec
University of Maribor, Slovenia

Prof. Dr.Dusan Sekulic
University of Kentucky, USA

Students at partner universities can study for one or two semesters at the Faculty of Mechanical Engineering at University of Belgrade as part of an ERASMUS or direct exchange program.

University of Belgrade, Faculty of Mechanical Engineering
Alumni Foundation

INTERNATIONAL ACCREDITATION OF ENGINEERING STUDIES

144856-TEMPUS-2008-RS-JPGR
(15.1.2009–14.1.2013)
This project has been funded with support from the European Commission.

Certificate

Standard: **ISO 9001:2015**
Certificate Registr. No.: **01 100 1520589**

Certificate Holder:
Univerzitet u Beogradu – Mašinski fakultet
Kraljice Marije 16
11120 Beograd
Republic of Serbia

Scope: Higher education, scientific & research activities and the provision of engineering services.

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2020-12-25 until 2023-12-24
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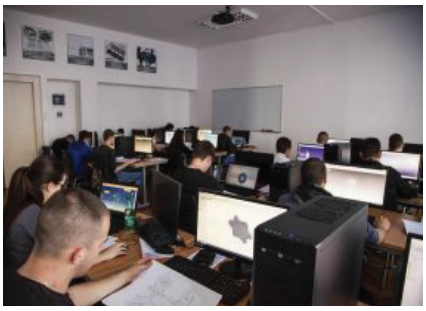
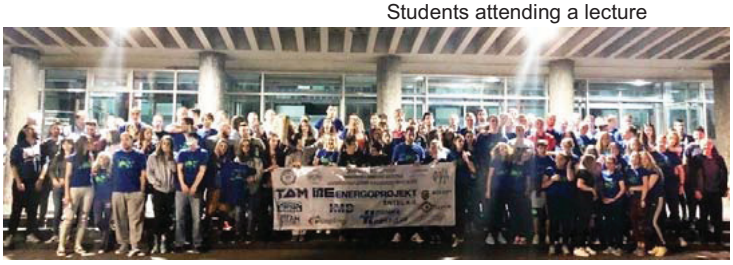
Students' life at Faculty of Mechanical Engineering


Admission Ceremony



Students attending a lecture

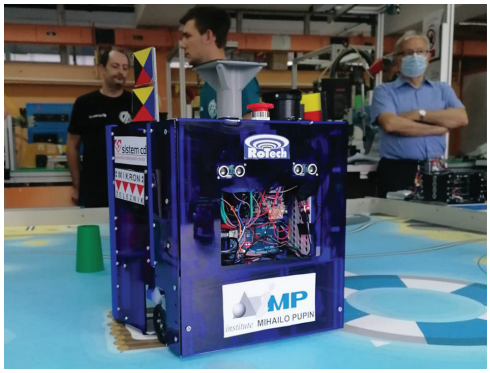
Traditional internet chess match Uni-Belgrade vs. Uni-Texas Dallas - TransAtlantic Cup "Svetozar Gligoric"



Regional mechanical engineering students gathering "Mašinijada"

University of Belgrade Formula Student Team – "Road Arrow"

Faculty of Mechanical Engineering Student Team – "Confluence Belgrade"



Faculty of Mechanical Engineering Student Team – "Robotoid"

Faculty of Mechanical Engineering Student Team – "Beoavia"

Best students Award

Promotion Ceremony of Doctors of Philosophy in Mechanical Engineering (Ph.D.) in Rectorate`s Ceremonial Room

Famous Serbian Scientists and Innovators

Milutin Milanković, Serbian civil engineer, doctor of technical sciences and university professor, best known for his theory of ice ages, relating variations of the Earth's orbit and long-term climate change, now known as Milankovitch cycles.
Born in 1879 in Dalj in a Serbian merchant family in former Austro-Hungary. Died in 1958 in Belgrade.
At age of 25, defended his doctoral thesis at TU Vienna and proudly became the first Serbian Doctor of Technical Sciences. Worked for an engineering company in Vienna, using his knowledge to design structures. Obtained several patents relating to methods of building with reinforced concrete.

In 1909, became university professor heading the 'Chair of Applied Mathematics' at the University of Belgrade. Lectured on rational mechanics, celestial mechanics and theoretical physics, doing in parallel his scientific research.

http://en.wikipedia.org/wiki/Milutin_Milankovi%C4%87

Monuments of Nikola Tesla

Belgrade

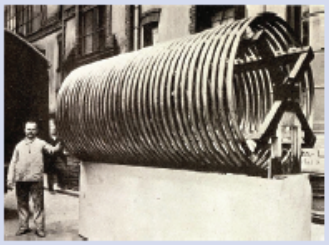
Niagara Falls

$1\ T = 1\ Wb/m^2$

Tesla Roadster

Mihajlo Pupin, Serbian-American physicist and inventor, was born in village Idvor in former Austria-Hungary empire (today part of Serbia) in 1858. Michael Pupin immigrated to the United States in 1874, graduated from Columbia University in physics in 1883, and obtained his Ph.D. at the University of Berlin in 1889. Pupin taught at Columbia University for more than 40 years, 30 of them as a professor of electromechanics. Died in 1935 in New York.

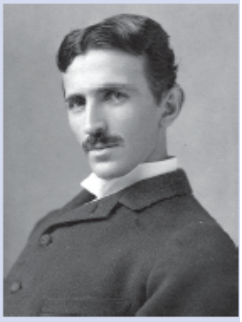
Michael Idvorski (after his birthplace) Pupin improved the quality of long-distance telephone and telegraph transmission by inserting coils in the long lines at intervals; he discovered that matter struck by X-rays is stimulated to radiate other X-rays (secondary radiation) and invented an electrical resonator. Michael Pupin received 34 patents for his inventions, and he won the Pulitzer Prize in 1924 for his autobiography, "From Immigrant to Inventor".



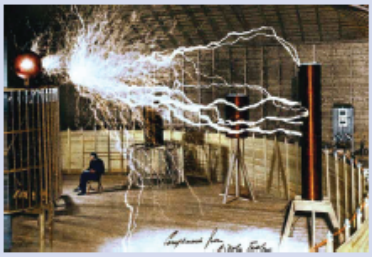
Pupin was a founding member of National Advisory Committee for Aeronautics (NACA) on March 3, 1915, which later became NASA.

http://en.wikipedia.org/wiki/Mihajlo_Pupin

Nikola Tesla, Serbian-American inventor was born in 1856 in village Smiljan in former Austria-Hungary empire. He was the son of a Serbian Orthodox clergyman. Tesla studied engineering at the Austrian Polytechnic School, then worked as an electrical engineer in Budapest and later emigrated to the United States in 1884 to work at the Edison Machine Works. He died in New York City on Christmas Day January 7, 1943.



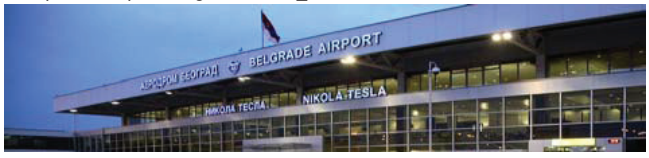
During his lifetime, Tesla invented fluorescent lighting, the Tesla induction motor, the Tesla coil, and developed the alternating current (AC) electrical supply system that included a motor and transformer, and 3-phase electricity.



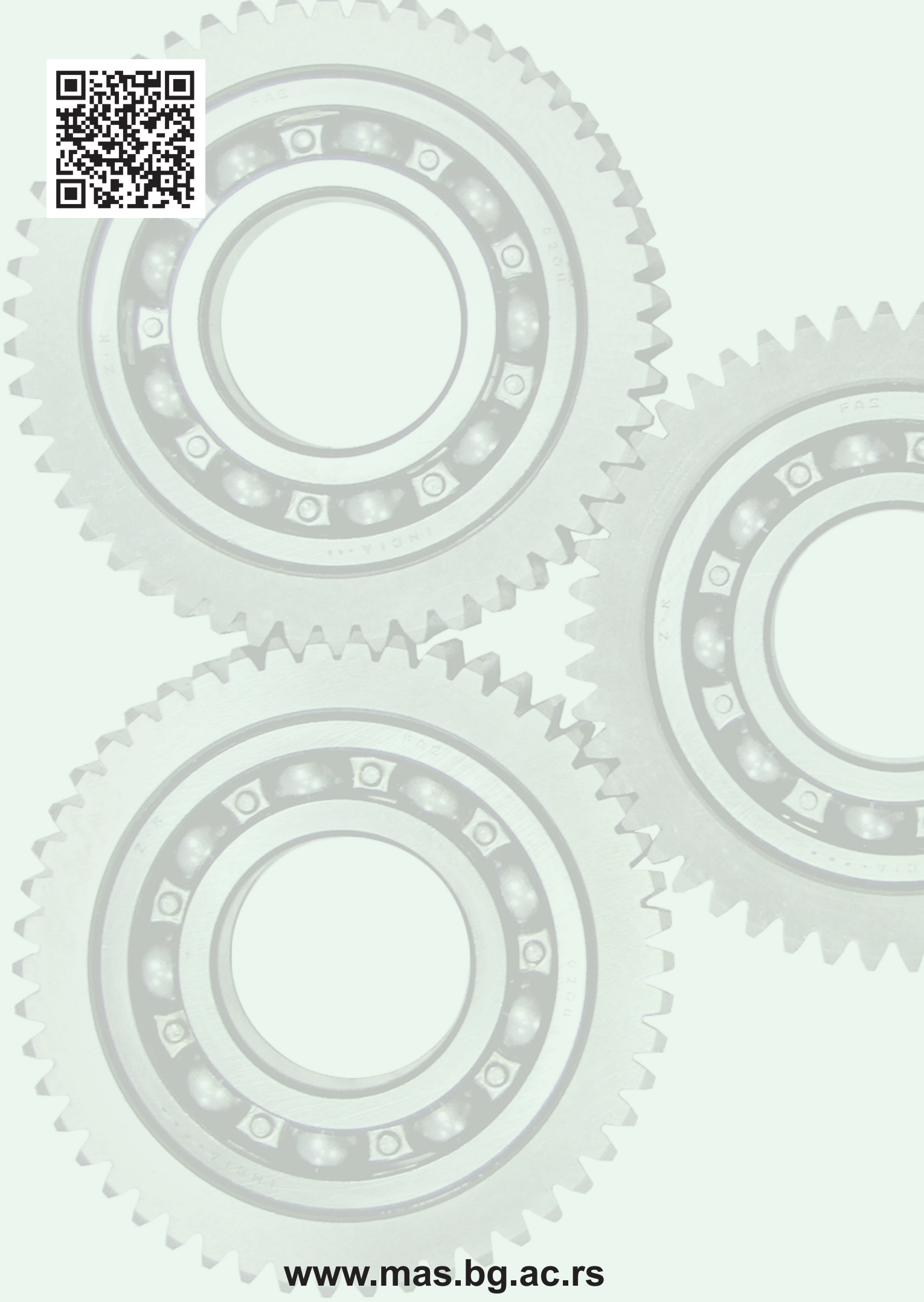
Tesla is now credited with inventing modern radio as well; since the Supreme Court overturned Guglielmo Marconi's patent in 1943 in favor of Nikola Tesla's earlier patents. The Tesla coil, invented in 1891, is still used in radio and television sets and other electronic equipment.

In 1960, in honor of Tesla, the General Conference on Weights and Measures for the International System of Units dedicated the name "Tesla" to the SI unit measure for magnetic field strength.

http://en.wikipedia.org/wiki/Nikola_tesla



Belgrade airport named Nikola Tesla



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