

THE “MECHANICAL ENGINEERING – RESEARCH AND DEVELOPMENT PROGRAMME” INFORMATION

Basic information

Programme title	Mechanical Engineering – Research and Development Programme
Programme features	
Type	Academic degree
Study level (cycle)	First cycle
KLASIUS-SRV	Academic higher education (first Bologna cycle)/academic higher education degree (first Bologna cycle) (16204)
ISCED	• Technics (52)
KLASIUS-P	• Mechanical engineering (5211)
M KLASIUS-P-16	• Metallurgy, mechanical engineering and metalwork (0715)
Frascati	• Technical sciences (2)
SOK level	SOK level 7
EOK level	EOK level 6
EOVK level	First cycle
Fields/modules/courses of study	• No subdivision (study programme)
Member of the University of Ljubljana	• Faculty of Mechanical Engineering, Aškerčeva 6, 1000 Ljubljana, Slovenia
Duration (years)	3
Number of ECTS credits per year	60
Modes of study	Full-time

Key objectives of the programme

The primary objective of the second-cycle academic study programme “MECHANICAL ENGINEERING – Research and Development Programme” is to educate mechanical engineers who will become qualified for independent R&D and project-oriented work and generate new knowledge both in the field of mechanical sciences as well as areas that require interdisciplinary integration, whereas the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme” is intended as the initial level of studies in acquiring the necessary competencies. Accordingly, the core objectives of the accredited study program have also been defined.

The core objectives of the first-cycle academic undergraduate study programme “MECHANICAL ENGINEERING – Research and Development Programme” are primarily as follows:

- Addressing the needs and requirements of the national economy and therefore, the students’ needs to acquire the necessary competencies that will ensure immediate employability upon completion of the study programme, and accordingly
 - providing graduates with broad basic engineering knowledge, especially high-level expertise in the field of mechanical engineering, thus ensuring suitable employability,
 - graduates receive a solid foundation in expertise and understanding within the broader field of mechanical engineering,
 - graduates are qualified for further studies at the postgraduate level – second cycle,
 - graduates are sufficiently knowledgeable in the broader field of mechanical engineering to be capable of linking up different interdisciplinary fields.
- Upholding the principles of the Bologna Declaration, the European University Association (EUA), the European Federation of National Engineering Associations (FEANI) and the German accreditation agency ASIIN. By providing a wide range of courses to choose from and mobility, the programme enables graduates to acquire skills and employment qualifications that are comparable across Europe. Accordingly:
 - Graduates receive an education that is comparable to similar study programmes in Central and Western Europe.
 - Students can transfer to other similar undergraduate studies at home or abroad using a transfer credit

statement of completed study requirements.

– The programme enables transfers between study programmes and provides teaching methods that encourage regular studies and a tutoring system, which helps to create the right conditions for good student progression.

In order to achieve the desired objectives of the programme to the fullest possible extent, the focus is on:

– enabling students, first and foremost, to acquire in-depth fundamental physical and general professional technical expertise in the field of mechanical engineering, as well as the skills needed for modern technical computer-aided communication and computational analysis; there is a special emphasis on building an in-depth understanding of the laws of physical phenomena and their use and implementation in technically designed systems;

– consciously developing (through appropriate methodological approaches) the students' scientific critical thinking, which represents the foundation for later research work. By analysing the results of examples of relatively simple technical problems and the synthesis of conclusions based on this analysis, students are faced with a creative approach early on during their undergraduate studies, which forms a good basis for their subsequent handling of R&D tasks.

The second key objective of the accredited study programme is to uphold the principles of the Bologna Declaration, the European University Association (EUA), the European Federation of National Engineering Associations (FEANI) and the German accreditation agency specialising in engineering, informatics/computer science, the natural sciences and mathematics (ASIIN). Accordingly:

– Students receive an education that is comparable to similar study programmes in Central and Western Europe.

– Students can transfer to another similar undergraduate study at home or abroad using a transfer credit statement of completed study requirements.

Undergoing an external evaluation and obtaining an international accreditation of the first-cycle academic study programme “MECHANICAL ENGINEERING – Research and Development Programme” and the second-cycle master's degree programme “MECHANICAL ENGINEERING – Research and Development Programme” from the German accreditation agency ASIIN is an acknowledgement that we are on the right track with our study programmes and with our methodological approach in the study process. The acquisition of the EUR-ACE certificate from the European Federation of National Engineering Associations (FEANI) for both of our study programmes is a clear recognition of the comprehensive nature of the engineering knowledge advanced by both study programmes at the UL Faculty of Mechanical Engineering in the broader European context.

General competencies (learning outcomes)

The general competencies of graduates upon completing the first-cycle academic undergraduate study programme “MECHANICAL ENGINEERING – Research and Development Programme” are:

- the ability to define, comprehend and creatively solve professional challenges;
- developing the ability of critical, analytical and synthetic thinking;
- developing professional responsibility and ethics;
- proficiency in professional communication and writing, including the use of a foreign professional language;
- the ability to make use of information and communication technology;
- the ability to make use of the acquired knowledge while independently solving technical problems in the field of mechanical engineering;
- the ability to search for sources, critically assess information, independently expand the acquired knowledge and broaden the skills in specialised fields of mechanical engineering;
- the ability to work in a group and take part in interdisciplinary networking;
- adherence to safety, functional, economic and environmental protection principles at work;
- compliance with the engineering code of ethics.

Course-specific competencies (learning outcomes)

The course-specific competencies of graduates upon completing the first-cycle academic undergraduate study programme “Mechanical Engineering – Research and Development Programme” are, first and foremost:

- proficiency in basic theoretical knowledge essential for the technical field of mechanical engineering;
- proficiency in fundamental technical expertise in the field of mechanical engineering and essential complementary sciences (metallurgy, information technology and organizational sciences);

- a solid skills base in the field of mechanical engineering, which enables the continuation of studies in the second cycle;
- the ability to independently acquire new expertise and skills;
- the capacity for independently performing less demanding development, engineering and skilled organizational work and carrying out specific well-defined tasks in the field of mechanical engineering;
- specific competencies that are listed in individual course syllabi.

Entry requirements

The prerequisite for enrolling in the first year of the first-cycle academic study programme “MECHANICAL ENGINEERING – Research and Development Programme” is completing one of the following secondary school-leaving exams:

- a) the general matura examination;
- b) vocational matura examination as part of any available four-year secondary school programme (mechanical technician, car service technician, electrical technician, construction technician, chemical technician, marine mechanical technician, metallurgical technician, mechatronics technician, computer technician, woodworking technician, electronic communications technician), and general matura examination in the subject of mathematics; when doing the vocational matura exam, the candidate may not choose mathematics;
- c) final examination, passed before 1 June 1995, at the end of any four-year secondary school programme.

Selection criteria in the case of admission quotas

In the case of admission quotas, candidates from point a) will be selected based on their:

- overall score in the general matura examination, worth 30% of the total points awarded,
- overall academic record in the 3rd and 4th year, worth 30% of the total points awarded,
- maths score in the general matura examination worth 20% of the total points awarded,
- physics or mechanics score in the general matura examination, worth 20% of the total points awarded;

candidates from point b) will be selected based on their:

- overall score in the vocational matura examination, worth 30% of the total points awarded,
- overall academic record in the 3rd and 4th year, worth 30% of the total points awarded,
- maths score in the general matura examination, worth 20% of the total points awarded,
- vocational matura score in one of the following subjects: mechanical engineering or automechanics or electrical engineering or building construction or chemistry or marine machinery or metallurgy or mechatronics or computer science or woodworking or electronic communications, worth 20% of the total points awarded;

candidates from point c) will be selected based on their:

- overall score in the final examination, worth 30% of the points awarded,
- overall academic record in the 3rd and 4th year, worth 30% of the total points awarded,
- maths score in the final exam or the maths academic record in the 4th year of secondary school if the candidate did not take maths in the final exam, worth 20% of the points awarded,
- physics, mechanics or mechanical engineering score in the final exam or the academic record for these subjects in the 4th year of secondary school if the candidate did not take these subjects in the final exam, worth 20% of the points awarded.

Criteria for the recognition of knowledge and skills acquired before enrolment in the programme

Any knowledge conforming in terms of content and scope to the educational content of the courses in the “MECHANICAL ENGINEERING – Research and Development Programme” may be recognized. The decision on whether or not to acknowledge the knowledge and skills acquired before enrolment is made by the Committee for University Studies at the UL Faculty of Mechanical Engineering, based on the student’s written application, the attached written certificates and other documents proving the successfully acquired skills and the content of these skills, and in accordance with the Rules on the Procedure and Criteria for the Acknowledgement of Informally Acquired Knowledge and Skills, adopted at the 15th meeting of the UL Senate on 29 May 2007. If

the Committee for University Studies determines that the acquired knowledge can be recognized, it will be evaluated with the same number of ECTS credits as the number of credit points for the given course.

Methods of assessment

The methods of assessment are compliant with [the UL Statute](#) and are listed in the course syllabi.

Requirements for the progression through the programme

Conditions for progressing from 1st to 2nd year of the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”:

A student may enter the second year of study if, by the end of the academic year, he has completed the requirements of the first year as defined by the curricula in the minimum amount of 48 ECTS credits.

Conditions for progressing from first to second year of the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme” are as follows:

A student may enrol in the third year of study if, by the end of the academic year, he has completed the requirements for the second year in the amount of 48 ECTS credits and all the requirements for the 1st year as defined by the curricula (60 ECTS credits).

Exceptionally, a student may enrol in a higher year of study even if he has not completed all the study requirements stipulated in the study programme regarding enrolment in a higher year, when there are justifiable grounds for doing so, as defined in Article 153 of the UL Statute (maternity, prolonged illness, extenuating family and social circumstances, disability status, active participation in top professional, cultural and sporting events, active participation in the bodies of the university) or reasons pertaining to study commitments to do with parallel studies, transferring from one university to another, language difficulties (foreign students), additional commitments due to international exchange or increased workload to do with additional development and research work. The student must provide valid reasons for his inability to meet the study requirements and submit the exam programme for the previous period when lodging his application. Whether or not the conditions for justified grounds have been met shall be decided by a special committee, consisting of the Vice-Dean of Pedagogical Work for the study programme “MECHANICAL ENGINEERING”, the mentor of the year in which the student is enrolled and the mentor of the year in which the student wishes to enrol.

A student with above-average academic performance in his studies is allowed to progress faster. The decision on this is made by the UL FME Senate based on each candidate's application and the opinion of the UL FME Committee for University Studies. The method of faster progression shall be determined by the decision of the Senate.

A student who has not fulfilled all the study requirements set by the study programme for enrolment into a higher year may repeat a year if he has earned at least 24 ECTS credits. A year can only be repeated once during the course of the studies.

A student may still be able to repeat a year even if he has not fulfilled the requirements referred to in the preceding paragraph, if there are justified grounds for doing so (prolonged illness, extenuating family and social circumstances, study commitments to do with parallel studies, transferring from one university to another, language difficulties (foreign students), additional commitments due to international exchange or increased workload to do with additional development and research work). The student must provide valid reasons for uncompleted requirements and submit the exam programme for the previous period when lodging his application. Whether or not the conditions for justified grounds have been met shall be decided by a special committee, consisting of the Vice-Dean of Pedagogical Work for the university study programme “MECHANICAL ENGINEERING”, the mentor of the year in which the student is currently enrolled and the student's tutor.

Conditions for transferring between programmes

The transfer between programmes shall mean the termination of the student's education in the study programme in which he initially enrolled and the continuation of education in the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”, whereby part of the study requirements or all of the requirements that the student has already passed as part of the initial study programme shall be deemed to have been completed. It should be noted, however, that transferring is only possible between study programmes that provide comparable competencies upon completion.

Applications for transferring to the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme” and the scope of satisfied requirements recognized within the study programme will be reviewed by the Undergraduate Studies Committee. In accordance with the Criteria for Transfers Between Study Programmes, a candidate can enrol in the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”, provided that he is entitled to at least half of the ECTS credits from the initial study programme, pertaining to the compulsory subjects of the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”. If, during the recognition procedure, the candidate is found to be entitled to at least as many (and specifically those) credit points that are the prerequisite for enrolment in a higher year of the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”, the candidate shall be allowed to enrol in a higher year of the first-cycle university study programme “MECHANICAL ENGINEERING – Research and Development Programme”.

Requirements for the completion of studies

A student is deemed to have completed his studies once he has completed all the study requirements prescribed by the study programme in the amount of 180 ECTS credits.

Requirements for completing individual parts of the programme, if any exist:

There are no options to complete individual parts of the study programme. The programme is implemented and treated as a whole.

Professional or scientific or artistic title (male)

- BSc in Mechanical Engineering (academic higher education)

Professional or scientific or artistic title (female)

- BSc in Mechanical Engineering (higher education)

Professional or scientific or artistic title (abbreviation)

- BSc, Mech. Eng. (academic higher education)

Professional or scientific or artistic title in English including abbreviation

- Bachelor of Science (BSc, Mech. Eng.)

STUDY PROGRAMME SYLLABUS AND COURSE LEADERS

No subdivision (study programme)

CURRICULUM OF THE STUDY PROGRAMME WITH THE DESIGNATED LECTURERS AND HEADS OF SUBJECTS

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Year 1

	Code	Title	Heads of subject	Contact hours					Independent work	Total No. of hours	ECTS	Semesters	Elective
				Lectures	Seminars	Practical work	Clinical work	Other forms of study					
1.	0562738	Calculus and ordinary differential equations	Aljoša Peperko, Darja Rupnik Poklukar, Janez Žerovnik	75		60			90	225	9	Winter	no
2.	0562739	Physics	Rok Petkovšek	45		30			75	150	6	Winter	no
3.	0562740	Measurements in mechanical engineering	Gregor Bobovnik, Jože Kutin	30		30			65	125	5	Winter	no
4.	0562741	Statics and kinematics	Gregor Čepon, Miha Boltežar	45		30			50	125	5	Winter	no
5.	0577579	Technical drawing and computer aided modelling of geometry	Nikola Vukašinović, Robert Kunc, Samo Zupan	45		30			50	125	5	Winter	no
6.	0562743	Linear algebra and vector analysis	Aljoša Peperko, Darja Rupnik Poklukar, Janez Žerovnik	60		45			70	175	7	Summer	no
7.	0562744	Strength of materials	Miha Brojan	30		30			40	100	4	Summer	no
8.	0562745	Non-metallic materials - RRP	Lidija Slemenik Perše	45		30			50	125	5	Summer	no
9.	0562746	Thermodynamics	Božidar Šarler, Matjaž Perpar	45		30			75	150	6	Summer	no
10.	0577584	Metals - RRP	Roman Šturm	30		30			40	100	4	Summer	no
11.	0562748	Electrical engineering	Marjan Jenko	30		30			40	100	4	Summer	no
		Total		480	0	375	0	0	645	1500	60		

Year 2

	Code	Title	Heads of subject	Contact hours					Independent work	Total No. of hours	ECTS	Semesters	Elective
				Lectures	Seminars	Practical work	Clinical work	Other forms of study					
1.	0562749	Integral transformations and Fourier analysis	Aljoša Peperko, Janez Žerovnik	45		45			60	150	6	Winter	no
2.	0562750	Rigid body dynamics	Miha Boltežar	45		30			75	150	6	Winter	no
3.	0562751	Fluid statics and dynamics	Božidar Šarler	45		30			50	125	5	Winter	no
4.	0601059	Numerical methods	Janko Slavič	45		30			50	125	5	Winter	no
5.	0562753	Machine elements 1 - RRP	Jernej Klemenc, Marko Nagode	45		30			50	125	5	Winter	no
6.	0545374	General elective subject 1 1		15		15			45	75	3	Winter	yes
7.	0577592	Partial differential equations, complex analysis and optimization	Aljoša Peperko, Janez Žerovnik	45		45			35	125	5	Summer	no
8.	0562756	Machine elements 2 - RRP	Jernej Klemenc, Marko Nagode	30		30			40	100	4	Summer	no
9.	0562757	Production technologies 1	Franci Pušavec, Tomaž Pepelnjak	45		30			50	125	5	Summer	no
10.	0562758	Heat transfer	Iztok Golobič	45		30			50	125	5	Summer	no
11.	0577596	Control technology	Drago Bračun, Janez Diaci	30		30			40	100	4	Summer	no
12.	0545375	General elective subject 2		15		15			45	75	3	Summer	yes

13.	0562761	Engineerig Design Methodology - RRP	Janez Benedičič, Roman Žavbi	30		30			40	100	4	Summer	no
Total				480	0	390	0	0	630	1500	60		

Year 2, General elective subject 1 1

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0545347	Engineering reporting - RRP	Miha Brojan / Franc Majdič / Rok Vrabič / Nikola Vukašinović	15		15			45	75	3	Winter	yes
Total				15	0	15	0	0	45	75	3		

General elective subject 1 amounting to 3 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Poročanje v strojništvu - RRP.

Year 2, General elective subject 2

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0545355	Innovation in Mechanical Engineering - RRP	Janez Kušar	15		15			45	75	3	Summer	yes
Total				15	0	15	0	0	45	75	3		

General elective subject 2 amounting to 3 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Inoviranje v strojništvu - RRP

Year 3

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0562764	Numerical modelling methods	Miroslav Halilovič, Nikolaj Mole	30		30			65	125	5	Winter	no
2.	0562765	Tribology	Mitjan Kalin	30		30			40	100	4	Winter	no

3.	0562766	Manufacturing technologies 2	Damjan Klobčar, Joško Valentinčič	45		30			50	125	5	Winter	no
4.	0562767	Hydraulics and Pneumatics - RRP	Franc Majdič, Niko Herakovič	30		30			40	100	4	Winter	no
5.	0577605	Drives	Mitjan Kalin, Tomaž Katrašnik	30		30			40	100	4	Winter	no
6.	0562769	Energy machines and appliances - RRP	Mihael Sekavčnik	30		30			40	100	4	Winter	no
7.	0545376	General elective subject 3		30		30			40	100	4	Winter	yes
8.	0545377	General elective subject 4		30		30			40	100	4	Summer	yes
9.	0577609	Data processing and validation	Edvard Govekar	30		30			40	100	4	Summer	no
10.	0577610	Mechatronics and laser technologies	Janez Diaci, Matija Jezeršek	45		30			50	125	5	Summer	no
11.	0545378	General elective subject 5		15		15			45	75	3	Summer	yes
12.	0545379	General elective subject 6		30		15			55	100	4	Summer	yes
13.	0562776	Final paper	All heads in the programme		35			70	145	250	10	Summer	no
Total				375	35	330	0	70	690	1500	60		

Year 3, General elective subject 3

	Code	Title	Heads of subject	Contact hours					Independent work	Total No. of hours	ECTS	Semesters	Elective
				Lectures	Seminars	Practical work	Clinical work	Other forms of study					
1.	0562777	High-end computing tools	Janez Povh, Leon Kos, Roman Žavbi	30		30			40	100	4	Winter	yes
Total				30	0	30	0	0	40	100	4		

General elective subject 3 amounting to 4 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Napredna računalniška orodja.

Year 3, General elective subject 4

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0562778	Production engineering	Janez Kušar, Niko Herakovič	30		30			40	100	4	Summer	yes
Total				30	0	30	0	0	40	100	4		

General elective subject 4 amounting to 4 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Proizvodno inženirstvo.

Year 3, General elective subject 5

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0545370	Interdisciplinary project - RRP	Božidar Šarler, Edvard Govekar, Franci Pušavec, Iztok Golobič, Janez Diaci, Lidija Slemenik Perše, Marko Nagode, Miha Boltežar, Mihael Sekavčnik, Mitjan Kalin, Niko Herakovič, Robert Kunc, Rok Petkovšek, Roman Šturm, Roman Žavbi, Sašo Medved	15		15			45	75	3	Summer	yes
Total				15	0	15	0	0	45	75	3		

General elective subject 5 amounting to 3 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Interdisciplinary project - RRP.

Year 3, General elective subject 6

				Contact hours									
	Code	Title	Heads of subject	Lectures	Seminars	Practical work	Clinical work	Other forms of study	Independent work	Total No. of hours	ECTS	Semesters	Elective
1.	0562780	Environmental engineering	Iztok Golobič, Sašo Medved	30		15			55	100	4	Summer	yes
		Total		30	0	15	0	0	55	100	4		

General elective subject 6 amounting to 4 ECTS is chosen by the student at his/her own choice in any programme, faculty or university. Elective course offered by FME: Okoljsko inženirstvo.

