

INFORMATION OF THE STUDY PROGRAMME MECHANICAL ENGINEERING - RESEARCH AND DEVELOPMENT PROGRAMME:

Basic information

Programme name	Mechanical Engineering - Research and Development Program:
Programme properties	
Type	University
Level	level 3:
KLASIUS-SRV	16204 Higher education university degree (first Bologna cycle)
ISCED	Technique (52)
KLASIUS-P	Mechanical Engineering (5211)
KLASIUS-P-16	Metallurgy, Mechanical Engineering and Metallurgy (0715)
Frascati	Technical sciences (2)
Level SQF	Level SQF 7
Level EQF	Level EQF 6
Level QF-EHEA	1 st cycle:
Specified directions	--
Members of the University of Ljubljana	Faculty of Mechanical Engineering, Aškerčeva 6, 1000 Ljubljana, Slovenia
Duration (years)	3
Number of ECTS per year	60
Mode of study	full-time

Primary objectives of the programme

In the second-cycle master's degree MECHANICAL ENGINEERING - Research and Development programme, whose basic objective is to educate master engineers in mechanical engineering who will be capable of independent development research and project application work, and the creation of new knowledge in mechanical engineering and in areas that require interdisciplinary integration, the 1st cycle university degree MECHANICAL ENGINEERING - Research and Development programme appears as the first stage for acquiring the required competencies. The basic goals of the accredited study programme are defined.

The basic objectives of the first cycle of the undergraduate MECHANICAL ENGINEERING - Research and Development programme are primarily:

- To follow the needs and desires of the national economy and, the desires of the student, to acquire the competencies that will enable him/her to be directly employable after graduation, and, - to provide the graduate with a broad basic engineering knowledge, in particular high quality knowledge in mechanical engineering and thus an appropriate employability,
 - the graduate will acquire a sound basis of knowledge and understanding in the wider field of mechanical engineering,
 - the graduate is qualified for further study in postgraduate studies - 2nd cycle,
 - the graduate will know of in the broader field mechanical engineering to be capable of interdisciplinary integration of different disciplines.
- To follow the principles of Bologna Declaration, the European Association of the EUA universities, the European Association of the National Engineering Associations FEANI, and the German accreditation agency ASIIN, thus enabling European comparable knowledge and employment qualifications of graduates through a broad spectrum of subjects and mobility.
 - the graduate receives an education comparable with similar courses of study in Central and Western Europe,
 - the student is enabled to transfer to another related course of study at home or abroad with a creditable certificate of academic achievements,
 - the conditions for transition between study programmes and the method of pedagogical work that promotes ongoing study, and the tutoring system, ensure the conditions for a good transition of students.

To achieve the intended objectives of the program much, the emphasis is on:

- to enable the student, to acquire in-depth basic physical and general technical knowledge in mechanical engineering, and the skills of modern technical computer-aided communication and computational analysis. Special emphasis is

placed on building a deeper understanding of the laws of physical phenomena and their application and implementation in technically designed systems.

- that the student, supported by appropriate methodological approaches, consciously develops scientific-critical thinking, which is the basis for later research work. By analysing results on examples of relatively simple technical problems and synthesising conclusions based on them, students in the 1st cycle of study are exposed to a creative approach that provides a good foundation for solving development problems later in their career.

The second fundamental objective of the accredited study programme is the desire to follow the principles of the Bologna Declaration, the European University Association, the European Association of National Engineering Associations FEANI and the German Accreditation Agency for Technology, Informatics, Natural Sciences and Mathematics ASIIN, accordingly:

- the student acquires an education comparable to similar study programmes in Central and Western Europe;
- the student is enabled to transfer to another related postgraduate programme at home or abroad, with credit assessed evidence of academic achievement.

Besides the external evaluation of the first cycle of the university study MECHANICAL ENGINEERING - Research and Development programme and the 2nd cycle of the master study MECHANICAL ENGINEERING - Research and Development programme at the accreditation agency ASIIN, we accept their international accreditation as a confirmation of the correctness of our study programmes and methods. Obtaining the EUR-ACE certificate of the European Association of National Engineering Associations FEANI for both study programmes is an unquestionable recognition of the adequacy of the engineering skills developed by both UL FME study programmes in the wider European area.

General competences (learning outcomes)

The general competencies of the graduate after completing the undergraduate study programme of MECHANICAL ENGINEERING - Research and Development are:

- Ability to define, understand and creatively solve professional challenges.
- Developing the ability of critical, analytical and synthetic thinking.
- Developing professional responsibility and ethics.
- Ability to communicate professionally and in writing, including the use of a foreign professional language.
- Ability to use information and communication technology.
- Ability to use the acquired knowledge in independent solving of technical problems in mechanical engineering.
- Ability to find sources, critically assess information, independently upgrade acquired knowledge and deepen knowledge in individual specialised fields of mechanical engineering.
- Ability to work in a group and interdisciplinary networking.
- Observance of safety, functional, economic and environmental principles in their work.
- Compliance with the Engineering Code.

Subject-specific competences (learning outcomes)

The subject-specific competences of the graduate after completion of the basic university studies of the 1st cycle MECHANICAL ENGINEERING - Research and Development programme are mainly:

- Mastery of the basic theoretical knowledge essential for the technical field of mechanical engineering.
- Mastery of the basic technical knowledge in mechanical engineering and the essential complementary sciences (metallurgy, informatics and organisational sciences).
- Basic qualification in mechanical engineering enabling continuation of studies on the 2nd cycle.
- Ability to acquire new knowledge and skills independently.
- The 1st cycle graduate can independently perform less demanding developmental, engineering and professional organisational work and solve individual well-defined tasks in mechanical engineering.
- Specific competencies are listed in the curricula of individual subjects.

Conditions for enrolment

Students who have met these requirements may be enrolled in the 1st year of University Study Programme in MECHANICAL ENGINEERING of the 1st Cycle - Research and Development Programme:

- a) general matura,
- b) vocational matura in one of the four-year high school programmes (mechanical engineer technician, automotive

service technician, electrical engineer, civil engineer technician, chemical engineer technician, marine engineering technician, metallurgy technician, mechatronics technician, computer technician, wood technician, communication electronics technician),

b) vocational matura in one of the four-year high school programmes (mechanical engineer technician, automotive service technician, electrical engineer, civil engineer technician, chemical engineer technician, marine engineering technician, metallurgy technician, mechatronics technician, computer technician, wood technician, communication electronics technician),

- success in the Mathematics at the general matura, The candidate may not choose Mathematics at the vocational matura.

c) a final examination passed before 1.6.1995 in any four-year secondary school programme.

Selection criteria with restricted enrolment

If admission restriction occurs, the applicants referred to in point (a) will be selected based on these criteria:

- overall achievement in the general matura 30% of points,
- overall achievement in the 3rd and 4th years of secondary school 30% of points,
- success in the Mathematics at the general matura 20% of points,
- success in the Physics or Mechanics at the general matura 20% of points.

for the candidates referred to in point b):

- overall achievement in the vocational matura 30% of points,
- overall achievement in the 3rd and 4th years of secondary school 30% of points,
- success in the Mathematics at the general matura 20% of points.
- success in mechanical engineering or automotive mechatronics or electrical engineering or plant engineering or chemistry or marine engineering or metallurgy or mechatronics or information technology or woodworking or electronic communications at the vocational matura 20% of points.

for the candidates referred to in point c):

- overall achievement in the final examination 30% of points,
- overall achievement in the 3rd and 4th years of secondary school 30% of points,
- success in Mathematics in the final examination or in the 4th year of secondary school if the candidate did not take Mathematics in the final examination 20% of points,
- success in Physics, Mechanics or Mechanical Engineering in the final examination or in the 4th year of secondary school if the candidate did not take the subjects in the final examination 20% of points.

Criteria to recognise knowledge and skills acquired before enrolment in the programme

The student may be recognised for knowledge that corresponds in content and scope to the learning content of the subjects in the programme MECHANICAL ENGINEERING - Research and Development programme. The UL FME University Studies Commission decides on the recognition of knowledge and skills acquired before enrolment based on the student's written request, the attached written certificates and other documents proving the knowledge successfully acquired and the content of this knowledge, and under the Regulations on the Procedure and Criteria for the Recognition of Informally Acquired Knowledge and Skills, adopted at the 15th meeting of the UL Senate on 29.5.2007. If the University Studies Committee determines that the knowledge gained can be recognised, this may be awarded the same number of ECTS as the number of credits in the course.

Assessment methods

Assessment methods are under [UL Statute](#) and are specified in the syllabi.

Conditions for advancement through the programme

Conditions for progression from the 1st to the 2nd year of the university study program of the 1st cycle of MECHANICAL ENGINEERING - Research and Development programme:

A student may enrol in the 2nd year if he/she fulfils the 1st year curricular obligations with at least 48 ECTS by the end of the academic year.

Conditions for progression from the 2nd to the 3rd year of the university study programme of the 1st cycle of MECHANICAL ENGINEERING - Research and Development programme:

A student may enrol in the 3rd year if he/she fulfils the prescribed 2nd year obligations of 48 ECTS and all 1st year obligations (60 ECTS) prescribed in the curricula by the end of the academic year.

Exceptionally, a student may enrol in a higher year even if he/she has not fulfilled all the obligations prescribed in the study programme for enrolment in a higher year, if he/she has legitimate reasons determined by Article 153 of the UL Statute (maternity, long illness, exceptional family and social circumstances, recognised status of a person with special needs, active participation in high-profile professional, cultural and sporting events, active participation in university committees) or reasons resulting from obligations arising from parallel studies, transition from one university to another, language problems), additional burdens due to international exchanges or increased workload in additional research and development work. The student must explain failure to perform and, upon request, provide a programme for taking examinations for the preceding period. Fulfilling the justified reasons will be decided by a special committee consisting of the Associate Dean for Educational Work of the programme MECHANICAL ENGINEERING, the mentor of the cohort in which the student is enrolled, and the mentor of the cohort in which the student wishes to enrol.

A student who demonstrates above average academic results may advance faster. The UL FME Senate will decide based on the candidate's application and the opinion of the UL FME University Studies Committee. The decision determines the method of faster progress.

A student who has not fulfilled all the obligations set out in the study programme for enrolment in a final year shall repeat the year if he/she has obtained at least 24 ECTS credits. During study, a student may repeat a year only once. A student may repeat a year even if he/she does not fulfil the obligations of the previous paragraph if he/she has justified reasons (long illness, exceptional family and social circumstances, obligations arising from parallel studies, transfer from one university to another, language problems, burdens arising from international exchanges or increased workload due to additional Research and Development work). The student must explain failure to perform and, upon request, provide a programme for taking examinations for the preceding period. The existence of justified reasons is decided by a special committee consisting of the Vice Dean for Pedagogical Work of the study programme MECHANICAL ENGINEERING, the mentor of the year in which the student is enrolled and the student's tutor.

Conditions for switching between programmes

Transition between programmes of study is considered the completion of the student's education in the programme of study in which the student enrolled and the continuation of education in the 1st cycle of university programme of study of MECHANICAL ENGINEERING - Research and Development in which some or the course obligations in the first programme of study are recognised as completed. It should be borne in mind that transitions are only possible between study programmes, which ensure the acquisition of comparable competences at the end.

Candidates' requests for transition to the 1st cycle programme MECHANICAL ENGINEERING - Research and Development programme and the extent of the recognised study obligations in the degree programme are considered individually by the Study Committee. Under the criteria for transitions between study programmes, a candidate may enrol in a 1st cycle higher education programme MECHANICAL ENGINEERING - Research and Development programme provided that at least half of the ECTS obligations from the first cycle program related to compulsory higher education subjects are recognised in the 1st cycle programme MECHANICAL ENGINEERING - Research and Development programme. If in recognition due to transition the candidate has recognised at least as many and those credits that are a condition for enrolment in the upper level of the University Degree Programme MECHANICAL ENGINEERING - Research and Development Programme, the candidate is eligible to enrol in the higher year of the University Degree Programme MECHANICAL ENGINEERING - Research and Development Programme.

Conditions for completion of studies

The student completes his/her studies after having fulfilled all the obligations prescribed in the study programme for 180 ECTS credits.

Conditions for completion of individual parts of the study programme, if the program includes them

There is no possibility to complete individual parts of the study programme. The program is implemented and considered as a whole.

Professional or scientific or artistic title (male)

Bachelor of Science in Mechanical Engineering (UN)

Professional or scientific or artistic title (female)

Bachelor of Science in Mechanical Engineering (UN)

Professional or scientific or artistic title (abbreviation)

dipl.inž.str. (UN)

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.

