INFORMATION ON METALLURGY AND MATERIALS STUDY PROGRAMME

Verzija (veljavna od): 2024-1 (01. 10. 2024)

Basic information

Name of programme	Metallurgy and Materials
Programme properties	
Type of study	Master's degree study programme
Degree of study	Postgraduate study programme
KLASIUS-SRV	Master's education (second Bologna cycle) (17003)
ISCED	Production technologies (54)
KLASIUS-P	Mining and other extraction of minerals (undefined in more detail) (5440)
KLASIUS-P-16	Metallurgy, mechanical engineering and metalwork (0715)
Frascati	Technical sciences (2)
Level SOK	Level SOK 8
Level EOK	Level EOK 7
Level EOVK	Second-level postgraduate study programme
Areas/modules/fields of study	No subdivision (study programme)
Member of the University of Ljubljana	Faculty of Natural Sciences and Engineering, Aškerčeva cesta 12, 1000 Ljubljana, Slovenia
Duration (years)	2
ECTS credit points per year	60
Mode of study	Full-time and part-time

Basic goals of the programme

The goal of the study programme is to train masters in the field of metallurgy and materials for work in commercial companies, public, educational and scientific-research institutions. All starting points for checking students' learning outcomes are aimed at this goal.

By working in groups, project work and problem tasks, students get used to work in a group, public speaking and doing business with clients, and are actively involved in research. To the greatest extent possible, they test all acquired theoretical knowledge on examples of exercises and solving demanding theoretical or professionally-oriented problems and projects, which will enable them to integrate more easily into practice after completing their studies and understand the problems of the narrower fields of materials and metallurgy. Students acquire the necessary in-depth and targeted knowledge from basic natural science and computer-information courses, they upgrade their knowledge from basic metallurgical courses and specific knowledge from professional courses. Within the scope of the curriculum and elective courses, students can specialise and also prepare for continuing studies in programmes at the third level.

General competences (learning outcomes)

The title Master of Science in Metallurgy and Materials will be awarded to students who have demonstrated in the appropriate assessment process that they:

- master the fundamental theoretical knowledge of natural-mathematical sciences of chemistry, physics, mechanics, mathematics and informatics, comparable to the best European universities in their respective fields;

- have acquired and can use fundamental professional knowledge of interdisciplinary related fields typical of the operation of metallurgical technologies, of responsible and high-quality management of technologies, their control and point out the possibilities of improvements and innovations;
- have developed the ability to communicate with colleagues and experts of related disciplines, which enables them to actively participate in multidisciplinary groups;
- have acquired such a standard of knowledge and competences that they will be able to enter the cycle of lecture sets of doctoral study programmes;
- are able to analyse, synthesise and understand the impact of technical solutions on environmental and social relations;
- are able to understand management principles and understand business practice;
- are able to understand their professional and ethical responsibility;
- are capable of independent learning and have a need for lifelong learning.

Subject-specific competences (learning outcomes)

In accordance with the principles of the Bologna process, the programme means, compared to the previous one, a departure from the familiarisation with various existing technologies and attention to selected model or natural science explanations of the present processes and phenomena. The default learning philosophy is oriented towards learning professional skills, along with acquiring additional competences of graduates who enter an innovative entrepreneurial society, where rapidly developing classic and high technologies are constantly present, which students can actively monitor and which require solid theoretical foundations. Students are ready for lifelong learning and the acquisition of new skills typical of the information and communication society. In consequence, the programme places great emphasis on testing theoretical knowledge in practicums and teamwork, as well as on encouraging innovative thinking.

Enrolment requirements

The postgraduate study programme Metallurgy and Materials can be entered by anyone who has completed:

a) first-level study programme in the field of metallurgy and materials;
b) first-level study programme from other technical and natural science professional fields (mechanical engineering, chemistry, physics etc.) if the candidate completes the study obligations before the enrolment, which are essential for continuing studies in the range 20–60 ECTS credit points; candidates can complete these obligation while studying at the first level or by taking exams before enrolling in the master's degree studies. For the candidates from other technical professional fields, the faculty Study Committee determines differential exams on the basis of the exams taken at the first-level undergraduate studies;
c) first-level professional higher education study programme in the field of Metallurgical Technology if the candidate completes before the enrolment the study obligations which are essential for continuing studies in the range 20–60 ECTS credit points; candidates can complete these obligations during their studies at the first level or by taking exams before enrolling in the master's degree studies;
d) higher education professional study programme according to the old programme in the field of Metallurgical Technology if the candidate completes before the enrolment the study obligations which are essential for continuing studies in the scope of 20 ECTS credit points;
e) higher education professional study programme according to the old programme from other technical and natural science fields (mechanical engineering, chemistry, physics etc.) if the candidate completes before the enrolment the study obligations which are essential for continuing studies in the range 20–60 ECTS credit points; candidates can complete these obligations during their studies at the first level or by taking exams before enrolling in the master's degree studies. For the candidates from other technical professional fields, the faculty Study Committee determines differential exams on the basis of the exams taken at the first-level undergraduate studies.

Study obligations essential for continuing studies (points b, c, d and e) are determined by the Study Committee of the Department of Materials and Metallurgy.

Criteria in case of limited enrolment

In case limited enrolment, the additional criterion will be completed study assessment at the first-level study programme, i.e. students will be short-listed based on their previous success (70% comes from the average grade and 30% from the final thesis).

The points are calculated by multiplying the average grade of the study or additional study obligations from point (e) rounded to one decimal place by 10 (maximum 100 points).

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

A student can be recognised for knowledge that in terms of content and scope corresponds to the learning content of the courses in the Metallurgy and Materials study programme. The Study Committee of the Department of Materials and Metallurgy of the Faculty of Natural Sciences and Engineering of the University of Ljubljana decides on the recognition of knowledge and skills acquired before the enrolment on the basis of student's written application, attached certificates and other documents that prove the successfully acquired knowledge and the content of this knowledge, and in accordance with the Rules on Procedures and Criteria for Recognition of Informally Acquired Knowledge and Skills of the 15th session of the Senate of the University of Ljubljana of 29 May 2007.

When recognising knowledge and skills:

- certificates and other documents on completed courses and other forms of education will be taken into account,
- products, services, publications and other authored works of students will be evaluated,
- knowledge that the student has acquired through self-education or through experiential learning (possibility of fulfilling study obligations without attending lectures, exercises, seminars) will be evaluated,
- relevant work experience will be considered.

In the event that the department Study Committee determines that the acquired knowledge can be recognised, this is allocated the same number of ECTS credit points as the number of ECTS credit points in the course.

Assessment methods

Assessment methods are in accordance with the Statute of the University of Ljubljana and are specified in the curricula.

Requirements for progression through the programme

Students can enrol in the higher year if they have by the end of the academic year completed the obligations prescribed by the curriculum in the amount of at least 48 ECTS credit points.

Exceptionally, students can enrol in the higher year even if they have not completed all the obligations set out in the study programme for enrolment in the higher year, when there are justified reasons for doing so. Justified reasons are listed in the Statute of the University of Ljubljana (maternity, prolonged illness, exceptional family and social circumstances, recognised status of a person with special needs, active participation in top professional, cultural and sports events, active participation in university bodies).

Under the conditions from the previous paragraph, students can enrol in the higher year if they have collected at least 40 ECTS credit points. The Study Committee of the Faculty of Natural Sciences and Engineering of the University of Ljubljana decides on the enrolment from the previous paragraph.

A student who shows above-average academic results in their studies is given the opportunity to advance faster. The decision on this is made by the Dean of the Faculty of Natural Sciences and Engineering based on the candidate's application and the reasoned opinion of the Study Committee of the Department of Materials and Metallurgy. The decision determines the method of faster advancement.

To repeat a study year, students must collect at least 30 ECTS credit points.

Requirements for transferring between programmes

Transfer between study programmes is defined as the termination of the student's education in the study programme they were enrolled in and continuation of education in a new study programme, in which all or part

of the obligations that the student has already completed in the first study programme are recognised as completed obligations of the new study programme (Criteria for transitions between study programs (Official Gazette of the Republic of Slovenia, no. 45/94)).
A passed exam in the first study programme is recognised as a passed exam in the new study programme if the content of the two courses is at least 75% compatible. In the credit evaluation of an individual year (60 ECTS credit points), the recognised exam is evaluated with the credit points in the first study programme; however, not with more credit points than it is evaluated in the Metallurgy and Materials study programme. A change of the study programme due to non-fulfilment of obligations in the previous study programme is not considered a transfer from the previous paragraph.

In the master's degree study programme of the second-level study programme Metallurgy and Materials transfers are foreseen:

- from the second-level master's degree study programmes in the field of materials and metallurgy or related study programmes (technical and natural sciences);
- for graduates of university study programmes in the field of materials and metallurgy or related study programmes (technical and natural sciences) that were accepted after 1994 and
- for graduates of higher education study programmes in materials and metallurgy or related study programmes (technical and natural sciences) that were accepted before 1994.

Students can transfer to the 2nd year of the second-level master's degree study programme Metallurgy and Materials if:

- they meet the conditions for enrolment in this study programme,
- vacant places are available,
- they have fully completed the study obligations in the junior year of the previous study programme and
- if the contents of the second-level master's degree study programme Metallurgy and Materials do not differ by more than 30 ECTS credit points from the contents of the 1st year of the previous study programme.

In accordance with the Examinations Regulations at the Faculty of Natural Sciences and Engineering of the University of Ljubljana, the Study Committee can decide on additional obligations (differential exams) for the student and the deadline by which the student must complete these obligations. In this case, the Study Committee of the Faculty of Natural Sciences and Engineering can recognise a part of the exams passed by the student in the previous study programme that are not included in the new study programme (Metallurgy and Materials) at the expense of electives outside the Faculty of Natural Sciences and Engineering of the University of Ljubljana.

If the student transfers to the study programme Metallurgy and Materials from a master's degree study programme conducted by the Faculty of Natural Sciences and Engineering of the University of Ljubljana, the Study Committee may also recognise certain "professional" exams from the previous programme to the student at the expense of electives within the Faculty of Natural Sciences and Engineering of the University of Ljubljana.

Graduates of university study programmes in the field of materials and metallurgy or related (technical) study programmes accepted after 1994, as well as graduates of higher education study programmes in metallurgical technology or related study programmes (technical) that were accepted before 1994 can enrol in the 2nd year of the second-level master's degree study programme Metallurgy and Materials.

The Study Committee can decide on student's additional obligations (differential exams) of up to 40 ECTS credit points that must be completed until the completion of the new study programme and can also take into account the candidate's possible professional or scientific publications and work experience in practical work.

Requirements for completing studies

Students complete their studies when all prescribed obligations are completed in the range of 120 ECTS credit points. Thereby, they obtain the professional title of Master of Science in Metallurgy and Materials.

Conditions for completing individual parts of the programme, if the programme contains them

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Professional or scientific or artistic title (abbreviation)

Master of Science (M.Sc.)

SUBJECTS OF THE STUDY PROGRAM WITH INTENDED COURSES AND SUBJECT CARRIERS

1. year

1. semester

				Contact hours								
	University Course Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other forms of study	Individual student work	Total hours	ECTS	Elective
1.	0067988	Thermodynamics of Materials 2	Jožef Medved	45	15	30	0	0	90	180	6	no
2.	0067979	Physical Metallurgy 2	Boštjan Markoli, Iztok Naglič	45	10	25	0	10	90	180	6	no
3.	0067987	Computational Materials Science	David Bombač, Goran Kugler	45	15	30	0	0	90	180	6	no
4.	0067981	Industrial Ecology and Energetics	Borut Kosec	45	15	30	0	0	90	180	6	no
5.	0067983	Casting 2	Primož Mrvar	45	15	25	0	5	90	180	6	no
		Total		225	70	140	0	15	450	900	30	

2. semester

				Contact hours								
	University Course Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other forms of study	Individual student work	Total hours	ECTS	Elective
1.	0067982	Steelmaking 2	Matjaž Knap	30	20	25	0	15	90	180	6	no
2.	0067985	Materials Testing	Aleš Nagode, Milan Bizjak	30	0	30	0	0	60	120	4	no
3.	0067986	Forming 2	Tomaž Rodič	45	10	35	0	0	90	180	6	no

4.	0067980	Physical Metallurgy of Steels	Aleš Nagode	45	10	35	0	0	90	180	6	no
5.	0067989	Welding	Borut Zorc	30	0	30	0	0	60	120	4	no
6.	0554928	Thermomechanical Processing of Materials	Milan Terčelj, Peter Fajfar	30	15	15	0	0	60	120	4	no
		Total		210	55	170	0	15	450	900	30	

2. year

1. semester

				Contact hours								
	University Course Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other forms of study	Individual student work	Total hours	ECTS	Elective
1.	0067992	Materials Design	Boštjan Markoli	45	0	45	0	0	90	180	6	no
2.	0067993	Aluminium Technology	Aleš Nagode, Jožef Medved	45	10	30	0	5	90	180	6	no
3.	0067990	Composites	Aleš Nagode	45	0	45	0	0	90	180	6	no
4.	0111858	Optional course 1		30	0	30	0	0	60	120	4	yes
5.	0111859	Optional course 2		30	15	15	0	0	60	120	4	yes
6.	0111860	Optional course 3		30	10	20	0	0	60	120	4	yes
		Total		225	35	185	0	5	450	900	30	

2. semester

	Contact hours	

	University Course Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other forms of study	Individual student work	Total hours	ECTS	Elective
1.	0067991	Masters Degree		0	0	135	0	315	450	900	30	no
		Total		0	0	135	0	315	450	900	30	

2. year, Elective courses

1. semester

				Contact hours								
	University Course Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other forms of study	Individual student work	Total hours	ECTS	Elective
1.	0078004	Selected Topics in Higher Mathematics	Janko Bračič	30	0	30	0	0	60	120	4	yes
2.	0078013	Mechanics of Polymers	Tomaž Rodič	30	0	30	0	0	60	120	4	yes
3.	0078005	Corrosion	Aleš Nagode, Jožef Medved	30	15	15	0	0	60	120	4	yes
4.	0078014	Structural Ceramics		30	0	30	0	0	60	120	4	yes
5.	0067975	Failure Analyses	Aleš Nagode, Borut Kosec	40	0	20	0	0	60	120	4	yes
6.	0078007	Materials in Electrotechnics and Electronics	Milan Bizjak	30	0	30	0	0	60	120	4	yes
7.	0078015	Endurace of Materials	Milan Terčelj	30	15	15	0	0	60	120	4	yes
8.	0078003	Industrial and Process Furnaces	Borut Kosec	30	0	30	0	0	60	120	4	yes
9.	0067978	Ingots and Continuous Casting	Matjaž Knap	30	10	20	0	0	60	120	4	yes

10.	0078011	Special Steelmaking Technologies	Matjaž Knap	15	15	20	0	10	60	120	4	yes
11.	0078006	Casting Techniques	Primož Mrvar	30	5	20	0	5	60	120	4	yes
12.	0078009	Powder Metallurgy	Aleš Nagode	30	15	15	0	0	60	120	4	yes
13.	0067976	Measuring and Analysis of Data	David Bombač, Matjaž Knap, Peter Fajfar	30	10	20	0	0	60	120	4	yes
14.	0067977	Practical Work	Peter Fajfar	0	0	60	0	0	60	120	4	yes
		Total		385	85	355	0	15	840	1680	56	