Univerza *v Ljubljani*
Fakulteta *za gradbeništvo in geodezijo*

Presentation of the study programme

2nd cycle master study programme

WATER SCIENCE AND ENVIRONMENTAL ENGINEERING (MA)

Valid from study year 2021/2022 | Valid study programme from 20/01/2021

University of Ljubljana, Faculty of Civil and Geodetic Engineering

INFORMATION ABOUT THE STUDY PROGRAMME

1. Basic Data

Programme name	Water science and environmental engineering
Programme characteristics	
Type	Master
Cycle	second cycle
KLASIUS-SRV	Master higher education (second cycle Bologna)/Master higher education (second cycle Bologna) (17003)
ISCED	• architecture, urbanism and civil engineering (58)
KLASIUS-P	• Civil engineering (other) (5829)
Frascati	• Technical sciences (2)
Level SOK	Level SOK 7
Level EOK	Level EOK 6
Level EOVK	Second cycle
Areas/modules/orientations	• No subdivision (study programme) • Hydraulic engineering (module) • Environmental engineering (module) • Flood risk management (module)
Member of University of Ljubljana	• Faculty of Civil and Geodetic Engineering, Jamova 2, 1000 Ljubljana, Slovenia
Duration (years)	2
Number of ECTS per year	60
Implementation of study	full time

2. Basic goals of the programme

Graduates of the master study programme Water Science and Environmental Engineering will acquire fundamental knowledge of natural sciences, as well as applicable expert (civil engineering) skills for solving demanding administrative procedures and designing, planning, implementing and maintaining more demanding (according to the Construction Act) civil engineering structures (according to the uniform classification of types of constructions CC-SI) in the areas of water management, municipal and environmental engineering.

Besides gaining general theoretic knowledge about hydraulics and geotechnics, students will also learn the modern principles of water science and the latest achievements of the profession in individual areas of environmental and civil engineering, presented in a modern way using state-of-the-art technology. By working in groups, involvement in project work, field work and by solving problem tasks, students will acquire essential teamwork and public speaking skills and will be able to coherently present scientific and engineering ideas to expert and lay public. They will become acquainted with project management in the fields of environmental civil engineering and water management, and especially designing specialised construction types and measures. The students will have the opportunity to test all the acquired expert knowledge to the largest possible extent within practical exercises and real-life case studies, which will help them, together with practical training as part of the study, to get involved in practical work after the finished master's study. Another goal of the programme is also to provide the students with sufficient basic engineering knowledge to allow the development of abstract thinking and successful continuation of the study at different third cycle (i.e. doctoral) programmes (e.g. civil engineering or environment protection).

3. General competences

General competences acquired by the graduates of the master study programme *Water Science and Environmental Engineering* are:

- general overview of academic areas,
- development of abilities to frame, comprehend and creatively solve problems, principles and theories,
- high level of creativity and innovation as a result of the interdisciplinary nature of the study,
- critical reading and understanding of relevant literature, independent knowledge gathering and literature search,

- development of the abilities of critical, analytical and synthetic thinking,
- competences for transferring and applying theoretical knowledge into practice and solving demanding professional and practical problems,
- development of professional and ethical responsibilities,
- development of verbal and numerical literacy, public speaking skills and competences to communicate with clients as well as the lay and professional public,
- ability to use a foreign language in professional written and oral communication,
- ability to use information and communication technologies, also in an international setting,
- ability to establish local and international interdisciplinary connections,
- compliance with safety, functional, economic and environmental aspects of work,
- development of high ethical and moral standards (maintaining integrity when working with clients, providing unbiased advice, sustaining independence and expertise according to valid legislation),
- developing an objective view of the environment and society,
- accepting responsibilities to customers and employers as well as the society as a whole,
- ability to design and implement demanding constructions in compliance with quality and price standards and carry out independent technical evaluations supported by scientific analysis and synthesis, all based on the acquired in-depth knowledge of natural sciences and specialised expertise from the area of water science, environmental and environmental civil engineering,
- ability to recognise and take into account the environmental risk associated with construction and to consider the issues of environment protection in designing structures in the area of environmental civil engineering.

4. Course-related competences

Course-specific competences the students acquire within the program *Water Science and Environmental Engineering* are mainly the following:

- understanding the role and importance of water management in modern society,
- taking part in planning, organisation, management and implementation of the construction of demanding civil engineering structures in the area of water management,
- designing individual elements as well as entire more demanding civil engineering structures in the area of water management,
- independently and creatively performing demanding tasks from the area of environmental civil engineering, environmental engineering and water management,
- managing groups in planning, design and implementation of different interventions into the aquatic environment, including construction in endangered areas,
- involvement in the preparation of spatial planning acts,
- coordinating work between investors, designers and contractors,
- knowing the legal, institutional and administrative system essential for water management and for managing and recording water resources and endangered areas,
- after suitable practical experience, the students are qualified to oversee larger water management companies.

5. Conditions for enrolment

The second cycle master study programme *Water Science and Environmental Engineering* is available to the following candidates:

a) graduates of a first cycle study programme from the area of Civil Engineering;

b) graduates of a first cycle study programme from other expert areas (e.g. technical or biotechnical), if prior to the enrolment the candidates complete other study obligations essential for the continuation of the study totalling 10-60 ECTS. These obligations are defined according to the nature of the expert area, and the candidates may complete them during the first cycle study or by taking exams before the enrolment in the master's study *Water Science and Environmental Engineering*. Requirements for individual bridging programmes are defined by the Study Board of the Department of Environmental Civil Engineering according to the missing knowledge of the candidate not obtained during previous education. This also applies to the enrolment of students from other higher education institutions in Slovenia, EU and elsewhere.

The number of places is determined in the Call for enrolment into the second cycle study programmes of the University of Ljubljana individually for each academic year.

6. Selection criteria when enrolment is restricted

In case of restricted enrolment, the following conditions shall be considered: grade obtained in the first cycle study (100%).

7. Criteria for recognising knowledge and skills acquired before enrolment in the programme

Certain knowledge and skills comparable to the content and scope of the programme *Water Science and Environmental Engineering* can be recognised by the Study Board of the Department of Environmental Civil Engineering of UL FGG. The Board makes decisions regarding the recognition of knowledge and skills acquired before enrolment based on the student's written application, enclosed certificates and other documents evidencing successfully acquired knowledge and contents, and in accordance with the Rules on the procedure and criteria for the acknowledgement of informally acquired knowledge and skills, adopted on 29 May 2007 at the 15th meeting of the UL Senate.

The recognition process considers the following:

- certificates and other documents (recognition of »non-typical certificates«, portfolios, documents about finished courses and other forms of education),
- evaluation of finished products, services, publications and other original works of the student (possibility of performing study obligations – e.g. exams, preliminary exams, etc.
  – by evaluating products, e.g. projects, made by the student before the enrolment),
- evaluation of knowledge acquired by the student with self-education or empirical learning (possibility of completing study obligations without participation at lectures, practical work, seminars),
- adequate work experience (e.g. recognition of practical training and other course units of the program that are based on practical work and experience).

Should the Study Board of the department establish that the acquired knowledge may be recognised, this shall be evaluated with the same number of credits according to ECTS as the number of credits in the subject.

8. Methods of assessment

The assessment methods are in accordance with the Statute of University of Ljubljana and listed in the Course Syllabi.

9. Conditions for progression through the programme

Conditions for progression from one year to another

Students may enrol in a higher year if they complete all the obligations foreseen by the study plan amounting to at least 45 ECTS credits by the end of the study year.

Under exceptional circumstances students may be permitted to proceed without successful completion of 45 ECTS, i.e. the obligations defined to proceed to the higher year of the study programme, provided they have justifiable reasons as defined by Article 153 of the UL Statute (maternity, extended illness, exceptional family and social circumstances, certified status of a person with special needs, active participation in top expert, cultural and sports events, active participation in University bodies).

Under the conditions set out in the above paragraph, students may enrol in a higher year with at least 30 ECTS-credits collected. The decision to permit enrolment is adopted by the Study Board of the Department of Environmental Civil Engineering of UL FGG.

Faculty of Civil and Geodetic Engineering has an established tutorship and supervision system in place for its students, offered also in the framework of the master's study programme *Water Science and Environmental Engineering.* Students of both years have class mentors, and smaller groups of students have individual tutors who will either be academic staff members or second year students who will help their protégés in choosing study orientations, elective courses etc.

Students with above average study results will be allowed faster advancement, if applicable with regard to the study process. Based on the student's application the decision is adopted by the Study Board of the Department of Environmental Civil Engineering of UL FGG. With a decree of the Study Board the principles of faster progress are determined.

Conditions for repeat enrolment in the same year

Failing to meet the obligations defined by the study programme for advancement in a higher year, students may enrol in the same year for the second time, provided that they have obtained at least 30 ECTS credits.

10. Transfers between study programmes

Transfer between programmes shall mean termination of education in the student's original study programme (first programme) and continuation of education in the second cycle master study programme of *Water Science and Environmental Engineering* (second programme), in which a part of the completed study requirements from the first study programme are recognised as completed.
Transfers are possible from the second cycle study programmes, and until their expiration also from the undergraduate academic study programmes adopted before June 11, 2004, where the competences of the finished studies are comparable and according to the acknowledgement criteria at least half of the obligations according to ECTS from the first study programme related to compulsory courses of the second study programme can be acknowledged. Considering the scope of acknowledged obligations from the first study programme in the Republic of Slovenia or abroad student may enrol to the same or higher year in the second study programme. Transferring students shall fulfil the conditions for the enrolment to the second study programme.

Applications of candidates for the transfer to the second cycle master study programme *Water Science and Environmental Engineering* and the scope of acknowledged obligations in the study programme will be examined individually by the Study Board of the Department of Environmental Civil Engineering. If in the procedure of acknowledging obligations for the purpose of transfer the candidate is approved at least the amount of credit points and those point that are required for the enrolment to the second year of the second cycle master study programme *Water Science and Environmental Engineering*, the candidate may enrol to the second year of the second cycle master study programme *Water Science and Environmental Engineering*.

11. Conditions for completion of the study

Students finish the study by accomplishing all the prescribed obligations totalling 120 points according to ECTS, including practical training and submission and defence of the Master thesis.

12. Conditions for completion of individual parts of the programme

The study is uniform.

13. Qualification, professional or academic title

- magister inženir okoljskega gradbeništva (male)
  (second cycle graduate in environmental civil engineering)
- magistrica inženirka okoljskega gradbeništva (female)
  (second cycle graduate in environmental civil engineering)

14. Qualification, professional or academic title (abbreviation)

- mag. inž. ok. grad.

SYLLABUS OF STUDY PROGRAMME WITH FORESEEN COURSE COORDINATORS

1st year, mandatory

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1325	Hydraulic modelling	Franci Steinman, Matjaž Četina	45	15	0	60	0	120	240	8	Winter	no
2.	1587	Hydrological modelling	Mojca Šraj	30	0	0	60	0	90	180	6	Winter	no
3.	1588	Drinking water supply and treatment	Franc Steinman, Nataša Atanasova	45	15	0	55	5	120	240	8	Winter	no
4.	1496	Project management	Jana Šelih	30	0	0	30	0	60	120	4	Winter	no
5.	1634	Basics of spatial sociology	Matjaž Uršič	45	0	0	0	0	45	90	3	Winter	no
6.	1651	River engineering	Matjaž Mikoš, Simon Rusjan	60	30	15	0	15	120	240	8	Summer	no
7.	1652	Drainage and irrigation	Mojca Šraj	40	0	0	45	5	90	180	6	Summer	no
8.	1673	Water protection	Mario Krzyk, Nataša Atanasova	30	15	10	5	0	60	120	4	Summer	no
9.	1595	Open sea and coastal area	Dušan Žagar	30	0	20	0	10	60	120	4	Summer	no
10.	1329	Environmental geotechnics	Matej Maček	30	0	0	30	15	75	150	5	Summer	no
11.	1323	Remote sensing in environ. civil eng.	Mojca Kosmatin Fras	30	0	0	30	0	60	120	4	Summer	no
		Total		415	75	45	315	50	900	1800	60		

2nd year, mandatory

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1574	Elective course		45	0	45	0	0	90	180	6	Winter	yes
2.		Elective module		145	30	120	55	10	360	720	24	Winter	yes
3.	1654	Master thesis/work		0	0	0	0	450	450	900	30	Summer	no
		Total		190	30	165	55	460	900	1800	60		

Elective courses

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1752	Slope stabilisation	Matjaž Mikoš, Matej Maček	35	0	15	0	10	60	120	4	Winter	yes
2.	1753	Hydraulic machines and devices	Franci Steinman, Marko Hočevar	30	0	30	0	0	60	120	4	Winter	yes
3.	1334	Water policy	Andrej Kryžanowski	30	0	30	0	0	60	120	4	Winter	yes
4.	1754	Decision support systems in water management	Primož Banovec	45	15	0	15	0	75	150	5	Winter	yes
5.	1333	Landscape management	Mojca Golobič	30	0	0	30	0	60	120	4	Winter	yes
6.	1755	Introduction to research work	Matjaž Mikoš	30	15	0	15	0	60	120	4	Winter	yes
7.	1605	Project in infrastructural systems	Maruška Šubic-Kovač	30	30	0	0	0	60	120	4	Winter	yes
8.	1768	Selected topics from mathematics III	Marjeta Kramar Fijavž	30	0	30	0	0	60	120	4	Winter	yes
9.	1730	Ecohydrology	Matjaž Mikoš, Simon Rusjan	30	10	15	0	5	60	120	4	Winter	yes
10.	1731	Geotechnics of infrastructural facilities	Janko Logar	45	0	45	0	0	90	180	6	Winter	yes
11.	1653	Practical training	Andreja Istenič Starčič, Mario Krzyk	6	0	0	0	120	54	180	6	Winter	yes
		Total		341	70	165	60	135	699	1470	49		

Elective module Hydraulic engineering

2nd year

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1517	Hydraulic structures	Andrej Kryžanowski	60	0	60	0	0	120	240	8	Winter	no
2.	1337	Water management systems	Franci Steinman	10	15	30	0	5	60	120	4	Winter	no
3.	1550	Hydroelectric power	Andrej Kryžanowski	30	0	30	0	0	60	120	4	Winter	no
4.	1590	Urban drainage and wastewater treatment	Mario Krzyk, Nataša Atanasova	45	15		55	5	120	240	8	Winter	no
		Total		145	30	120	55	10	360	720	24		

Elective module Environmental engineering

2nd year

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1590	Urban drainage and wastewater treatment	Mario Krzyk, Nataša Atanasova	45	15	0	55	5	120	240	8	Winter	no
2.	1337	Water management systems	Franci Steinman	10	15	30	0	5	60	120	4	Winter	no
3.	1340	Torrent, erosion, rockfall and avalanche control	Matjaž Mikoš	35	0	15	0	10	60	120	4	Winter	no
4.	1757	Mathematical model. of environmental processes	Matjaž Četina	45	0	0	30	0	75	150	5	Winter	no
5.	1593	Meteorology	Gregor Skok	30	0	15	0	0	45	90	3	Winter	no
		Total		165	30	60	85	20	360	720	24		

Elective module Flood risk management

2nd year

				Contact hours									
	Code	Course title	Lecturers	Lectures	Seminar	Tutorials	Clinical tutorials	Other study forms	Independent work	Total hours	ECTS	Semester	Elective
1.	1548	Spatial planning for flood protection	Alma Zavodnik Lamovšek, Andrej Kryžanowski	37	38	0	0	0	75	150	5	Winter	no
2.	1547	Socio-economical assessment of flood risk	Aleksander Kešeljević, Drago Kos, Matjaž Mikoš	37	38	0	0	0	75	150	5	Winter	no
3.	1340	Torrent, erosion, rockfall and avalanche control	Matjaž Mikoš	35	0	15	0	10	60	120	4	Winter	no
4.	1602	Numerical methods in fluid dynamics	Matjaž Četina	45	15	0	30	0	90	180	6	Winter	no
5.	1601	Environmental technologies	Nataša Atanasova, Tjaša Griessler Bulc, Mario Krzyk	15	15	0	30	0	60	120	4	Winter	no
		Total		169	106	15	60	10	360	720	24		

15. Possibilities of elective courses and mobility

The master's study programme Water Science and Environmental Engineering foresees elective courses totalling 13 ECTS. Students shall select professional elective courses from the 2nd cycle study programmes Water Science and Environmental Engineering or Civil Engineering – Orientation Geotechnical and Hydraulic Engineering. Subjects in the amount of 6 ECTS (5%) may be selected freely. Elective courses are selected at student's own discretion or among other elective courses at other master study programmes. In this respect, students are recommended to select courses from the 2nd cycle study programmes Civil Engineering (Orientations Geotechnical and Hydraulic Engineering and Infrastructural Engineering) or the 2nd cycle study programme Geodesy and Geoinformation. Subjects at other faculties of the University of Ljubljana, other Universities in Slovenia or abroad may also be chosen.

Students may also choose elective courses from other faculties that are members of UL, other universities and higher education institutions in Slovenia, or internationally. They are recommended to select courses from the areas of law, economics, administration, statistics, geophysics, computer science, foreign languages, geomorphology, etc.

Students may transfer 30 ECTS credits of the programme (one study semester, regardless of compulsory and elective units) from any other environmental or hydraulic engineering programme in Slovenia or abroad, provided that UL FGG has a signed agreement with the institution in question.