

University *of Ljubljana*
Faculty *of Computer and Information Science*
Faculty *of Electrical Engineering*



**SECOND-CYCLE INTERDISCIPLINARY MASTER'S STUDY
PROGRAMME
MULTIMEDIA**

HANDBOOK

for students enrolled for the first time in the first year in the 2018/19 academic year

Ljubljana, 2018

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1. General information about the programme

Cycle

Second cycle.

Type and specialisation

Master's study programme. No specialisation.

Duration and number of credits

2 years (4 semesters), total of 120 ECTS credits.

Study mode

Full-time study.

Classes are conducted in Slovenian.

Title conferred

- *magister inženir multimedije,*
- *magistrica inženirka multimedije,*

abbreviated to *mag. inž. mm.*

Area of study to which the programme belongs (ISCED):

This is an interdisciplinary programme and falls within the areas of study Engineering and engineering trades (52).

Scientific disciplines underlying the programme (according to the Frascati classification):

This interdisciplinary programme falls within the area of Engineering and technology.

Levels of SQF, EQF and EHEQF: Slovenian Qualifications Framework (SQF) 8; European Qualifications Framework (EQF) 7; European Higher Education Qualifications Framework (EHEQF) Second Cycle

2. Main objectives and skills of the programme

Main objectives of the study programme

To offer the technical and non-technical aspects of the field of multimedia and their mutual synergy, specifically:

- provide systemic knowledge in the fields of telecommunications and computer science,
- train students to analyse problems, search relevant sources and critically assess information obtained,
- train students to plan and implement multimedia solutions, both in technical and user aspects,
- provide knowledge in the area of software development,
- provide knowledge in the areas of analysing, discovering and visualising data and information,

- provide knowledge in the area of analysing and processing multimedia content,
- train students for teamwork with experts in technical and non-technical fields, including the capacity for active communication in written or verbal form.

Providing high-quality knowledge in the field is a directly verifiable objective linked to the student's learning outcomes. The successful completion of studies serves as a basis for realistically assessing attainment of the objectives and outcomes. Within just a few years of the first generation of master's degree holders completing their studies, it will also be possible to verify directly the employability of those graduating from this study programme.

General and subject-specific skills

General skills:

- ability to define, understand and creatively address problems in the broader field of multimedia,
- ability to think critically on the basis of analysis and synthesis,
- systemic knowledge, ability to undertake research and planning,
- show professional, environmental and social responsibility,
- ability to engage in active technical communication in written and oral form;
- ability to make optimal use of information and communication technologies and develop them,
- ability to autonomously keep abreast of the latest achievements and acquire new knowledge,
- ability to search resources, critically assess information communicate knowledge,
- capacity for teamwork with experts in technical and non-technical fields.

Subject-specific skills acquired through the programme:

- master basic and specialised knowledge in the field of telecommunications and information systems,
- ability to generate technical plans and implement multimedia systems and services,
- ability to plan and implement multimedia systems from the user standpoint, including user experience,
- familiarisation with modern methods of software development in multimedia systems,
- familiarisation with the basic properties of designing information and visual communication,
- ability to understand data and extract knowledge from data,
- ability to analyse various types of multimedia content,
- ability to acquire knowledge from complementary technical fields and the business sector and understand it.

3. International comparison

Related study programmes have been identified based on the similarity of the fields they cover. All cases involve second-cycle Bologna study programmes in multimedia from the technical aspect. The countries offering these comparable programmes are Italy, Austria, Germany and the United Kingdom.

1. Masterstudium Medieninformatik, Technischen Universität Wien, Austria.
2. Comunicazione multimediale e tecnologie dell'informazione, Università degli Studi di Udine, Italy.
3. Masters in Computer Science and Media, Stuttgart Media University/Hochschule der Medien Stuttgart, Germany.
4. MSc in Multimedia Signal Processing and Communications, University of Surrey, UK.

Web links are given below.

<http://www.informatik.tuwien.ac.at/studium/angebot/master/medieninformatik>

http://www.uniud.it/it/didattica/corsi-offerta/offerta-formativa-area-scientifica/scienze-matematiche-informatiche-multimediali/laurea-magistrale/comunicazione-multimediale-e-tecnologie-dellinformazione?set_language=it

https://www.hdm-stuttgart.de/studieninteressierte/master/studiengaenge/studiengang_steckbrief?sgang_ID=550058

<http://www.surrey.ac.uk/postgraduate/multimedia-signal-processing-and-communications>

4. International cooperation and mobility

Information on the international cooperation of the Faculty of Electrical Engineering of the University of Ljubljana can be found on the website http://www.fe.uni-lj.si/izobrazevanje/mednarodne_izmenjave/; and information for the Faculty of Computer and Information Science at <http://izmenjave.fri.uni-lj.si/>.

5. Admission requirements and selection criteria for limited enrolment

Enrolment in the second-cycle interdisciplinary master's study programme in Multimedia is open to candidates who have completed:

- a) a first-cycle or post-secondary professional study programme, adopted under the legal provisions in force prior to 11 June 2004, in the specialist fields of multimedia, computer science or information technology, electrical engineering or studies in other fields of natural science and technology (mathematics, physics, chemistry and chemical technology, mechanical engineering, civil engineering),
- b) a first-cycle programme in the field or post-secondary professional study programme, adopted under the legal provisions in force prior to 11 June 2004, not covered under point a) and who prior to enrolment have passed the following examinations from the first-cycle Multimedia programme: Programming 1, Programming 2, Introduction to Multimedia Systems and Communication Systems, or who during their first-cycle studies mastered the material covered in the stated courses, regarding which the Committee for Study Affairs of FRI and the Study Committee of FE will decide,

c) equivalent education to that set out in points a) and b) abroad.

Selection criteria for limited enrolment

If a decision is taken to limit enrolment, the selection of candidates is made on the basis of the following criteria:

- first-cycle studies GPA (20%),
- selection exam results (80%).

The selection exam will cover the fields of mathematics, programming, algorithms, communication systems, internet protocols and the properties of multimedia content, and will be held in the first half of September, after the deadline to register for the study programme.

6. Requirements for transferring between study programmes

In accordance with Article 6 of the Criteria for Transferring between Programmes, it is possible to transfer between study programmes: (1) which on completion guarantee the acquisition of comparable competences and (2) for which at least half the course units under the European Credit Transfer System (ECTS) from the first study programme relating to compulsory subjects of the second study programme may be recognised in accordance with recognition criteria.

Transferring to the second-cycle Interdisciplinary Master's Study Programme in Multimedia from other programmes (master's programmes) is open to candidates who have:

- met the conditions for enrolment in the second-cycle interdisciplinary master's study programme in Multimedia,
- met the conditions for enrolment in the second year of the study specialisation in which the student is currently enrolled, with the added condition that they have completed the requirements in all mandatory courses of the first year or equivalent courses at other higher education institutions whose appropriateness is assessed by the Committee for Study Affairs of FRI and the Study Committee of FE.

Students may also be given consent to parallel enrolment in another study programme based on a personal application and their study performance.

7. Criteria for recognising knowledge and skills acquired prior to enrolment

Knowledge which is suitable in content and scope to the educational content of courses in the second-cycle master's study programme in Multimedia can be recognised in the education process. Recognition of knowledge and skills acquired prior to enrolment is decided upon by the Committee for Study Affairs of FRI and the Study Committee of FE, on the basis of a written application from the student, enclosing certificates and other documents demonstrating successfully acquired knowledge and the substance of such knowledge, and in

accordance with the Rules on the procedure and criteria for recognising informally acquired knowledge and skills, adopted by the UL Senate on 29 May 2007.

8. Requirements for progression through the programme

In order to enrol in the second year, students must have completed first-year course units in the amount of 54 ECTS credits.

For repeat enrolment in the same year students must have completed at least half the programme requirements of that year (i.e. 30 ECTS credits).

9. Requirements for completing studies

To complete the study programme, students must complete all prescribed course units, for a total of 120 ECTS credits, including their master's thesis.

This programme does not contain any separate parts which can be individually completed.

10. Methods of assessment

Student knowledge is assessed for individual subject courses (study units) in the manner envisaged in the course syllabuses (study units). Details concerning the verification of knowledge are defined in the internal documents of the University of Ljubljana, the Faculty of Electrical Engineering and Faculty of Computer and Information Science.

In accordance with the Statutes of the University of Ljubljana, the following assessment grades are used:

10 (excellent),

9 (very good),

8 (very good),

7 (good),

6 (sufficient),

5 (fail),

or descriptively “passed with excellence”, “passed” or “failed”.

For each subject course (study unit), after verification of knowledge candidates receive a single grade from the above scale.

Candidates pass the verification of knowledge in the subject (study unit) if they receive a grade of 6 or higher.

Candidates are granted in full the envisaged number of ECTS credits for that subject course (study unit) if they successfully pass the verification of knowledge in that course (study unit).

11. Syllabus

Key:

L = number of lecture hours

S = number of seminar hours

T = number of theoretical or laboratory practical hours

ECTS = number of ECTS credits

Each semester lasts 15 weeks.

1st YEAR

Course	Semester 1	Semester 2	ECTS
	L/S/T	L/S/T	
Transmission of Multimedia Signals	45/0/30		6
User-adapted Communication	45/0/30		6
Interaction and Information Design	45/20/10		6
Specialist elective course FRI 1	45/0/30		6
Specialist elective course FE 1	45/0/30		6
Multimedia Content Transfer		45/0/30	6
Web Information Extraction and Retrieval		45/10/20	6
Advanced Software Development Methods		45/10/20	6
Specialist elective course FRI 2		45/0/30	6
Specialist elective course FE 2		45/0/30	6

2nd YEAR

Course	Semester 3	Semester 4	ECTS
	L/S/T	L/S/T	
Module FE - course 1 (student selects Module FE A or Module FE B)	45/0/30		6
Module FE - course 2 (student selects Module FE A or Module FE B)	45/0/30		6
Thematic set FRI – course 1 (student selects a course from the same Thematic set FRI A/B/C/D)	45/6,8/23,2		6
Thematic set FRI – course 2 (student selects a course from the same Thematic set FRI A/B/C/D)	45/6,8/23,2		6
General elective course	45/0/30		6
General elective course		45/0/30	6
Master's thesis			24

Specialist elective course FRI 1 (students choose 1 out of 3 offered)

Course	L/S/T	ECTS
Introduction to Data Mining	45/20/10	6
Information Security and Privacy	45/0/30	6
Digital Marketing	45/15/15	6

Specialist elective course FE 1 (students choose 1 out of 2 offered)

Course	L/S/T	ECTS
Sensor Systems and Multimedia	45/0/30	6
Visual Communication Design	45/0/30	6

Specialist elective course FRI 2 (students choose 1 out of 2 offered)

Course	L/S/T	ECTS
Numerical Mathematics	45/0/30	6
Data mining	45/20/10	6

Specialist elective course FE 2 (students choose 1 out of 2 offered)

Course	L/S/T	ECTS
Ambient Intelligence	45/0/30	6
Multimedia Content Processing	45/0/30	6

Module FE A User-oriented (Students choose 2 courses from one of the 2 modules offered)

Course	L/S/T	ECTS
Multimedia Terminals	45/0/30	6
User Experience and User Interfaces Design	45/0/30	6

Module FE B System-oriented (Students choose 2 courses from one of the 2 modules offered)

Course	L/S/T	ECTS
3D Sound in Multimedia	45/0/30	6
Embedded Systems in Multimedia	45/0/30	6

Thematic set FRI A Designing Multimedia Services (students choose 2 courses from the set offered; precondition: selection of Module FE A)

Course	L/S/T	ECTS
Human-Computer Interaction	45/0/30	6
Functional Programming	45/10/20	6
Numerical Mathematics	45/0/30	6
Cloud Computing	45/20/10	6

Thematic set FRI B Users and User Experiences (students choose 2 courses from the set offered; precondition: selection of Module FE A)

Course	L/S/T	ECTS
Human-Computer Interaction	45/0/30	6
Information Security and Privacy	45/0/30	6
Natural Language Processing	45/10/20	6
Image Based Biometry	45/10/20	6

Thematic set FRI C Processing and Analysing Multimedia Content (students choose 2 courses from the set offered; precondition: selection of Module FE B)

Course	L/S/T	ECTS
Computer Based Sound Production	45/0/30	6
Advanced Topics in Computer Vision	45/10/20	6
Advanced Computer Graphics	45/0/30	6
Image Based Biometry	45/10/20	6

Thematic set FRI D Multimedia Systems Engineer (students choose 2 courses from the set offered; precondition: selection of Module FE B)

Course	L/S/T	ECTS
Cloud Computing	45/20/10	6
Wireless Sensor Networks	45/10/20	6
Cryptography and Computer Security	45/10/20	6
Information Security and Privacy	45/0/30	6

General elective courses

Course	L/S/T	ECTS
Computer Science and Society I	5/0/0	3
Computer Science and Society II	5/0/0	3
Interdisciplinary projects	30/0/60	6
Any other general elective courses		

Share of elective courses by year (ratio of ECTS credits that students acquire through mandatory and elective courses)

Year	Mandatory content	Elective content	Practical training	Master's thesis
Year 1	0.6	0.4	0	
Year 2	0	0.6	0	0.4
Total	0.3	0.5	0	0.2

12. Short presentation of study programme courses

A short presentation of courses is provided in the syllabus for each course.