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

FIRST CYCLE UNIVERSITY STUDY PROGRAMME
COMPUTER AND INFORMATION SCIENCE

HANDBOOK

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

Ljubljana, 2018

CONTENTS

Presentation of the study programme

1. About the study programme

The first cycle of the Computer and Information Science University Study Programme lasts 3 years (6 semesters) and comprises 180 ECTS. Classes are conducted in Slovenian.

The professional title to be obtained is:

- diplomirani inženir računalništva in informatike (UN),
- diplomirana inženirka računalništva in informatike (UN).

The professional title is given in accordance with the Professional and Academics Titles Act as: "diplomirani/-a inženir/-ka računalništva in informatike (UN)", abbreviated to "dipl. inž. rač. in inf. (UN)".

Area of study to which the programme belongs (ISCED): The basic field is "computer science (48)".

Scientific disciplines underlying the programme (according to the Frascati classification): The programme falls within the scope of "technology and natural sciences and mathematics".

Levels of SQF, EQF and EHEQF: Slovenian Qualifications Framework (SQF) 7; European Qualifications Framework (EQF) 6; European Higher Education Qualifications Framework (EHEQF) First cycle

2. Main objectives and general skills of the programme

Computer and information science is one of the leading breakthrough fields that have been shaping today's economy, education, culture, administration and other areas. The striking growth of computer technology dictates the need for highly qualified staff capable of developing, managing and maintaining user and systems technology and the IT systems based on those technologies. This study programme is inviting for young people interested in computer and information science. The programme is comparable to international standards and keeps up with the rapid development of computer science and the latest knowledge. In view of all this, the study programme accordingly provides future engineers with a sufficient professional basis to be able to keep abreast of technological changes and successfully continue their career at home as well as on an international level.

The study programme allows students to tailor courses according to their preferences and motivation, in keeping with the possibilities offered by professional specialisations. The core courses are followed by elective modules that offer specialisations in different professional fields.

General skills

General skills acquired in the programme

- developing skills in critical, analytical and synthetic thinking;
- the ability to define, understand and solve creative professional challenges in computer and information science;
- the ability to transfer knowledge and professional communication skills and writing skills;
- the ability to search for resources and critically analyse information;
- professional, environmental and social responsibility;
- the ability to apply acquired knowledge in independent work for solving technical and scientific problems in computer and information science;
- the ability to acquire new and enhance acquired technical knowledge;
- skills for group work in the field, including with experts in other technical fields;
- the development of professional responsibility and ethics;
- basic theoretical knowledge acquired in the fields of computer science and information technology and in the natural sciences and mathematics, which provides an excellent basis for continuing studies at the next level, both in computer science and in technical fields.

Specific skills acquired in the programme

- basic skills in computer and information science, which include basic theoretical skills, and skills essential for the field of computer and information science (mathematical treatment of problems, theoretical basis of computer science);
- the ability to understand and apply computer and information science knowledge to other technical and relevant fields (economics, organisational science, etc.);
- practical knowledge and skills in the development of software, hardware and information technologies, which are a necessary part of a successful professional's work in computer and information science (programming, computer architecture, networks);
- the ability to independently perform demanding engineering and organisational tasks in their specialised fields and independently solve specific well-defined tasks in computer and information science;

The programme's international comparison

For comparison we relied on four study programmes in our vicinity, which we find related to our study programme:

- Bachelor Program, Eidgenossische Technische Hochschüle (ETH), Switzerland, http://www.inf.ethz.ch/education/bachelor
- Informatik: Software & Information Engineering, Technische Universität Vienna, Austria, http://www.tuwien.ac.at/
- Wirtschaftsinformatik, Technische Universität Vienna, Austria, http://www.tuwien.ac.at/
- Laurea in Informatica, Universita di Torino, Italy, http://www.educ.di.unito.it/

3. Admission requirements and selection criteria for limited enrolment

Candidates meeting the following requirements can enrol in the university study programme:

a) A completed Matura exam;
b) A completed vocational Matura exam at any secondary school and an exam in one of the following subjects: computer science, mathematics or physics; the chosen subject must not be the same as the subject the candidate passes for the vocational Matura exam;
c) Any four-year secondary school study programme completed before 1 June 1995.

In the event of a decision limiting enrolment, candidates referred to in points a) and b) will be selected according to:

- the GPA in the Matura exam or secondary school final exam 60%;
- the GPA of the 3rd and 4th years of secondary school 40%.

Candidates from point b) will be selected according to:

- the GPA in the vocational Matura exam 20%;
- the GPA of the 3rd and 4th years of secondary school 40%;
- the grade average of one Matura exam subject 40%.

4. Criteria for recognizing knowledge and skills acquired prior to enrolment

The study programme enables the recognition of relevant knowledge acquired through formal and informal learning or experience. This knowledge can be recognised as part of the completed study requirements, at up to 6 ECTS for one set (the approximate study programme for a course) of knowledge acquired outside of the university. In the recognition process certificates and other documents are taken into account. Requests for recognition of acquired knowledge will be considered by the FRI Committee for Student Affairs.

5. Requirements for progression through the programme

Requirements for progressing to a higher year:
To enrol in a higher year students must pass all exams from the year in progress and all exams from previous years.

Requirements for retaking a year:
To retake a year the following must be completed:

- at least half of the requirements from the study programme of the year in progress (30 ECTS);
- all exams from the years before.

Students can only retake a year once in their course of study; changing the study programme is also considered to be retaking a year, owing to the uncompleted requirements of the previous study programme.

Advice and guidance for students

The Career Centre at the Faculty of Computer and Information Science and tutors will be in direct contact with students during their course of study, in order to motivate them to progress in their professional areas and help them with difficulties, problems and crises that might interfere with their studies. Students can also seek guidance and help from the Career Centre of the University of Ljubljana at any time.

6. Requirements for completing the study programme

To complete the study programme students must pass all exams and fulfil all requirements, including a diploma thesis paper, in a total amount of at least 180 ECTS.

7. Transferring between programmes

In accordance with the Criteria for Transferring between Programmes, transferring is possible from study programmes which upon completion guarantee similar competences and which enable the recognition of at least half of the obligations based on the European Credit Transfer System (ECTS) from the first study programme that are related to obligatory courses of the second study programme.

Transferring from other programmes is possible after the first year of study. The requirements for transferring to the University Programme Computer and Information Science from other programmes (university and professional) are:

- an equivalent curriculum in Mathematics and Physics under the programme from which students transfer; the recognised courses must have at least as many credits as the aforementioned courses;
- the appropriate authority defines, on the basis of the comparison of both programmes, the requirements to be recognised and the year in which the candidate can enrol, and consequently issues a decision;
- transferring is possible on the basis of the provisions applicable to such programmes. The requirements for transferring to the University Programme Computer and Information Science from professional programmes are:
- recognised ECTS credits the candidate obtained in the professional study programme; due to the variability and the different levels of difficulty in professional programmes, the level of the candidate's knowledge is assessed by a special Admissions Committee, headed by the Vice Dean for Education, and it consequently approves the courses to be recognised for each individual student;
- based on a comparison of both programmes, the appropriate Faculty authority defines the requirements to be recognised and the year in which the candidate can enrol, and issues a decision.

8. Assessment

The assessment methods are defined in the study programmes for individual courses. The general rules for assessment methods are regulated by the Study Regulations FRI UL. The assessment methods for all courses are either in the form of written or oral examinations. These assessment methods include: tests from exercises, defences of tests, oral examinations, seminars and projects, presentations of seminar and project work. The grading scale is in accordance with the Statutes of the University of Ljubljana. All assessments are graded on a scale from 5-10, where 6-10 are passing grades and 5 failing grade or passed with excellence, passed or failed.

9. Syllabus

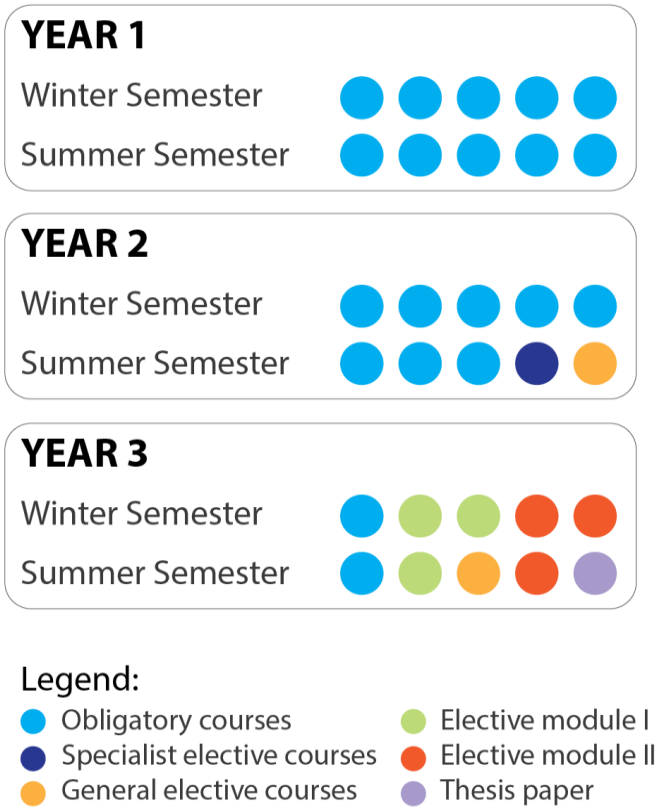
The organisation of the three-year programme is demonstrated in the study model below and individual courses are presented in the course syllabus. Year 1 is the same for all students and consists of 10 obligatory courses. In Year 2, 8 courses are obligatory, one course is a specialist elective course, where students can choose from three offered courses, and one course is a general elective course. In Year 3 there are two obligatory courses, a general elective course and the thesis paper, which students produce as part of the Diploma Seminar subject. Students choose two modules out of the eight offered modules. Each module has three different courses, which represent a different focus. Students who achieve an 8.5 GPA in the first two years and do not retake a year can choose any of the module courses. Tutors will assist and advise them in their choice. Consequently, these students will not be limited to two modules, but will be able to choose 6 courses (three in each module) out of any of the offered modules (24 courses).

In addition, students also have the option of choosing English, available in three difficulty levels. Each of them is worth 3 credits and is considered a general elective course. The Faculty offers these courses, because it is aware of the importance of a foreign language and enables students to choose and improve their level of English. The Faculty also offers the following general elective courses:

- "Topics in Computer and Information Science", which is provided by lecturers from other universities on exchange programmes, who contribute their knowledge and the latest developments in computer and information science;
- Computer Science Practice I and II;
- Computer Science Skills.

Students may also complete 6 ECTS in the second and third years by taking subjects at other faculties.

STUDY MODEL


YEAR 1
Winter Semester
Summer Semester
YEAR 2
Winter Semester
Summer Semester
YEAR 3
Winter Semester
Summer Semester
Legend:
Obligatory courses
Specialist elective courses
General elective courses
Elective module I
Elective module II
Thesis paper

Legend:
L = number of lectures
S = number of seminar exercises
T = number of theoretical and tutorial exercises
ECTS = number of ECTS points.
Each Semester lasts 15 weeks.

YEAR 1

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63277	Programming 1	Viljan Mahnič	45/0/30		6	
63202	Calculus	Nežka Mramor Kosta	45/0/30		6	
63203	Discrete Structures	Gašper Fijavž	45/0/30		6	
63204	Introduction to Digital Circuits	Nikolaj Zimic	45/0/30		6	
63205	Physics	Irena Drevenšek Olenik	45/030		6	
63278	Programming 2	Boštjan Slivnik		45/0/30	6	
63207	Linear Algebra	Bojan Orel		45/0/30	6	
63212	Computer Systems Architecture	Branko Šter		45/0/30	6	
63209	Computer Communications	Zoran Bosnić		45/0/30	6	
63215	Introduction to Information systems	Dejan Lavbič		45/0/30	6	

YEAR 2

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63279	Algorithms and Data Structures 1	Igor Kononenko	45/0/30		6	
63208	Basics of Databases	Marko Bajec	45/0/30		6	
63213	Probability and Statistics	Aleksander Jurišić	45/10/20		6	
63218	Computer Systems Organisation	Patricio Bulić	45/0/30		6	
63283	Computability and Computational Complexity	Borut Robič	45/0/30		6	
63216	Theory of Information and Systems	Uroš Lotrič		45/10/20	6	
63280	Algorithms and Data Structures 2	Borut Robič		45/0/30	6	
63217	Operating Systems	Borut Robič		45/0/30	6	
	General elective course *			45/0/30	6	
	Specialist elective course **			45/0/30	6	

* Mathematical Modelling, Principles of Programming Languages, Computer Technologies
** English Language (Level A, B, C), Topics in Computer and Information Science, Computer Science in Practice I, Computer Science in Practice II, Computer Science Skills

YEAR 3

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63214	Introduction to Artificial Intelligence	Ivan Bratko	45/0/30		6	
	Module elective course I		45/0/30		6	
	Module elective course I		45/0/30		6	
	Module elective course II		45/0/30		6	
	Module elective course II		45/0/30		6	
63256	Software Engineering	Viljan Mahnič		45/10/20	6	
	Module elective course I			45/0/30	6	
	Module elective course II			45/0/30	6	
	General elective course **			45/0/30	6	
63281	Diploma seminar	Franc Solina		45/10/5	6	

** English Language (Level A, B, C), Topics in Computer and Information Science, Computer Science in Practice I, Computer Science in Practice II, Computer Science Skills

SPECIALIST ELECTIVE COURSES

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63219	Mathematical Modelling	Nežka Mramor Kosta		45/0/30	6	
63220	Principles of Programming Languages	Ivan Bratko		45/0/30	6	
63221	Computer Technologies	Rok Žitko		45/0/30	6	

MODULE ELECTIVE COURSES

I. Information Systems

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63249	Electronic Business	Denis Trček	45/0/30		6	
63250	Organisation and Management	Tomaž Hovelja		45/10/20	6	
63251	Introduction to Data Mining	Blaž Zupan	45/20/10		6	

II. Management of Information Systems

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63252	Information Systems Development	Marko Bajec	45/20/10		6	
63226	Data Management Technologies	Matjaž Kukar	45/10/20		6	
63253	Informatics Planning and Management	Rok Rupnik		45/0/30	6	

III. Software Development

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63254	Software Development Processes	Branko Matjaž Jurič	45/10/20		6	
63255	Web Programming	Zoran Bosnić	45/20/10		6	
63287	Platform-Based Development	Zoran Bosnić		45/0/30	6	

IV. Computer Networks

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63257	Computer Networks Modelling	Miha Mraz	45/10/20		6	
63258	Communication Protocols	Mojca Ciglarič	45/0/30		6	
63259	Mobile and Wireless Networks	Nikolaj Zimic		45/10/20	6	

V. Computer Systems

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63260	Digital Design	Patricio Bulić	45/10/20		6	
63261	Distributed Systems	Uroš Lotrič	45/10/20		6	
63262	Computer Systems Reliability and Performance	Miha Mraz		45/20/10	6	

VI. Algorithms and System Utilities

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63263	Analysis of Algorithms and Heuristic Problem Solving	Marko Robnik Šikonja	45/10/20		6	
63264	System Software	Tomaž Dobravec	45/10/20		6	
63265	Compilers	Boštjan Slivnik		45/0/30	6	

VII. Artificial Intelligence

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63266	Intelligent Systems	Igor Kononenko, Marko Robnik Šikonja	45/6/24		6	
63267	Machine Perception	Matej Kristan	45/10/20		6	
63268	Development of Intelligent Systems	Danijel Skočaj		45/0/30	6	

VIII. Media Technologies

No.	Study unit	Lecturer	Semester 1	Semester 2	ECTS	Note
			L/S/T	L/S/T		
63269	Computer graphics and Game Technology	Matija Marolt	45/10/20		6	
63270	Multimedia Systems	Matej Kristan	45/10/20		6	
63271	Introduction to Graphic Design	Narvika Bovcon		45/0/30	6	

GENERAL ELECTIVE COURSES

No.	Study unit	Lecturer	Semester 1 L/S/T	Semester 2 L/S/T	ECTS	Note
63222	English Language – Level A	Marina Štros Bračko		30/0/15	3	
63223	English Language – Level B	Marina Štros Bračko	30/0/15		3	
63224	English Language – Level C	Marina Štros Bračko		20/0/15	3	
63225	Topics in Computer and Information Science	Lectures from other universities	45/0/30		6	
63241	Computer Science in Practice I	Vice Dean for Education	5/0/0		3	
63242	Computer Science in Practice II	Vice Dean for Education		5/0/0	3	
63284	Computer Science Skills	Study Programme Coordinator	15/0/45		3	
63248	Economics and Entrepreneurships	Mateja Drnovšek		45/10/20	6	

The study programme is based on modules that are carried out in Year 3. Students can choose two out of the eight modules offered. Each of the modules represents a different computer and information science topic, enabling students to choose their general study topic profile with the two selected modules.

Students who complete a Socrates/Erasmus exchange at a foreign university can transfer a maximum of 30 ECTS (if they are abroad for one semester) or 60 ECTS (if they are abroad for one year) from the courses completed at their exchange university.

10. International Mobility

Students can transfer 60 credits from any computer and information science programme affirmed by the FRI Committee for Student Affairs. The Faculty of Computer and Information Science has signed Erasmus+ exchange programme contracts with numerous foreign universities.

11. Presentation of individual courses

The presentation of individual courses is available on the Faculty website.