**CHALLENGING THE FUTURE**

**FRI**

**2ⁿᵈ Cycle**

**Master's Study Programmes**

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

# Accept the Challenge

Today, computer and information science is an important and inevitable building block of all systems and organisations—from companies to public services, from education and research to industry and sales. Most systems are already interconnected and by means of artificial intelligence they have become even more autonomous. Are people still needed at all? Of course. More than ever, we need those that can manage advanced computer systems and processes and will be capable of directing the fast development of this segment in the future. Employment trends indicate a growing demand for such highly-qualified personnel.

The Faculty of Computer and Information Science of the University of Ljubljana (FRI) focuses particularly on this goal. The close cooperation of educational personnel—researchers with partners from the corporate sector provides up-to-date programmes, dealing with modern challenges, and a direct transfer of the latest findings into practice. Working in the largest technological companies or independently penetrating the market requires integration in the global environment. As a response the Faculty offers a double degree programme with the University of Graz and promotes exchange with many partner universities all over the world.

We realise that the importance of computer knowledge becomes evident in connection with other disciplines, which is why our master's study programme is even more interdisciplinary and offers more elective content that students can base their career paths on. What represents a challenge for you? Programming mobile applications or web applications in the cloud, developing games consoles, new methods of using touch screens, virtual reality and wearable technologies, developing artificial intelligence and autonomous robots, managing complex systems or working with large-scale databases? Perhaps something completely new? Even better.

Bachelor graduates in computer and information science, and graduates in other fields of study, don't miss the opportunity. Master's studies at the Faculty of Computer and Information Science will upgrade your existing knowledge and strenghten competencies for a successful career.

Seize the opportunity!

# Master's Study Programmes

The Faculty of Computer and Information Science of the University of Ljubljana conducts several Master's study programmes that offer a wide spectrum of knowledge of computer and information sciences and related fields. Great emphasis is placed on interdisciplinary integration of knowledge, so all programmes allow for cooperation with partner faculties and universities. During the two-year study, students become qualified for a successful career in the industry and entrepreneurial world as well as in the academic field.

## Master's Study Programmes

Computer and Information Science  `LECTURES IN ENGLISH`

Data Science  `LECTURES IN ENGLISH`
(Computer and Information Science programme track)

Interdisciplinary study Computer Science and Mathematics
(with the Faculty of Mathematics and Physics)

Interdisciplinary study Multimedia
(with the Faculty of Electrical Engineering)

Interdisciplinary study Cognitive Science
(with the Faculty of Education, the Faculty of Arts,
and the Faculty of Medicine)

Applied Statistics
(with the Faculty of Electrical Engineering, Biotechnical Faculty,
Faculty of Economics, Faculty of Mathematics and Physics, Faculty of
Medicine, and the Faculty of Social Sciences)

**ŽIGA LESAR**

*Computer and Information Science Master's Graduate and
recipient of the University Prešeren Award for the diploma project*

Master's programmes at the Faculty of Computer and Information Science offer in-depth knowledge in numerous fields. Students can choose from a wide range of courses, some directly related to the industry. At tutorials, we can directly apply the theoretical knowledge that we have obtained in classes to intriguing practical problems and thus consolidate our knowledge. I believe that the Faculty offers numerous possibilities for high-quality education, to which professors and assistants contribute by good will and an amiable approach.

# Computer and Information Science

This study is the logical next step from the bachelor University and Professional study programme Computer and Information Science and it is also available to graduates from other bachelor programmes. The course syllabus enables the study to be tailored to students' wishes, motivations, and preferences. Elective content covers a wide range of fields and technologies, and thus allows for diverse professional specialisation. The Computer and Information Science study programme offers future Master's degree holders the knowledge and skills enabling them to keep up with the development and technological changes and novelties as well as to become involved in research and scientific work, offering exceptional employment opportunities in Slovenia and around the world.

Eligible for enrolment: (a) Graduates of the bachelor study or an equivalent study in the field of computer and information science or natural and technical sciences (mathematics, physics, electrical engineering, chemistry and chemical technology, mechanical engineering, construction); (b) Students who have completed the bachelor study or an equivalent study in a field that is not stated under item a) and before enrolment have passed the bachelor courses at the FRI: Programming 1; Discrete Structures; Introduction to Digital Circuits; Computer Systems Architecture; Introduction to IT systems; or have covered the subject matter of these courses in their undergraduate studies.
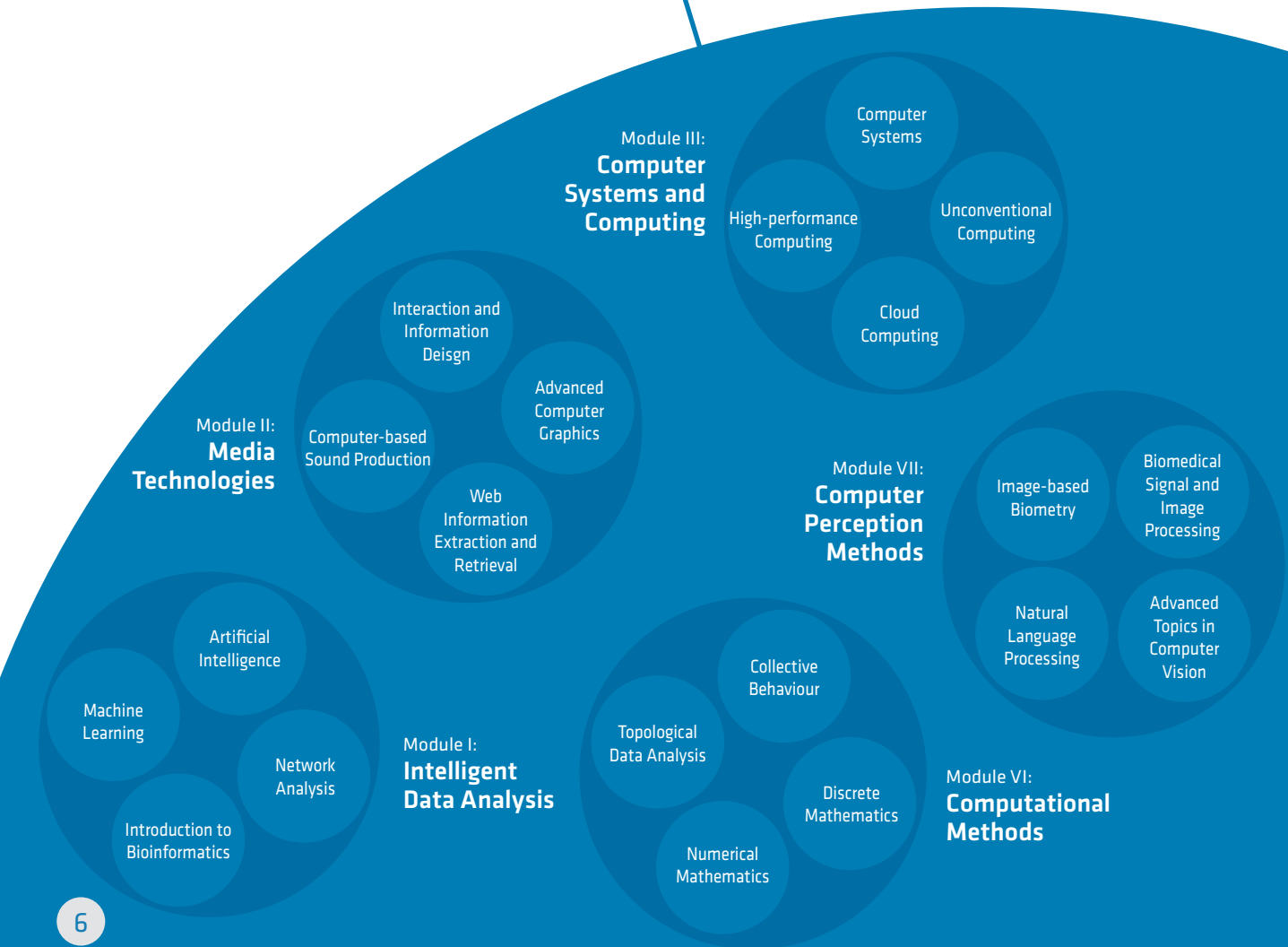
The candidates will be selected based on:
• The average grade achieved in the bachelor study (40%);
• the results of the selection exam (60%).

The selection exam covers chapters in mathematics, programming, algorithms and computer systems, and is held in September, after the application deadline for enrolment in the study programme.
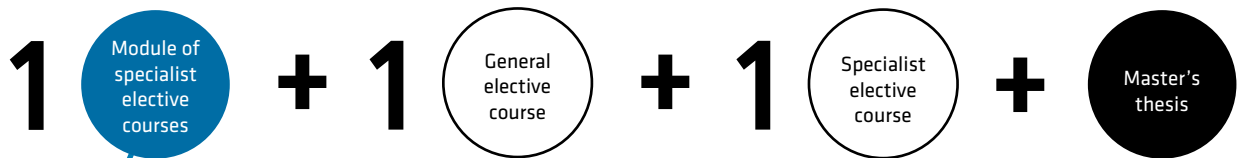
# Computer and Information Science

The first year of the programme is comprised of one mandatory course, two modules of four specialist elective courses each and one general elective course. Students select the study direction that they will pursue by choosing two modules. In the second year students choose one module of specialist elective courses, one general elective course, one general elective course and master's thesis.

# 1st year

Mathematics I

**+ 2**

Modules of specialist elective courses

**+ 1**

General elective course

Module III:
**Computer Systems and Computing**

Computer Systems

High-performance Computing

Unconventional Computing

Cloud Computing

Module II:
**Media Technologies**

Interaction and Information Deisgn

Computer-based Sound Production

Advanced Computer Graphics

Web Information Extraction and Retrieval

Module VII:
**Computer Perception Methods**

Image-based Biometry

Biomedical Signal and Image Processing

Natural Language Processing

Advanced Topics in Computer Vision

Artificial Intelligence

Machine Learning

Network Analysis

Introduction to Bioinformatics

Module I:
**Intelligent Data Analysis**

Collective Behaviour

Topological Data Analysis

Discrete Mathematics

Numerical Mathematics

Module VI:
**Computational Methods**

# 2<sup>nd</sup> year

**1** Module of specialist elective courses **+ 1** General elective course **+ 1** Specialist elective course **+** Master's thesis

Cryptography and Computer Security

Information Security and Privacy

Wireless Sensor Networks

Digital Forensic

Module IV:
**Computer Networks and Security**

Human-Computer Interaction

Functional Programming

Algorithms

Module V:
**Algorithms and Software**

Approximation and Randomized Algorithms

Other specialist elective courses:
- Perception in Cognitive Systems
- Management of Production and Service Processes
- Teaching Algorithmic Thinking
- Advanced Software Development Methods
- Big Data
- Deep Learning
- Topical Research Themes 1
- Topical Research Themes 2
- Topics in Computer and Information Science
- Research Seminar

Student may also choose a specialist elective course from any module.

General elective courses:
- Computer Science and Society 1
- Computer Science and Society 2
- Data Mining and Visualization

# Double Degree Study Programme in Computer and Information Science

The students of the Master's programme in Computer and Information Science may in the 2nd year enrol in the double degree study programme conducted by the Faculty of Computer and Information Science of the University of Ljubljana and the Graz University of Technology (Technische Universität Graz). There are 10 available enrolment places.

The Master's programme at Graz University enables students to deepen their knowledge in algorithms, software technology, intelligent systems, information security, image processing, computer graphics and visualisation, media and computer science and multimedia systems. The programme is delivered in English.

Students who pass at least one semester in Austria and prepare a Master's thesis with mentors from both universities, obtain degrees from the University of Ljubljana and the University of Graz. Both universities acknowledge credit points earned by students at the partner university.

With a population of 300,000, Graz is the second largest Austrian town and the capital of the federal state of Styria. Lying next to the Mura river, the town is included in the UNESCO world cultural heritage list and was awarded the 2003 title of European Capital of Culture. It is an important university town hosting six universities frequented by over 40,000 students. About 12,500 students visit Graz University of Technology, of whom more than 100 are from Slovenia.

**JAKA CIKAČ**

*Computer and Information Science Master's Graduate*

I warmly recommend student exchange programmes to all FRI students. It is not only an excellent opportunity to expand your knowledge by taking courses which are not offered at the home university, but also an insight into a new environment and its culture, as well as an opportunity to learn a new language and bridge cultural differences. The double degree study programme in cooperation with the Graz University of Technology has also allowed me to become more involved in their research. My experience through collaboration with their international research groups has been invaluable. Furthermore, I have made acquaintances with many high calibre researchers. In addition to academic experience, I have also gained extensive organisation and time management skills. The double degree programme is truly an unforgettable life experience.

```
1 def recover(self, vertex):
2   level = self.level[vertex]
3   while level < self.nLevels and self.nAtO
4     self.level[vertex] += 1
5     self.nAtOrAboveSelfLevel[vertex]
6     for fr in self.friends[vertex]: for
7     self.moveFriend(other, vertex, level
8     level = self.level[vertex]
9 def moveFriend(self, vertex, other
```

## MANCA ŽEROVNIK MEKUČ

*Computer and Information Science Master's Graduate and Doctoral Student*

At first I was not certain whether or not to decide for post-graduate study at the Faculty of Computer and Information Science, but I definitely do not regret my decision now. Things that we learned in the study start coming together in the study. Every week my knowledge becomes more comprehensive. Learning new things about the fields that I am familiar with is much more interesting and demanding that learning the basics. The attitude is more student-friendly, as we are given more freedom and the deadlines are not as strict. Study indeed becomes a pleasure.

# Data Science

## Computer and Information Science programme track

The Data Science programme is a highly selective track, suited for students with a strong background in mathematics, computer science, and/or applied statistics. The track features a demanding curriculum that focuses on equipping the students with the theoretical foundations and practical skills that they need to become leading data science professionals, researchers, or data science teachers. The program is part of the second cycle master's study program Computer and Information Science.

The Data Science Master's assumes that the enrolling student is knowledgeable in calculus, linear algebra, probability, algorithms and data structures, and programming skills in a general-purpose programming language. We anticipate that most students will have gaps in at least one of these areas, so this will not preclude them from being accepted. However, we expect students to put in the required extra work and catch up during the 1st year of the Master's or prior to enrolling by consulting the following references:

– Magnus L. Hetland: Beginning Python, 2nd Edition, Apress, 2008.
– Cormen et al.: Introduction to Algorithms, 3rd Edition, MIT Press, 2009 [Chapters 2, 3.1, 4.1, 7.1, 7.2, 10.1, 10.2, 11.2, 12.1-12.3, 15.1, 16.1, 22.1-22.4., 23.1, 23.2]
– James Stewart: Calculus: Early Transcendentals, 8th Edition, Cengage Learning, 2017.
– Gilbert Strang: Introduction to Linear Algebra, 5th Edition, 2016. [Chapters 1-6]
– Sheldon Ross: A First Course in Probability, 9th Edition, Pearson Education India, 2013.
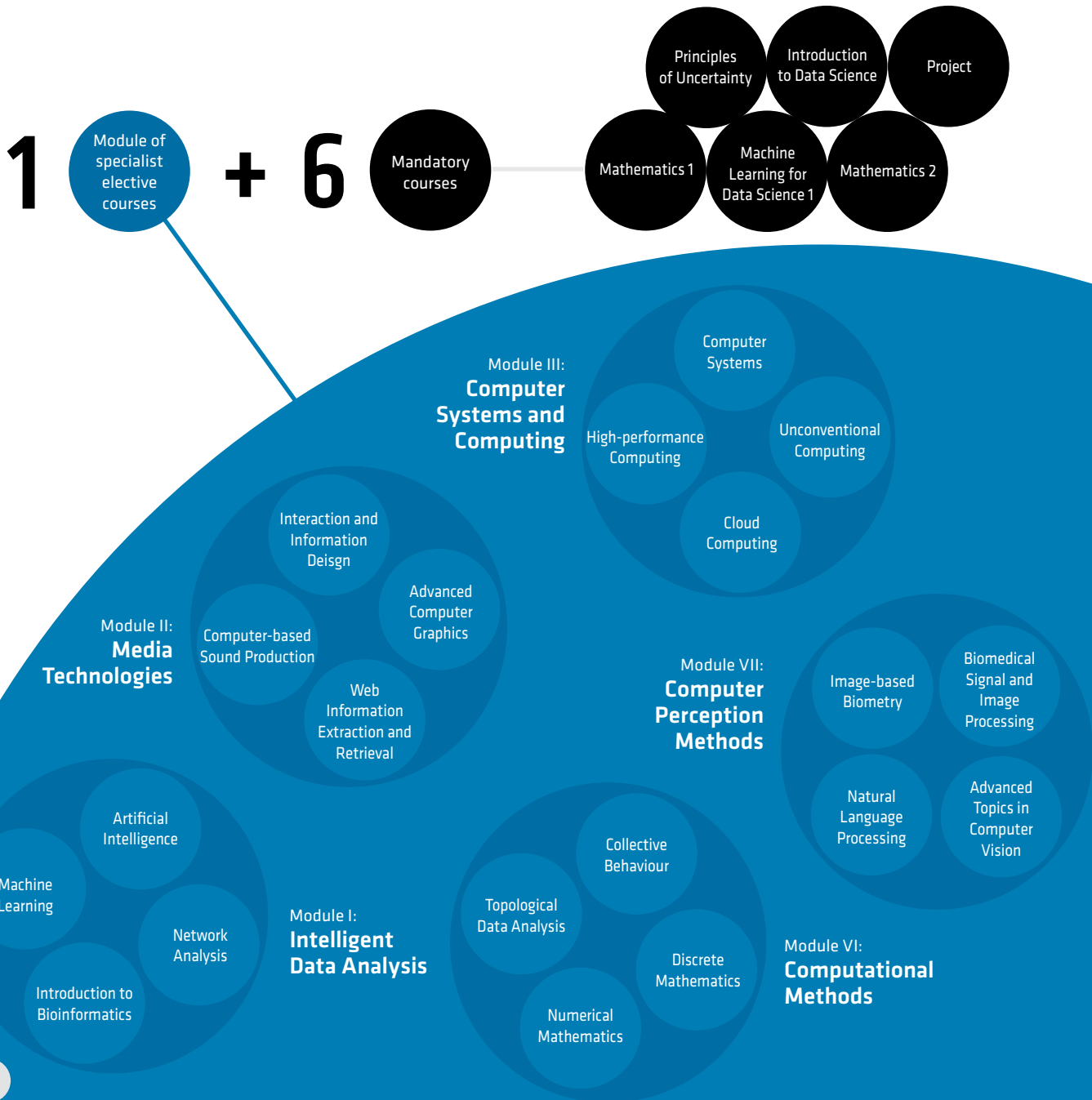
The candidates will be selected based on:
• The average grade achieved in the bachelor study (40%);
• the results of the selection exam (60%).

The selection exam covers chapters in mathematics, programming, algorithms and computer systems, and is held in September, after the application deadline for enrolment in the study programme.
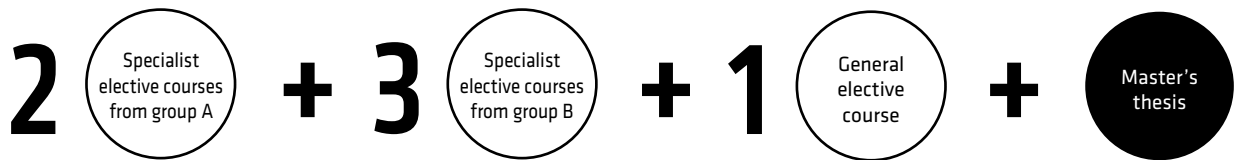
# Data Science

The curriculum is divided up into four semesters, two semesters each year. The first year features six mandatory courses. Additionally, the student selects one four-course Module from the Computer and Information Science Master's programme, for a total of ten courses in the first year. In the second year each student selects five Data Science elective courses and one general elective course, which can be selected from the courses offered by the Faculty of Computer and Information Science or even other Faculties of the University of Ljubljana.

# 1st year

**1** Module of specialist elective courses

**+ 6** Mandatory courses

- Principles of Uncertainty
- Introduction to Data Science
- Project
- Mathematics 1
- Machine Learning for Data Science 1
- Mathematics 2

## Module III: Computer Systems and Computing
- Computer Systems
- High-performance Computing
- Unconventional Computing
- Cloud Computing

## Module II: Media Technologies
- Interaction and Information Deisgn
- Advanced Computer Graphics
- Computer-based Sound Production
- Web Information Extraction and Retrieval

## Module VII: Computer Perception Methods
- Image-based Biometry
- Biomedical Signal and Image Processing
- Natural Language Processing
- Advanced Topics in Computer Vision

## Module I: Intelligent Data Analysis
- Artificial Intelligence
- Machine Learning
- Network Analysis
- Introduction to Bioinformatics

## Module VI: Computational Methods
- Collective Behaviour
- Topological Data Analysis
- Discrete Mathematics
- Numerical Mathematics

# 2<sup>nd</sup> year

$$2 \quad \text{Specialist elective courses from group A} \quad + \quad 3 \quad \text{Specialist elective courses from group B} \quad + \quad 1 \quad \text{General elective course} \quad + \quad \text{Master's thesis}$$

**2** — Specialist elective courses from group A

**+ 3** — Specialist elective courses from group B

**+ 1** — General elective course

**+** Master's thesis

Cryptography and Computer Security

Information Security and Privacy

Wireless Sensor Networks

Digital Forensic

Module IV:
**Computer Networks and Security**

Human-Computer Interaction

Functional Programming

Algorithms

Module V:
**Algorithms and Software**

Approximation and Randomized Algorithms

## Group A: Specialist elective courses:
- Bayesian Statistics
- Deep Learning
- Machine Learning for Data Science 2
- Big Data

## Group B: Specialist elective courses:
- Machine Learning
- Introduction to Bioinformatics
- Biomedical Signal and Image Processing
- Natural Language Processing
- Image-based Biometry
- Machine Learning for Data Science 2
- Bayesian Statistics
- Advanced Topics in Computer Vision
- Web Information Extraction and Retrieval
- High Performance Computing
- Deep Learning
- Big Data
- Artificial Intelligence
- Network Analysis

## General elective courses:
- Computer Science and Society 1
- Computer Science and Society 2
- Data Mining and Visualization
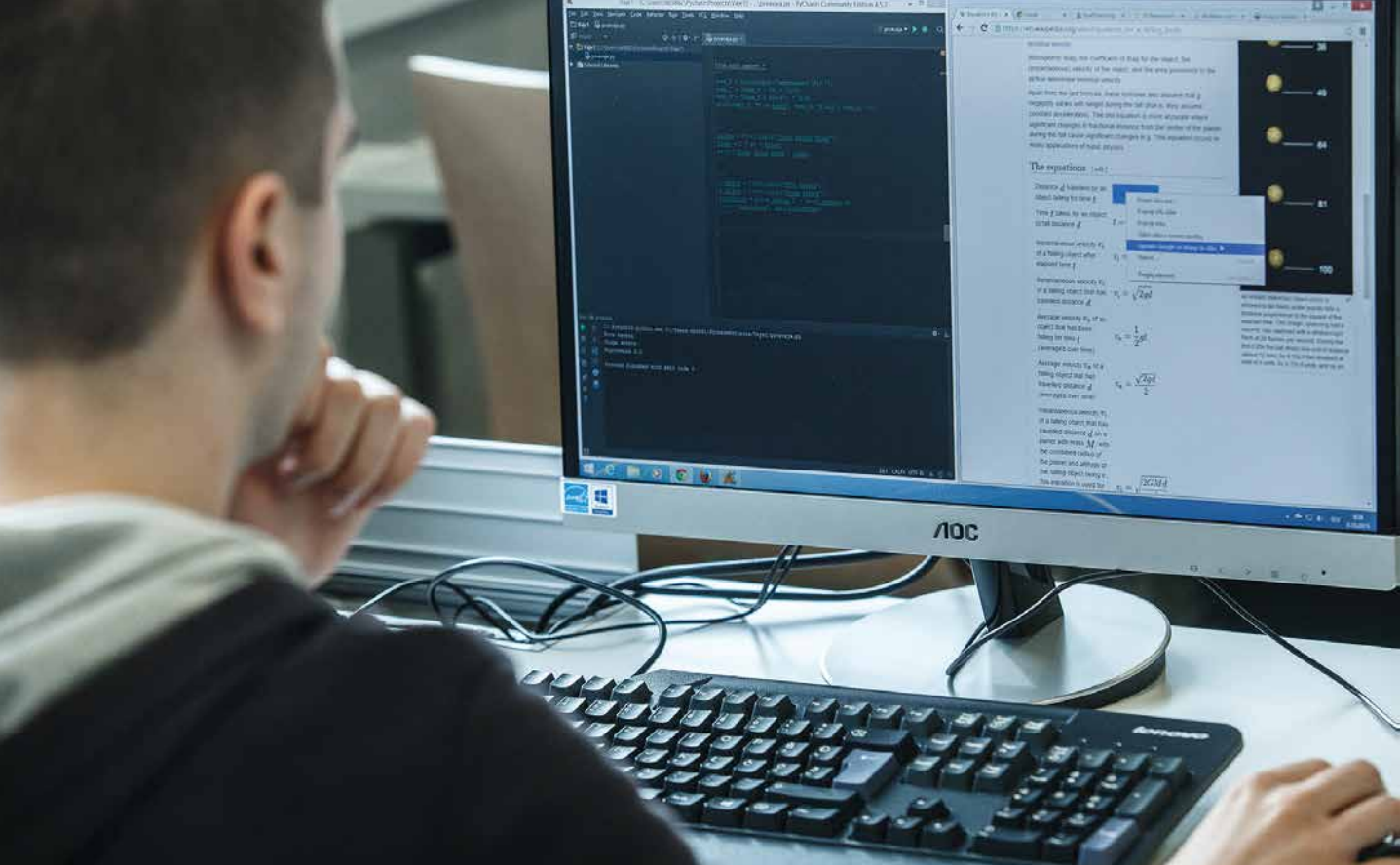
## LIDIJA MAGDEVSKA

*Computer Science and Mathematics Master's Student*

I have always been more interested in theoretical matters than in practical skills. In addition to mathematics subjects, I gained most satisfaction during the Computer Science and Mathematics programme by taking part in iGEM, the international synthetic biology competition, and by undertaking research work at the Computer Structures and Systems Laboratory. I owe the highest debt of gratitude to my mentors. Without their approachability and their commitment to teaching and research work, I would not have been able to publish my first conference papers and scientific articles as early as I did.

# Computer Science and Mathematics

The interdisciplinary master's study programme Computer Science and Mathematics is offered jointly with the Faculty of Mathematics and Physics of the University of Ljubljana. The study focuses on training for the development and working with new technologies, research in mathematics and theoretical computer science, and the development of the ability to quickly master new findings and achievements. Master's degree holders can become employed in any branch of the economy, in the public or non-profit sector, working in a number of fields, from information and communication technologies to computer and mathematical support in management of complex systems.

Eligible for enrolment: (a) Graduates of the bachelor study programmes in fields of Computer or Information Science, Mathematics, Financial Mathematics, Pedagogical Mathematics, Statistics, Physics, or other acquired equivalent programme; (b) Graduated of the bachelor study in other professional fields, if they fulfil the study obligations essential to continue the study before enrolment. The obligations ranging between 10 and 60 credit points are determined by both faculties together, and the candidates must fulfil them before enroling in master's study.

The selection of candidates is made on the basis of the following criteria:
• Bachelor studies GPA (50%)
• Selection exam results (50%)

The selection exam will be carried out in September, after the application deadline for enrolment in the study programme.

# Computer Science and Mathematics

The programme is comprised of two mandatory courses, five professional elective courses in computer science, seven professional elective courses in mathematics (at least 3 from group A), one professional computer or mathematical course, two general elective courses, a seminar, and a Master's thesis.

Algorithms

Functional Programming

**2** Mandatory course **+ 5** Professional elective course **+ 7** Professional elective course **+**
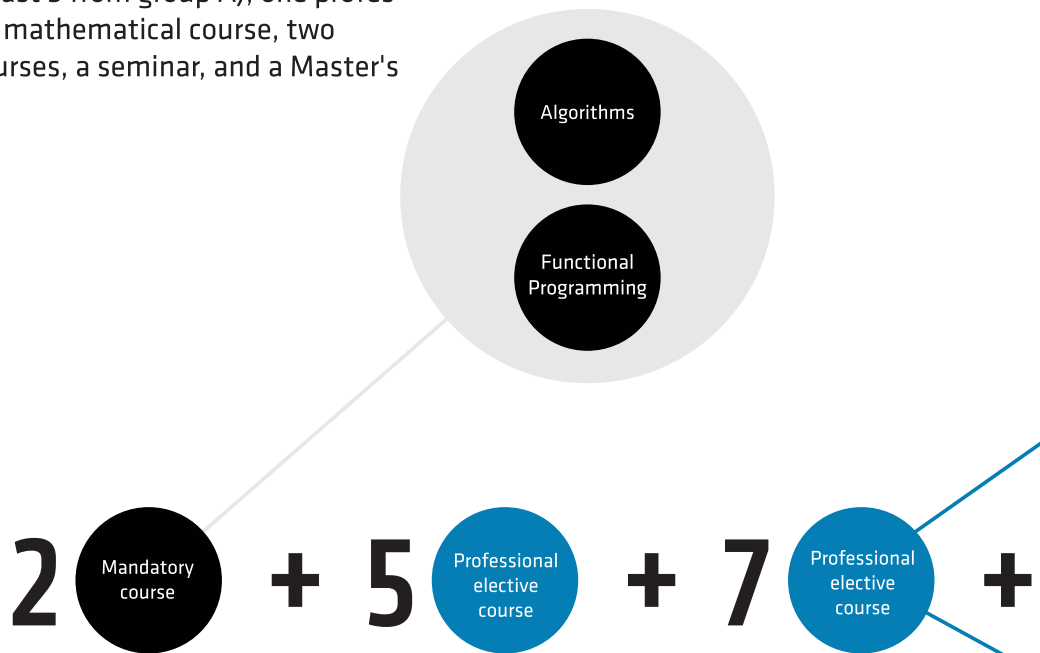
## PROFESSIONAL ELECTIVE COURSES IN COMPUTER SCIENCE

Machine Learning

Topical Research Themes I

Unconventional Computing

Teaching Algorithmic Thinking

Data Mining

Web Information Extraction and Retrieval

Digital Signal Processing

Topical Research Themes II

Digital Forensic

Cloud Computing

Biomedical Signal and Image Processing

Information Security and Privacy

Interaction and Information Design

Computer Based Sound Production

Artificial Intelligence

Computer Systems

Approximation and Randomized Algorithms

Topics in Computer and Information Science

Programming Language Theory

Perception in Cognitive Systems

Advanced Topics in Computer Vision

Introduction to Bioinformatics

Modern Software Development Methods

**PROFESSIONAL ELECTIVE COURSES IN MATHEMATICS (GROUP A)**

- Computer Aided Geometric Design
- Logic in Computer Science
- Computational Geometry
- Probability Methods in Computer Science

**1** Professional elective course **+** **2** General elective course **+** Seminar **+** Master's thesis

**PROFESSIONAL ELECTIVE COURSES IN MATHEMATICS (GROUP B)**

- Symbolic Computation
- Topics in Computer Mathematics
- Cryptography and Computer Security
- Topics in Numerical Mathematics
- Topological Data Analysis
- Data Analysis and Visualisation
- Topics in Game Theory
- Coding Theory and Cryptography
- Selected Topics in Discrete Mathematics
- Mathematics with Computers
- Combinatorics 2
- Optimization Methods 2
- Graph Theory

## DAMJAN PJEVIĆ
*Multimedia Student*

In the beginning I imagined this course completely differently. I expected just work with cameras, images and sound. The course surprised me in a positive way. I additionally acquired knowledge in programming, databases, creating applications, websites and more. The course brings together the best of the FRI and FE in multimedia. In addition to the actual course, there's a huge amount of extracurricular activities and societies I can take part in at the two faculties. This enabled me to fill up my CV with various experiences. One of the better things is the people you meet at the faculty. Most of them are interested in similar things, and it's easy to get involved in some joint project. I would recommend this course to anyone interested in the technological background of multimedia content.

# Multimedia

The interdisciplinary master's study programme in Multimedia is offered jointly with the Faculty of Electrical Engineering, and combines knowledge of computer science and telecommunications. The programme enables students to perform effective planning and implementation of multimedia systems, develop software, analyse and process multimedia content and present information visually. It constitutes an enhancement of the bachelor interdisciplinary university study programme in Multimedia. The numerous elective courses allow students to deepen their knowledge in specific fields of multimedia and to acquire competences that match the job description of a creator of multimedia services, designer of user experience, multimedia content analyst or multimedia systems engineer.

Eligible for enrolment:
(a) Graduates of the bachelor or post-secondary professional study programme adpoted prior to 11 June 2014 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) Graduates of the bachelor study programme in the field or post-secondary professional study programme adopted prior to 11 June 2004 not covered under point a) and who prior to enrolment have passed the following examinations from the bachelor study programme Multimedia: Programming 1, Programming 2, Introduction to Multimedia Systems and Communication Systems, or who during their bachelor studies mastered the material covered in the stated courses. (c) Students who have completed an equivalent education to that set out in points a) and b) abroad.

The selection of candidates is made on the basis of the following criteria:
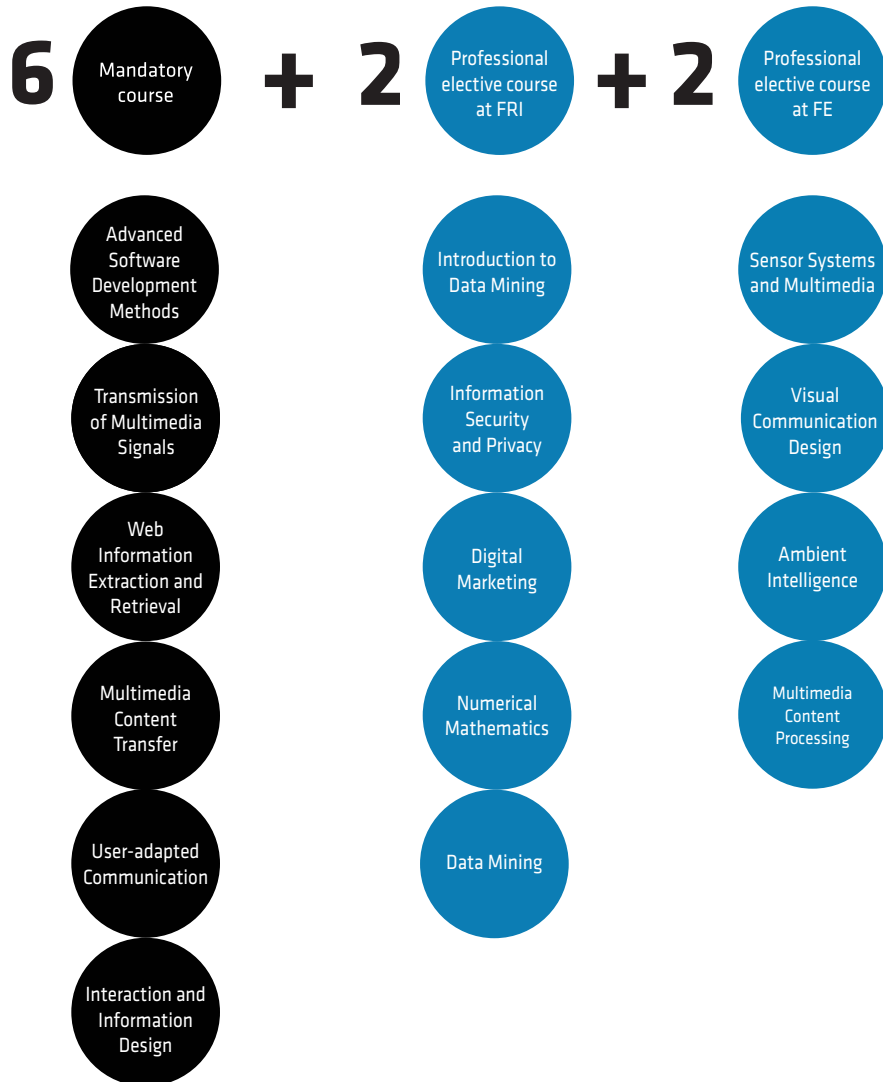• Bachelor studies GPA (20%)
• Selection exam results (80%)

The selection exam covers the chapters in mathematics, programming, algorithms, communication systems, internet protocols and the properties of multimedia content, and is held in September, after the application deadline for enrolment in the study programme.
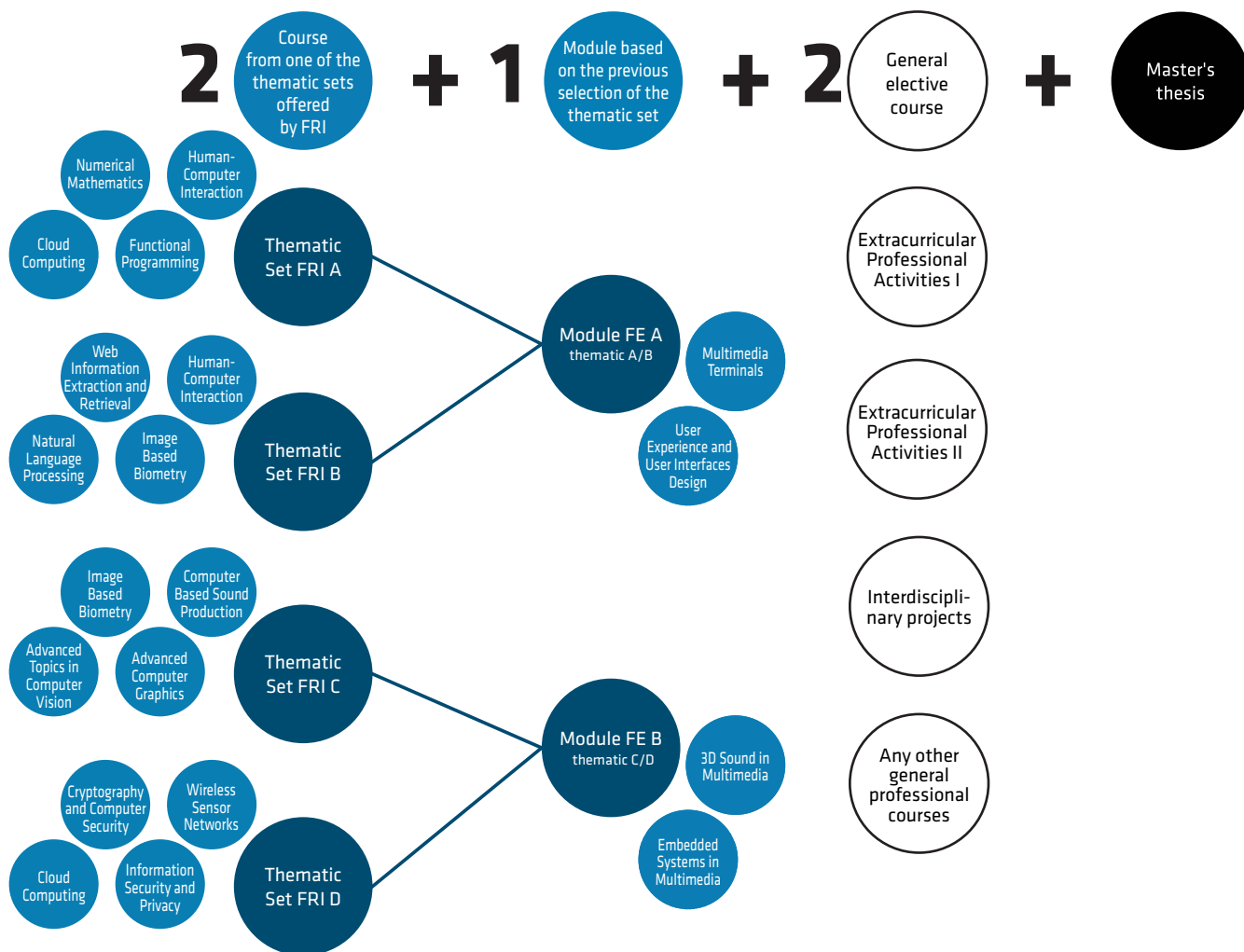
# Multimedia

In the first year the programme covers six mandatory courses, two professional elective courses at the Faculty of Computer and Information Science (FRI) and two professional elective courses at the Faculty of Electrical Engineering (FE).

**1ˢᵗ year**

**6** + **2** + **2**

| Mandatory course | Professional elective course at FRI | Professional elective course at FE |
|---|---|---|
| Advanced Software Development Methods | Introduction to Data Mining | Sensor Systems and Multimedia |
| Transmission of Multimedia Signals | Information Security and Privacy | Visual Communication Design |
| Web Information Extraction and Retrieval | Digital Marketing | Ambient Intelligence |
| Multimedia Content Transfer | Numerical Mathematics | Multimedia Content Processing |
| User-adapted Communication | Data Mining | |
| Interaction and Information Design | | |

# 2<sup>nd</sup> year

**2** Course from one of the thematic sets offered by FRI

**+ 1** Module based on the previous selection of the thematic set

**+ 2** General elective course

**+** Master's thesis

Numerical Mathematics
Human-Computer Interaction
Cloud Computing
Functional Programming

**Thematic Set FRI A**

Web Information Extraction and Retrieval
Human-Computer Interaction
Natural Language Processing
Image Based Biometry

**Thematic Set FRI B**

**Module FE A** thematic A/B
Multimedia Terminals
User Experience and User Interfaces Design

Image Based Biometry
Computer Based Sound Production
Advanced Topics in Computer Vision
Advanced Computer Graphics

**Thematic Set FRI C**

Cryptography and Computer Security
Wireless Sensor Networks
Cloud Computing
Information Security and Privacy

**Thematic Set FRI D**

**Module FE B** thematic C/D
3D Sound in Multimedia
Embedded Systems in Multimedia

General elective course

Extracurricular Professional Activities I

Extracurricular Professional Activities II

Interdisciplinary projects

Any other general professional courses

In the second year, students first select 2 courses from one of the four thematic sets at the Faculty of Computer and Information Science. Depending on the selection of the thematic set, students must then select the appropriate module A or B at the Faculty of Electrical Engineering, as shown by the lines in the diagram. Students must also select two general elective courses from the four on offer, and conclude their studies with their master's thesis.

## ANKA SLANA OZIMIČ
*Cognitive Science Master's Graduate*

Already as a child I was fascinated by human psyche: Why are we the way we are, how do we feel, dream, make decisions, can the functioning of our brain really be compared to the functioning of a computer? The decision to enrol was easy, as the study offered exactly what I wanted. The study is extremely interdisciplinary and comprises learning about various scientific disciplines, from neurology, psychology and philosophy to programming and artificial intelligence. As such, it meets both the requirements of science-oriented and more socially-oriented students. Lecturers are of top quality and you can feel that they are really interested in the topic. Often debates evolve that keep you up all night. Everyone looking for answers to the most fundamental questions of human essence will enjoy the study.

# Cognitive Science

The interdisciplinary master's study programme Cognitive Science is provided in cooperation with the Faculty of Education, the Faculty of Arts and the Faculty of Medicine of the University of Ljubljana, and a consortium of foreign universities. Cognitive Science researches mentality. Its basic disciplines include neuro science, artificial intelligence, biology, linguistics, anthropology, philosophy and psychology. The goal of the study is to educate researchers in cognitive science and experts qualified for integrative work in interdisciplinary projects. Master's degree holders will be capable of applying the findings of cognitive science to specific areas, such as teaching, designing software for machine learning, measuring user experience, producing interfaces and managing group processes.

Eligible for enrolment: All graduates of the academic bachelor study programmes (or programmes of same or higher level elsewhere) are eligible for the admission to the master study programme Cognitive Science, regardless of their field of study.

The selection of candidates is made on the basis of the following criteria:
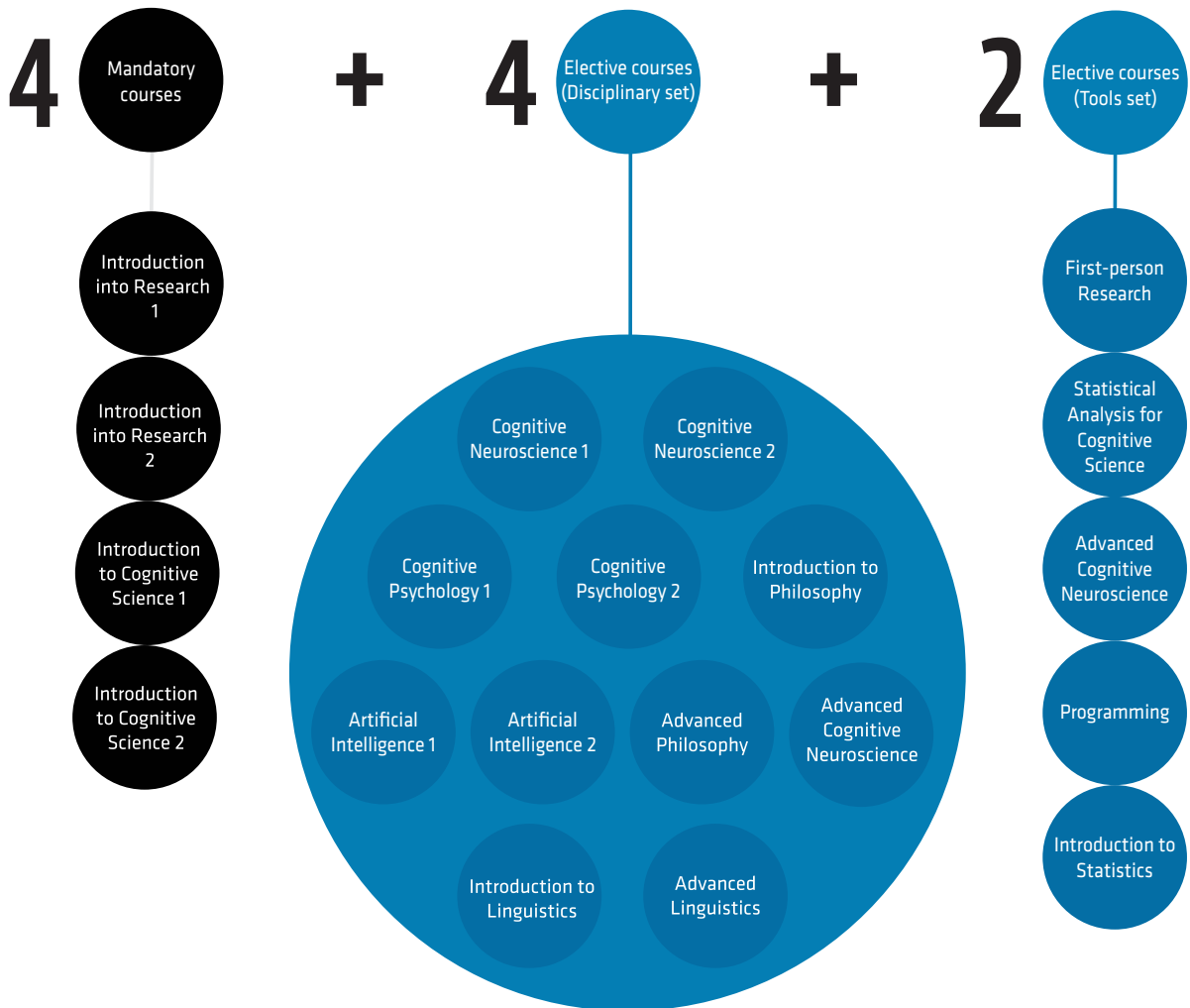- Bachelor studies GPA (50%)
- Selection exam results (50%)

The selection exam is held in September, after the application deadline for enrolment in the study programme.

# Cognitive Science

The course syllabus is organised in three interconnected sets. The disciplinary set and the tool set offering the student conceptual, practical, and cultural experience in cognitive science disciplines, whereas the integrative core is used as a platform for common reflection, reference, and integration of this experience. The study is designed as a two-year Master's study programme.
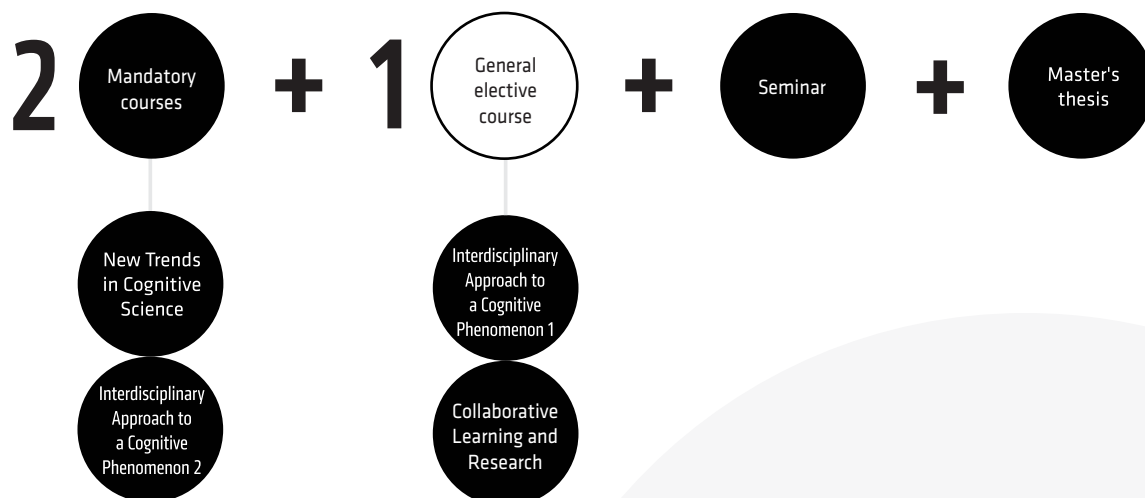
# 1st year

Students are oriented in the field of cognitive science and foundations are laid for interdisciplinary research. They become familiar with theoretical concepts and research methods of the fundamental cognitive science disciplines: neuro science, philosophy, psychology, linguistics, and artificial intelligence.

**4** Mandatory courses

- Introduction into Research 1
- Introduction into Research 2
- Introduction to Cognitive Science 1
- Introduction to Cognitive Science 2

**+**

**4** Elective courses (Disciplinary set)

- Cognitive Neuroscience 1
- Cognitive Neuroscience 2
- Cognitive Psychology 1
- Cognitive Psychology 2
- Introduction to Philosophy
- Artificial Intelligence 1
- Artificial Intelligence 2
- Advanced Philosophy
- Advanced Cognitive Neuroscience
- Introduction to Linguistics
- Advanced Linguistics

**+**

**2** Elective courses (Tools set)

- First-person Research
- Statistical Analysis for Cognitive Science
- Advanced Cognitive Neuroscience
- Programming
- Introduction to Statistics

# 2<sup>nd</sup> year

Students obtain specialised knowledge of the selected topic and focus on a certain cognitive phenomenon through the connection of research methods and perspectives of various disciplines.

**2** ( Mandatory courses )
**+** **1** ( General elective course )
**+** ( Seminar )
**+** ( Master's thesis )

( New Trends in Cognitive Science )

( Interdisciplinary Approach to a Cognitive Phenomenon 2 )

( Interdisciplinary Approach to a Cognitive Phenomenon 1 )

( Collaborative Learning and Research )

## Study Semester Abroad

Study programme is part of the international student consortium Middle European Interdisciplinary Master Programme in Cognitive Science (MEi:CogSci). Every student must spend one semester on exchange abroad at one of the partner universities depending on his/her research preferences.

Members of the consortium: University of Ljubljana, University of Vienna, Eötvös Loránd University Budapest, Comenius University in Bratislava.

**BOŽEN JOVANOSKI**

*Computer and Information Science Master's Student*

I find the Master's program at FRI to be exciting and challenging at the same time while providing students with great opportunities. There is a great balance between theoretical knowledge and practical skills that can be learned here.

I would highly recommend this program to anyone who is looking to advance in their academic career as well as for people more inclined to start working in the industry because FRI represents the best of both worlds.

# Applied Statistics

The interdisciplinary master's study programme in Applied Statistics is offered jointly with the Faculty of Electrical Engineering, Biotechnical Faculty, Faculty of Economics, Faculty of Mathematics and Physics, Faculty of Medicine, and Faculty of Social Sciences. The main goal of the programme is to educate experts in statistical theory and methods in a chosen area of application. Graduates of the programme will master statistical way of thinking and will be able to independently perform all aspects of relevant statistical analysis in a given field, e.g., planning a research, collecting data, choosing relevant methods and interpreting results. The programme offers six study modules: Biostatistics, Social Sience Statistics, Economic Statistics, Business Statistics, Technical Statistics, Official Statistics, Mathematical Statistics, and Machine Learning, of which the latter is held at the Faculty of Computer and Information Science.

Eligible for enrolment: All graduates of the academic bachelor study programmes (or programmes of same or higher level elsewhere) are eligible for the admission to the master study programme Applied statistics, regardless of their field of study.

The selection of candidates is made on the basis of Bachelor studies GPA.

Master´s Programme in Applied Statistics is held as a part-time study.

Detailed programme information is available at http://stat.uni-lj.si/en

# How to Apply?

## Enrolment Procedure

Students apply for studies via eVŠ web portal at http://portal.evs.gov.si/prijava. Application deadlines are in August and September and differ among study programmes.

Application process includes recognition of foreign education. Detailed information regarding application process is available in the call for enrolment.

## Tuition Fee

Fee is paid by students of non-EU countries, excluding persons granted international protection, applicants for international protection and persons from countries with which the Republic of Slovenia has concluded bilateral agreement (with Macedonia, Bosnia and Herzegovina, Serbia, Montenegro and Kosovo).

## Scholarships

Public Scholarship, Development, Disability and Maintenance Fund of the Republic of Slovenia offers scholarships for foreign nationals.

## Contact Information

*Study programmes at the Faculty of Computer and Information Science*

**Ms. Vesna Gračner**
international.office@fri.uni-lj.si
Phone: +386 1 479 8249

*Application process at the University of Ljubljana*

**Ms. Tanja Žužek**, tanja.zuzek@uni-lj.si
**Ms. Alenka Šuligoj**, alenka.suligoj@uni-lj.si

Phone: +386 1 241 85 05
www.vpis.uni-lj.si

# Useful Information

## Year Plus

During their first year at the University of Ljubljana international students may attend the Year Plus module which includes Slovenian language courses and is designed to help international students to adapt to the Slovenian system and culture.

If a student completes 30 ECTS credits (including Faculty of Computer and Information Science and/or Year Plus courses), which include at least 6 ECTS of Slovenian language courses, she is entitled for a Year Plus and can preserve her student status even if she does not fulfil Faculty's requirements for the enrolment in the second year of studies

## Student Life in Ljubljana

During their stay in Ljubljana all students are entitled to food and transport subventions. The price for a meal in a restaurant is 2-5€ and 20€ for a monthly bus ticket. International students should find a private room as there are no dormitories available for international students. The average price for a room is 150–250€. Living expenses (rent, food, public transport, books) in the Republic of Slovenia roughly amount to 500€ per month.

Students from EU countries and countries with which Slovenia has an agreement can enter without a visa and stay up to 90 days. They can apply for the residence permit in Slovenia. Non-EU students need a visa to enter the Republic of Slovenia.

# International Connections

A step into the unknown, an invaluable life experience, an opportunity for new acquaintances, expanding horizon, gaining new knowledge – all this and much more is within the reach of your hand with study exchange programmes. Students who fulfilled part of their study obligations abroad have diverse experience, but all agree that the semester spent abroad was one of the best in their life.
Students can opt for a student exchange or practical training through various international programmes. The Master's programme in Computer and Information Science in cooperation with the Technical University of Graz even provides double degree study and two diplomas, whereas the interdisciplinary study of Cognitive Science requires students to spend at least one semester abroad at one of the partner universities.
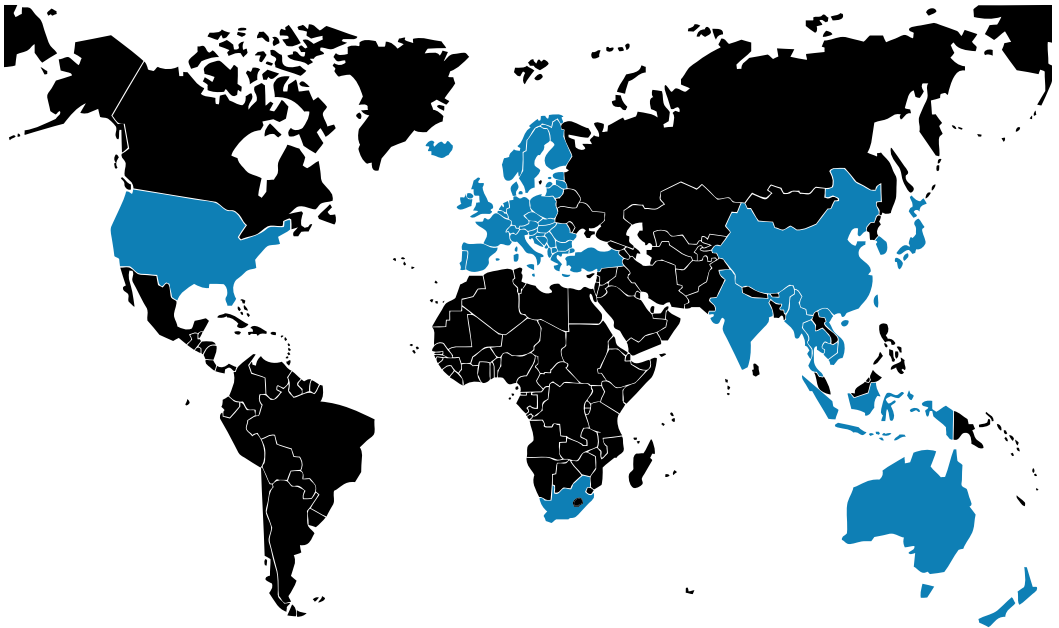
Map of the countries we collaborate with:

Albania • Australia • Austria • Belgium • Bosnia and Herzegovina • Bulgaria • Cambodia • China • Croatia • Czech Republic • Denmark • Estonia • Finland • France • Germany • Greece • Hungary • India • Indonesia • Ireland • Island • Italy • Japan • Kosovo • Latvia • Liechtenstein • Lithuania • Luxembourg • Malta • Montenegro • Myanmar • Netherlands • New Zeland • Norway • Poland • Portugal • Republic of Cyprus • Republic of Macedonia • Romania • Serbia • Slovakia • South Africa • South Korea • Spain • Sweden • Switzerland • Thailand • Turkey • United Kingdom • United States of America • Vietnam

## Elective Courses Taught by dr. Jure Leskovec from Stanford University

Bachelor and master university study gives students a special opportunity, because in the framework of general elective courses they can choose two courses taught by dr. Jure Leskovec at the prestigious Stanford University. These are *Analysis of Networks* and *Mining Massive Datasets*. The latter can be selected also by students of doctoral study.

The *Analysis of Networks* deals with the practical approaches to analysis and understanding extremely large (real) networks based on various models of their set-up and development. The *Mining Massive Datasets* studies the machine learning algorithms, allowing processing of a vast quantity of data and used to derive knowledge and laws from data.

### Dr. MARINKA ŽITNIK

The international exchange is an excellent opportunity for a student to expand his/her horizon, for networking with peers from other cultures, learning about new fields of research and in general establishing connections outside the comfortable domestic environment. During the study I made several research visits to the University of Toronto, the Imperial College in London, the Baylor College of Medicine in Houston, and Stanford University. The Faculty of Computer and Information Science has always offered me extremely sound support, for which I am grateful. In my case, the Bioinformatics Laboratory played a particularly important role. I started cooperating with it while still an undergraduate, as Prof. dr. Blaž Zupan opened the door for me to many research institutions. I believe that the exchanges have enriched my perspective of the world. I therefore always strive to share my experience and enthusiasm of research with the environment that I return to.

### DUŠAN KALANJ,
*Computer and Information Science Master's Graduate*

When I was leaving for the exchange in Denmark in the first year of my Master's study, I was not sure what to expect. I only wanted to experience independent life in a different environment. Six months later I realised that my wishes had been much too modest. I had the best experience of my life, which drastically changed my habits and my view of the future. I returned home with an insatiable appetite for life, craving new knowledge and experience. Now I make plans for the time until my departure for Erasmus practical training, because I realise that this could change everything.

# Career Path

According to Forbes magazine the number of tech employment opportunities is expected to increase by 12% by 2024, which will lead to more and more jobs becoming available to IT professionals. Tech positions in web development, data analysis, IT architecture, cybersecurity, AI, VR and AR, are expected to grow exponentially within the next year. Furthermore, European Commission estimates that by 2030 Europe will lack 2,400,000 experts in IT.

## Chief Information Officer

A chief information officer or CIO is responsible for the functioning of the information system according to the needs and goals of the business system. A CIO deals both with technology and organisation, human resources, and finance.

## System Architect

A system architect produces the information solution architecture tailored to the clients' wishes in terms of efficiency, expandability, transferability, connectivity, etc.

## Robotics Engineer

A robotics engineer develops robots for everyday use, for instance the iRobot Roomba, as well as specialised mobile robots for search under ruins, avalanches, and minefields.

## Artificial Intelligence Expert

This expert programmes computers to simulate human thinking. He/She develops search algorithms, speech commands, facial identification, fastest route calculation and medical diagnostics for new generations of advanced technologies.

## Development Manager

A development manager sees to the technological development of a company or organisation according to a long-term strategy. He/She coordinates development teams, creates new products and designs innovative solutions.

## E-Training Designer

An e-training designer uses the knowledge of modern technologies and the understanding of educational processes to develop and support e-learning, such as on-line courses, as well as designs didactic e-material for various platforms.

## Data Analyst

With the knowledge of data analysis and amoeba observation a data analyst can develop a new antibiotic, use the data on customers to double the profit or resolve the economic crisis with international banking transactions.

## ANDRAŽ TORI,
## founder and CTO at Zemanta

My passion for computers was the reason why I enroled in computer science studies. During my studies, I already used my computer skills in various ways - in the non-government sector, for activist and entrepreneurial purposes. It is important for students to get to know the great world out there, which is why at Zemanta we try to cooperate with the Faculty in order to open student's minds and subsequently their future opportunities. We cooperate in the University challange and in "in the Mud" lecture series. We started with "Up to our Ankles", continued with "Up to our Knees, Waists and Necks", while this year we are already "Over our Heads in (industrial) Mud". More is avalable at:
**http://meetup.com/vblatu**

## IZA LOGIN,
## co-founder of Outfit 7, the creator of Talking Friends

Samo and I created our first multimedia app for children while we were still students at FRI. At the time, this represented quite a technological challenge and was a lot of fun. Later on, our business path led us to different enterprises, where we gained skills in business and leadership. When Samo decided to create a mobile app company in 2009, he invited me, along with six of his colleagues. We decided to build entertaining apps for children, which had been my dream twenty years ago. The scope of our work has grown considerably and now also involves the development of various apps (cartoons, films, physical products, music and so on). For areas where we had no experience, we hired top experts from Slovenia and abroad.

# Doctoral Study Programmes

The Faculty of Computer and Information Science delivers a doctoral programme in Computer and Information Science. The study programme aims to deepen the student's knowledge of computer science and train them for research. We recommend it for students who intend to stay in academia and also others whose goal is to work in more demanding development and innovation computer science industries. The entire study programme is conducted in English language. In addition, the Faculty participates in the interdisciplinary study programme Biosciences, offered jointly with the Biotechnical Faculty, the Faculty of Electrical Engineering and the Faculty of Mechanical Engineering.
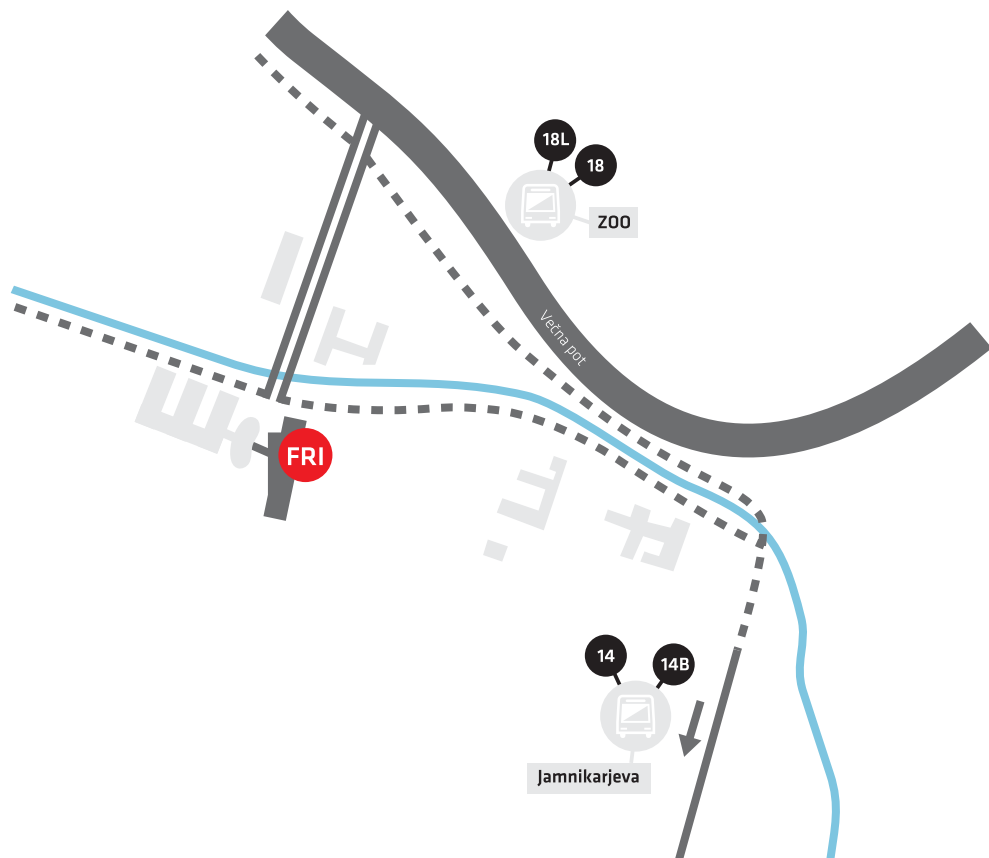
**RATKO PILIPOVIĆ,**
**doctoral student**

The curiosity, the enthusiasm, the desire for knowledge, that is what it takes to turn a good engineer into a brilliant researcher.  Challenges you will face in doctoral study aren't for light-hearted, but if you overcome them, great rewards are waiting for you. Every day in the doctoral study you will experience ups and downs through which you will become stronger and more independent researcher.  Evolving each day, bit by bit, you grow up and become a better and more fulfilling person as your research progresses. I am glad that  I have experienced all of it at the Faculty of Computer and Information Science. With a help of a friendly faculty staff and considerate professors, each day I am one more step closer to achieving my life goal: Doctorate in Computer Science.

The Faculty of Computer and Information Science of the University of Ljubljana is located in the South-West part of the city, in a pleasant green environment next to the Rožnik hill. The area has been evolving into a hub, connecting technology and natural science students and researchers.

The Faculty can be accessed by city bus routes nr. 14, 14B, 18 and 18L. Leading to the Faculty are also a nice bike and walking trail.