

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



**FIRST CYCLE PROFESSIONAL STUDY PROGRAMME  
COMPUTER AND INFORMATION SCIENCE**

**HANDBOOK**

for students enrolled for the first time in the first year in the 2023/2024 academic year

Ljubljana, 2023

# INFORMATION ABOUT THE STUDY PROGRAMME COMPUTER AND INFORMATION SCIENCE

## Main objectives of the programme

Computer and information science is one of the leading breakthrough areas that have been shaping today's economy, education, culture and other activities for several decades now. 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. The professional study programme is aimed principally at those with an interest in learning to solve practical problems in computer and information science. The programme is comparable to international standards and recommendations, taking into account the rapid development of computer science and new knowledge. In addition to providing a knowledge of all the fundamental subjects necessary for future engineers, the study programmes enable students to tailor their studies according to their own wishes, motivations and strengths, taking into account the various possibilities of professional specialisation. This is helped by the compulsory nine-week work assignment, which acquaints students with the needs of the commercial and public sectors and enables them once they become employed to be productively involved in the work of their selected company. The study programme accordingly provides future engineers with a sufficient professional basis, once they have completed this professional course of study, to be able to keep abreast of technical changes and continue their careers successfully at home as well as at an international level.

## General competences

Graduates will be able to resolve practical problems in the area of information technology. They acquire a complete set of competences that enables them to enter directly into a working environment:

- the capacity for critical, analytical and synthetic thinking,
- the capacity to understand and solve technical challenges,
- a knowledge of basic skills in computer science and information technology, including theoretical foundations and practical skills,
- the ability to independently perform less demanding and complex developmental engineering tasks in individual specialised fields and independently solve specific well-defined tasks in other areas of computer and information science,
- the ability to transfer specific computer skills to relevant fields,
- a qualification for group work and the ability to head small groups,
- the ability to become rapidly and productively involved in the working process at a future employer,
- a knowledge of sources of information and their application in professional work,
- the ability to communicate on a professional level in the native language and in one foreign language,
- a knowledge of professional responsibility and understanding of ethics at work,
- sufficient training in the fields of computer science and information technology to enable further study in second-cycle programmes.

## Subject-specific competences

- a knowledge of the operating principles of hardware and software, networks, programming languages and applications,
- a knowledge of programming constructs and databases and their effective application to solve problems in the real world,
- the ability to analyse a problem and create appropriate algorithm solutions,
- a knowledge of the appropriate programmer approaches and the capacity to distinguish between poorer and better solutions,

- a knowledge of the mathematical language for consistent and accurate description of phenomena and an understanding of the relationship between a theoretical model and its implementation in various fields of computer science,
- an understanding of the functioning of multifaceted systems of modern communication and their use,
- an awareness of security and insecurity in a network environment and the use of basic security mechanisms,
- a knowledge of the basic business functions and organisation of the selected company (practical assignment).

### Admission requirements

Enrolment in the professional study programme Computer and Information Science is open to students who:

- have completed the final examination in any four-year secondary school programme,
- have passed the vocational matura or general matura.

### Selection criteria for limited enrolment

In the event of a decision limiting enrolment, candidates will be selected depending on:

- the GPA in the final examination, vocational matura or matura examination, 60 points,
- the GPA of years 3 and 4 of secondary school, 35 points,
- grades in mathematics in years 3 and 4 of secondary school, 5 points.

### Criteria for recognising knowledge and skills acquired prior to enrolment

The study programme enables the recognition of relevant knowledge in the field acquired through formal, non-formal or experiential learning. The basis for recognition is the [Rules on the procedure and criteria for recognising non-formally acquired knowledge and skills](#). This type of knowledge can be recognised as part of the completed study requirements, at up to 6 ECTS for one set (the approximate study programme covered in one course) of knowledge acquired outside the Faculty. In the recognition process certificates and other documents are taken into account. Requests for recognition of acquired knowledge will be considered by FRI's Committee for Study Affairs.

### Assessment methods

The methods of assessment comply with the [UL Statutes](#) and are set out in the curriculums.

### Requirements for progression through the course

Students who have completed course units consisting of 53 credit points may enrol in the second year.

Students who have completed all the requirements of the first year and course units consisting of 53 credits in the second year may enrol in the third year.

### Requirements for retaking a year

To retake a year, students must complete the following:

- a) at least half of the requirements from the study programme of that year (30 ECTS),
- b) all exams from the years before.

Students can only retake a year once in their course of study; changing programme is also considered retaking a year,

because of the uncompleted requirements of the previous study programme.

### Counselling and guidance during study

During the period of study the Career Centre at the Faculty of Computer and Information Science and tutors will be in direct contact with students, guiding their development, exercising concern for their academic success, motivating them towards personal advancement in the profession, and helping and advising them in resolving possible difficulties, problems and crises that can impede students during

their course. If they encounter difficulties, students can also turn to the Career Centre of the University of Ljubljana.

#### Requirements for 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 relating to compulsory subjects of the second study programme. Transferring from other programmes is possible after the first year of study.

The requirements for transferring to the first-cycle professional study programme Computer and Information Science from other programmes (academic and professional) are:

- completed requirements for enrolment in the programme,
- at least an equivalent curriculum to Mathematics and Programming 1 in the study programme they are being transferred from (the recognised courses must have at least the same number of credits as the aforementioned subjects),
- the appropriate faculty authority defines, on the basis of a comparison of the two 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.

#### Requirements for completing the study programme

The requirements for completion of the programme are the passing of all exams and other requirements, including the diploma seminar, in a total of 180 ECTS.

#### Requirements for completing individual parts of the programme if the programme contains them

The study programme contains no parts that can be completed individually. The programme is integral.

#### Professional or academic title (male)

- diplomirani inženir računalništva in informatike (VS)

#### Professional or academic title (female)

- diplomirana inženirka računalništva in informatike (VS)

#### Professional or academic title (abbreviated)

- dipl. inž. rač. in inf. (VS)

## STUDY PROGRAMME CURRICULUM COMPUTER AND INFORMATION SCIENCE

2023/2024

|                                 |   |
|---------------------------------|---|
| Name of study programme         | <b>Computer and information science</b>   |
| Programme characteristics       |   |
| Type                            | higher professional   |
| Cycle                           | bachelor  |
| University of Ljubljana members | Faculty of Computer and Information Science, Večna pot 113, 1000 Ljubljana, Slovenija |

### Year 1

|    | University Course Code | Course title                     | Lecturers        | Contact hours |         |           |                    |                      | Individual student work | Total hours | ECTS | Semesters    | Elective |
|----|------------------------|----------------------------------|------------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|    |                        |                                  |                  | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study |                         |             |      |              |          |
| 1. | 0039655                | Introduction to Computer Science | Vlado Stankovski | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 2. | 0039651                | Programming 1                    | Janez Demšar     | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 3. | 0039653                | Computer Architecture            | Robert Rozman    | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 4. | 0039647                | Mathematics                      | Polona Oblak     | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 5. | 0039646                | Discrete Structures              | Gašper Fijavž    | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 6. | 0039652                | Programming 2                    | Tomaž Dobravec   | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 2nd semester | no       |

|       |         |  |                    |     |   |     |   |   |      |      |    |              |    |
|-------|---------|--|--------------------|-----|---|-----|---|---|------|------|----|--------------|----|
| 7.    | 0039650 | Databases                                  | Matjaž Kukar       | 45  |   | 30  |   |   | 105  | 180  | 6  | 2nd semester | no |
| 8.    | 0039654 | Computer Communications                    | Mojca Ciglarič     | 45  |   | 30  |   |   | 105  | 180  | 6  | 2nd semester | no |
| 9.    | 0039648 | Operating Systems                          | Peter Peer         | 45  |   | 30  |   |   | 105  | 180  | 6  | 2nd semester | no |
| 10.   | 0039649 | Introduction to Probability and Statistics | Aleksandar Jurišić | 45  |   | 30  |   |   | 105  | 180  | 6  | 2nd semester | no |
| Total |         |  |                    | 450 | 0 | 300 | 0 | 0 | 1050 | 1800 | 60 |              |    |

## Year 2

|       |                        |                                  |                | Contact hours |         |           |                    |                      |                         |             |      |              |          |
|-------|------------------------|----------------------------------|----------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|       | University Course Code | Course title                     | Lecturers      | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study | Individual student work | Total hours | ECTS | Semesters    | Elective |
| 1.    | 0070031                | Algorithms and Data Structures I | Jurij Mihelič  | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 2.    | 0070034                | General elective courses         |                | 180           |         | 120       |                    |                      | 420                     | 720         | 24   | 1st semester | yes      |
| 3.    | 0070032                | Algorithms and Data Structures 2 | Andrej Brodnik | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 2nd semester | no       |
| 4.    | 0070035                | General elective courses         |                | 135           |         | 90        |                    |                      | 315                     | 540         | 18   | 2nd semester | yes      |
| 5.    | 0069530                | Specialist elective course       |                | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 2nd semester | yes      |
| Total |                        |                                  |                | 450           | 0       | 300       | 0                  | 0                    | 1050                    | 1800        | 60   |              |          |

## Year 2, Professional Elective Courses

|     |                        |   |                                   | Contact hours |         |           |                    |                      |                         |             |      |              |          |
|-----|------------------------|---|-----------------------------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|     | University Course Code | Course title                                  | Lecturers                         | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study | Individual student work | Total hours | ECTS | Semesters    | Elective |
| 1.  | 0039664                | Electronic and Mobile Business                | Rok Rupnik                        | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 2.  | 0039674                | Databases 2                                   | Aljaž Zrnec                       | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 3.  | 0039666                | Information Systems                           | Damjan Vavpotič                   | 45            | 10      | 20        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 4.  | 0039665                | Graphic Design                                | Iztok Lebar Bajec, Narvika Bovcon | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 5.  | 0039670                | Communications Protocols and Network Security | Andrej Brodnik                    | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 6.  | 0039673                | Computer Organisation                         | Robert Rozman                     | 45            | 6       | 24        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 7.  | 0039662                | Digital Circuits                              | izr. prof. dr. Miha Moškon        | 45            | 10      | 20        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 8.  | 0039681                | Computer Graphics                             | Iztok Lebar Bajec                 | 45            | 15      | 15        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 9.  | 0039692                | Artificial Intelligence                       | Igor Kononenko                    | 45            | 6       | 24        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 10. | 0039693                | User Interfaces                               | Aleš Smrdel                       | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 2nd semester | yes      |

|     |         |  |                            |    |    |    |  |  |     |     |   |                               |     |
|-----|---------|--|----------------------------|----|----|----|--|--|-----|-----|---|-------------------------------|-----|
| 11. | 0039678 | Compilers and Virtual Machines             | Boštjan Slivnik            | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 12. | 0039691 | Testing and Quality                        | Igor Rožanc                | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 13. | 0039684 | Information Systems Development            | Damjan Vavpotič            | 45 | 10 | 20 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 14. | 0039679 | Multimedia Content Production              | Borut Batagelj             | 45 | 10 | 20 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 15. | 0039663 | Digital Signal Processing                  | Franc Jager                | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 16. | 0039686 | Web Technologies                           | Aleš Smrdel                | 45 | 10 | 20 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 17. | 0039694 | Input-Output Systems                       | Robert Rozman              | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 18. | 0039672 | Digital Logic Design                       | izr. prof. dr. Miha Moškon | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 19. | 0039675 | Data Mining                                | Tomaž Curk                 | 45 | 10 | 20 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 20. | 0041950 | The C Programming language                 | Tomaž Dobravec             | 15 |    | 45 |  |  | 30  | 90  | 3 | 1st semester                  | yes |
| 21. | 0039689 | Computer Science Skills                    | David Modic                | 15 |    | 45 |  |  | 30  | 90  | 3 | 1st semester,<br>2nd semester | yes |
| 22. | 0039690 | Computer Science Skills 2                  | David Modic                | 15 |    | 45 |  |  | 30  | 90  | 3 | 1st semester,<br>2nd semester | yes |
| 23. | 0041949 | Topics in Computer and Information Science |                            | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 24. | 0643540 | IT law                                     | Karmen Lutman              | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |
| 25. | 0643424 | Organisation Security                      | David Modic                | 45 | 30 |    |  |  | 105 | 180 | 6 | 1st semester                  | yes |
| 26. | 0643448 | Software Security                          | Matevž Pesek               | 45 |    | 30 |  |  | 105 | 180 | 6 | 2nd semester                  | yes |



|       |         |               |             |      |     |     |   |   |      |      |     |              |     |
|-------|---------|---------------|-------------|------|-----|-----|---|---|------|------|-----|--------------|-----|
| 27.   | 0643450 | Data Security | Denis Trček | 45   |     | 30  |   |   | 105  | 180  | 6   | 1st semester | yes |
| Total |         |               |             | 1125 | 117 | 738 | 0 | 0 | 2610 | 4590 | 153 |              |     |

### Year 3

|       |                        |                            |              | Contact hours |         |           |                    |                      |                         |             |      |              |          |
|-------|------------------------|----------------------------|--------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|       | University Course Code | Course title               | Lecturers    | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study | Individual student work | Total hours | ECTS | Semesters    | Elective |
| 1.    | 0070037                | Software Engineering       | Igor Rožanc  | 45            | 20      | 10        |                    |                      | 105                     | 180         | 6    | 1st semester | no       |
| 2.    | 0070034                | General elective courses   |              | 180           |         | 120       |                    |                      | 420                     | 720         | 24   | 1st semester | yes      |
| 3.    | 0070039                | Industrial Practice        |              |               |         |           |                    | 225                  | 315                     | 540         | 18   | 2nd semester | no       |
| 4.    | 0070038                | Diploma seminar            | Franc Solina | 45            | 10      | 5         |                    |                      | 120                     | 180         | 6    | 2nd semester | no       |
| 5.    | 0069530                | Specialist elective course |              | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 2nd semester | yes      |
| Total |                        |                            |              | 315           | 30      | 165       | 0                  | 225                  | 1065                    | 1800        | 60   |              |          |

### Year 3, Professional Elective Courses

|    |                        |                         |               | Contact hours |         |           |                    |                      |                         |             |      |              |          |
|----|------------------------|-------------------------|---------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|    | University Course Code | Course title            | Lecturers     | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study | Individual student work | Total hours | ECTS | Semesters    | Elective |
| 1. | 0039710                | IT Governance           | Rok Rupnik    | 45            |         | 30        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |
| 2. | 0039706                | Multimedia Technologies | Alenka Kavčič | 45            | 10      | 20        |                    |                      | 105                     | 180         | 6    | 1st semester | yes      |

|       |         |   |                       |     |    |     |   |   |      |      |    |              |     |
|-------|---------|---|-----------------------|-----|----|-----|---|---|------|------|----|--------------|-----|
| 3.    | 0039725 | Parallel and Distributed Systems and Algorithms | Patricio Bulić        | 45  | 10 | 20  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 4.    | 0039718 | System Software                                 | Branko Šter           | 45  |    | 30  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 5.    | 0039712 | Process Automation                              | Nejc Ilc, Uroš Lotrič | 45  | 10 | 20  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 6.    | 0039724 | Embedded Systems                                | Patricio Bulić        | 45  | 10 | 20  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 7.    | 0039717 | Robotics and Machine Perception                 | Danijel Skočaj        | 45  |    | 30  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 8.    | 0039721 | Game Technology and Virtual Reality             | Peter Peer            | 45  |    | 30  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 9.    | 0039708 | Decision Systems                                | Aleksander Sadikov    | 45  | 10 | 20  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 10.   | 0039707 | Numerical Methods                               | Aljaž Zalar           | 45  |    | 30  |   |   | 105  | 180  | 6  | 1st semester | yes |
| 11.   | 0643451 | Programming of Energy-Constrained Devices       | Veljko Pejović        | 45  | 15 | 15  |   |   | 105  | 180  | 6  | 1st semester | yes |
| Total |         |   |                       | 495 | 65 | 265 | 0 | 0 | 1155 | 1980 | 66 |              |     |

#### Year 2 and Year 3, General Elective Courses

|    |                        |                  |                    | Contact hours |         |           |                    |                      |                         |             |      |              |          |
|----|------------------------|------------------|--------------------|---------------|---------|-----------|--------------------|----------------------|-------------------------|-------------|------|--------------|----------|
|    | University Course Code | Course title     | Lecturers          | Lectures      | Seminar | Tutorials | Clinical tutorials | Other forms of study | Individual student work | Total hours | ECTS | Semesters    | Elective |
| 1. | 0041962                | English, level A | Nina Bishop Bostič | 30            |         | 15        |                    |                      | 45                      | 90          | 3    | 2nd semester | yes      |
| 2. | 0041963                | English, level B | Nina Bishop Bostič | 30            |         | 15        |                    |                      | 45                      | 90          | 3    | 1st semester | yes      |

|       |         |                                       |                       |     |   |     |   |    |     |     |    |                               |     |
|-------|---------|---------------------------------------|-----------------------|-----|---|-----|---|----|-----|-----|----|-------------------------------|-----|
| 3.    | 0041964 | English, level C                      | Nina Bishop<br>Bostič | 30  |   | 15  |   |    | 45  | 90  | 3  | 2nd semester                  | yes |
| 4.    | 0041965 | Computer<br>Science in<br>Practice I  | Slavko<br>Žitnik      | 5   |   |     |   | 40 | 45  | 90  | 3  | 1st semester,<br>2nd semester | yes |
| 5.    | 0041966 | Computer<br>Science in<br>Practice II | Slavko<br>Žitnik      | 5   |   |     |   | 40 | 45  | 90  | 3  | 1st semester,<br>2nd semester | yes |
| 6.    | 0041967 | Physical<br>education                 | Saša<br>Ogrizović     |     |   | 30  |   |    | 60  | 90  | 3  | 1st semester                  | yes |
| 7.    | 0096887 | Use of IT for<br>study                | Damjan<br>Vavpotič    | 30  |   | 15  |   |    | 45  | 90  | 3  | 1st semester,<br>2nd semester | yes |
| 8.    | 0643375 | Physical<br>education 2               | Saša<br>Ogrizović     | 5   |   | 30  |   |    | 55  | 90  | 3  | 2nd semester                  | yes |
| Total |         |                                       |                       | 135 | 0 | 120 | 0 | 80 | 385 | 720 | 24 |                               |     |