

# Bachelor's Programme (BSc) in Computer Science Engineering

## Head of the programme

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This study guide is for those Computer Science Engineering BSc students who started their studies after September 1, 2017.

## The Structure of the Programme

**The length of the study programme:** 7 semesters, full-time course. Graduate students attain a BSc in Computer Science Engineering.

- level of education: *BSc*
- qualification: *Computer Science Engineer*
- field of studies: informatics

The program is available in dual and non-dual forms as well.

### Specializations

- Industrial Informatics
- Mobile and Web Application Development
- Network Security and Operation

The computer science engineering BSc programme is the ideal study programme for those who are interested in computers as well as the structure and operation of IT systems; software development and maintenance. We also recommend this study programme for those who are willing to plan, deploy, and operate computer networks. Besides, it will be also interesting for those students who are fascinated by industrial applications, for instance industrial robot programming, development of industrial information systems, and application of artificial intelligence. Finally, it is the right choice for those who would like to learn professional web, desktop, and mobile app development as well as apply modern and up-to-date technologies on individual and corporate levels.

## Academic Objectives

The objective of the programme is to train and educate engineers who can install, exploit, and maintain information technology-based systems and services including the design and

development of the necessary software systems as well. The graduates can progress into a Master of Science Degree Programme in Computer Science Engineering and/or are prepared to embark upon a professional career in the field.

Graduated computer science engineers possess the professional knowledge in science, technology, economics, and soft skills, and after having completed the mandatory internship become proficient in information technology and computer science, which qualifies them to solve information technology tasks in the following fields:

- design, development, and creation of technical constructions, in particular information infrastructure systems and services that require knowledge of technical information technology techniques,
- solving average complexity technical development tasks in the field of information technology and automation,
- developing mobile and web applications.

For further education the total number of study credits will be counted in the MSc degree programme in computer science and computer science engineering. The BSc degree can be considered in other MSc degree programmes as well. More information about it can be found in the description of the respective MSc degree programmes.

After graduating in the MSc programme there is a possibility to continue to obtain the PhD degree in information science.

## **Admission Requirements**

High school graduation examination requirements:

An intermediate or an advanced school graduation exam in mathematics and

an intermediate or an advanced school graduation exam in physics

or an intermediate or an advanced school graduation exam in informatics

or a sectoral professional school graduation exam:

An intermediate or an advanced final exam in IT skills or an intermediate or an advanced final exam in electrical industrial and electronic skills.

or an exam certificate in a professional preliminary course: an intermediate or an advanced final exam in basic electronics or an intermediate or an advanced final exam in basic IT skills

## **Specificities of the Programme**

The disciplines leading to the qualification, the fields of expertise from which the degree is built:

- Courses in Economic and Human Sciences Skills 17 credits,
- Foundation Courses in Natural Sciences: 40 credits,
- Core Courses: 83 credits,
- Differentiated Professional Proficiency (specialization): 39 credits,
- Optional Courses: 10 credits,
- Professional English: 6 credits,
- Final Thesis: 15 credits.

Requirements of foreign language competence: in order to obtain a BSc degree one state-accredited foreign language exam certificate is required.

## Courses

Economic and Human Skills (credits to be fulfilled: 17)

Course	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Economics		e	4	1	1	0	1
Management		e	4	2	1	0	3
Basics of Law		e	4	1	1	0	6
Business Economics		e	4	1	1	0	6
Soft Skills 1		tm	1	0	1	0	3

Science (credits to be fulfilled: 40)

Course	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Mathematics for Computer Science 1		tm	5	2	2	0	1
Basic Mathematics		s	0	0	2	0	1
Calculus 1		tm	5	2	2	0	1
Physics		e	5	2	2	0	1
Electricity		e	5	2	2	0	2
Calculus 2	Calculus 1, Basic Mathematics	e	5	2	2	0	2
Algorithms and Data Structures		e	5	2	0	2	2
Probability and Statistics	Calculus 2	tm	5	2	2	0	3
Mathematics for Computer Science 2	Mathematics for Computer Science 1 Calculus 1	e	5	0	2	2	4

Courses of the Core Programme (credits to be fulfilled: 83)

Course	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Digital Electronics 1		e	3	2	2	0	1
Computer Networking Fundamentals		e	5	2	0	2	1
Programming 1		tm	4	2	0	2	1

Course	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Digital Electronics II.	Digital Electronics I.	tm	2	0	0	2	2
Introduction to Microprocessor Systems	Digital Electronics I.	tm	4	2	2	0	2
Programming II.	Programming I.	tm	4	2	0	2	2
Computer Architectures I.	Digital Electronics I.	e	5	2	0	2	2
Databases		e	4	2	0	2	3
Signals and Systems	Electricity, Physics	e	4	2	2	0	3
Operating Systems	Computer Architectures I.	e	4	2	0	2	3
Programming Paradigms and Techniques	Programming I., Algorithms and Data Structures	tm	5	2	0	2	3
Database Systems	Databases, Programming I.	tm	4	2	0	2	4
Introduction to Information System Security		e	3	2	0	0	4
Linear Control Systems	Signals and Systems	e	4	2	2	0	4
Enterprise Resource Planning Systems 1	Databases	tm	4	2	0	2	4
Visual Programming	Programming Paradigms and Techniques	tm	5	2	0	2	4
Web Programming 1	Programming I.	tm	5	2	0	2	4
Advanced Programming Techniques	Programming Paradigms and Techniques	tm	4	2	0	2	5
Software Engineering	Programming Paradigms and Techniques	e	5	2	0	2	5
IT Project		tm	5	0	0	1	6

## Specializations

*Students who earned at least 100 credits can choose one out of the following specializations at the end of the 4<sup>th</sup> semester.*

### Network Security and Operation Specialization

Credits to be fulfilled: 39 credits

Head of the Specialization: Csaba Fábíán PhD, professor

Students will learn questions related to the security of computer networks and get acquainted with recent technologies. They get acquainted with regular components of computer networks and technologies of network building, and with the installation/configuration of software tools used in network management. They get acquainted with methods of operating/administering computer networks and learn questions of IT service management. They learn about the technologies of cloud computing.

Course	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Network Administration 1	100 cr	tm	5	2	0	2	5
Network Security	100 cr	tm	5	2	0	2	5
Network Configuration and Management	Computer Networking Fundamentals + 100 cr	tm	5	2	0	2	5
Enterprise Resource Planning Systems 2	Enterprise Resource Planning Systems 2 + 100 cr	tm	4	2	0	2	5
Cloud based Services	100 cr	tm	5	2	0	2	5
Network Administration 2	100 cr	tm	5	2	0	2	6
Ethical Hacking	100 cr	tm	5	2	0	2	6
IT Service Management	100 cr	tm	5	2	0	2	6

### Industrial Informatics Specialization

Credits to be fulfilled: 39

The lecturer in charge of the specialization: István Pintér PhD, professor

The students of the Specialization get competence in design, realization, control, operation, and application technology of basic system components of autonomous industrial information systems, moreover in the area of development, design, operation, and control of industrial robots and robot systems.

Courses	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Computer Architectures 2	Computer Architectures 1 + 100 cr	tm	5	2	0	2	5
Industrial Robotics 1	Calculus 1 + 100 cr	tm	5	2	0	2	5
Electronics	Signals and Systems + 100 cr	e	4	2	0	2	5

Courses	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Development of Microcontroller Based Systems	Introduction to Microprocessor Systems +100 cr	tm	5	2	0	2	5
Industrial Information Systems	Signals and Systems + 100 cr	tm	5	2	0	2	5
Industrial Image Processing	Calculus 2 +100 cr	tm	5	2	0	2	6
Digital Signal Processing	Calculus 2 +100 cr	tm	5	2	0	2	6
Industrial Robotics 2	Industrial Robotics 1 + 100 cr	tm	5	2	0	2	6

### Mobile and Web Application Development

Credits to be fulfilled: 39

Head of the Specialization: Kálmán Bolla PhD, associate professor

During the specialization the students learn the basic fundamentals of mobile and web development, smartphones, tablets, and other mobile devices as well as development opportunities of web applications. In addition, the aim is to learn artificial intelligence, game development, and acquire skills in the field of programming and to specialize and deepen existing knowledge.

Courses	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Java Applications	Programming Paradigms and Techniques + 100 cr	tm	5	2	0	2	5
Server-Side Applications	100 cr	tm	5	2	0	2	5
Developing Mobile Applications 1	100 cr	tm	5	2	0	2	5
Introduction to Artificial Intelligence	Web Programming 1 + 100 cr	tm	4	2	0	2	5
Web Programming 2	Java Applications + 100 cr	tm	5	2	0	2	5
Developing Mobile Applications 2	Introduction to Artificial Intelligence + 100 cr	tm	5	2	0	2	6
Game Development	Web Programming 1 + 100 cr	tm	5	2	0	2	6

Courses	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Application Development Using Web Technologies	Web Programming 1	tm	5	2	0	2	6

### Other courses

Courses	Precondition	Ev.	Cr.	Lec.	Sem.	L	Semester
Physical Education 1		s	0	0	2	0	3
Physical Education 2		s	0	0	2	0	4
English for Computer Science 1		tm	3	0	2	0	2
English for Computer Science 2		tm	3	0	2	0	3
Optional courses			10				
Mandatory Internship (8 weeks=320 hours)	100 cr	s	0				7
Final Thesis	170 credits	s	15			1	7

### Acronyms

cr	Credit point
Ev.	Evaluation method (s, tm, e)
tm	term mark
e	Exam
s	Instructor's signature
Lec.	Weekly hours of lectures
Sem.	Weekly hours of seminars
L	Weekly hours of labs

The Student Service Center at the University helps students with difficulties with various programmes and trainings, if necessary, by providing mentors. Considering student and teacher and external industry feedback, the content and requirements of individual courses can change regularly. The teachers constantly monitor the performance of the students and hold helpful consultations in problematic cases. Besides, there are possibilities of engaging in scientific work, students with outstanding performance will also have the opportunity to join a lecturer or a professor for advanced studies or a scientific workshop.

### Mandatory Internship

The duration of required Mandatory Internship is 8 weeks, 320 hours. The precondition of fulfilment is to have 100 credits.

In correspondence classes, if the student can verify six-month employment at the given field, exculpation can be given. In this case completion of a predetermined project task – in consultation with a consultant - is required to complete the course.

The practice companies are accepted by the institution, by taking the quality principles of programme into the consideration. The Mandatory Internship can be fulfilled at partner companies, institutions, professional organization, enterprises and practice situated at the University. At the end of the internship students have to submit a report to the university.

### **General rules of the evaluation and examination:**

Assessment of the student's performance:

- (1) If the assessment scale of the student's performance has five grades:
  - a) 86 – 100 % excellent (5),
  - b) 76 – 85 % good (4),
  - c) 61 – 75% satisfactory (3),
  - d) 50 – 60 % sufficient (2),
  - e) under 50 % insufficient (1)
  
- (2) If the assessment scale of the student's performance has three grades:
  - a) 76 - 100 % excellent (5),
  - b) 50 - 75 % satisfactory (3),
  - c) under 50 % insufficient (1)

The method of the evaluation and examination

- (1) The methods of assessment of students' abilities and skills are determined by the curriculum, the content requirements, and competences to be developed are determined by the course descriptions. They can be found in the NEPTUN electronic study system.
- (2) The methods of assessment of proficiencies are as follows:
  - a) Continuous evaluation (term mark)
  - b) Exam
  - c) Instructor's signature
- (3) The requirements of the continuously evaluated course for the full-time students have to be completed in the term-time. A failed practical course mark cannot be improved. The continuous evaluation has a five-grade assessment.
- (4) The exam is about summarizing the semester curriculum in a written or oral exam. The assessment reflects the student's level of competence and the ability of learning the additional curriculum of the other courses based on the given course. The assessment of the exam has a five-grade rating. The performance of the student during the semester can be counted into the exam mark.

Link to the Study and Exam Regulations:

<http://www.uni-neumann.hu/szabalyzatok>

### **Final thesis**

The thesis is the creative elaboration of a professional computer science engineering task in written form. It is a result of the individual work of the student carried out under the guidance of a supervisor. The student chooses a supervisor and proposes a thesis topic at the end of the 6th semester. The topic has to be approved by the supervisor and the head of the department of the supervisor. The student registers for the thesis course in the 7th semester.



## **Final Examination**

The Final Examination consists of three parts:

- Defence of the thesis.
- Elaboration of a question related to the topic Databases and Network Technologies. This topic covers selected materials from the courses Databases 1, Databases 2 and Computer Networks 1.
- Elaboration of a question related to the topic Computer Architectures and Operating Systems. This topic covers selected materials from the courses Computer Architectures 1 and Operating Systems.

The preconditions of participating in the final examination:

- obtaining the final certificate (pre-degree certificate stating that all course-units have been completed),
- submitted and accepted final thesis,
- application for the final examination.

The result of the final examination is the mathematical average of the results of the final thesis and the final exam mark on the given topic.