

# **Master of Science program in Construction Information Technology Engineering**

## **1. Name of the Master of Science program**

Construction Information Technology Engineering

## **2. Providing the name of level and qualification in the diploma**

- the level of qualification: master (MSc),
- qualification: Construction Information Technology Engineer,
- the Hungarian name of qualification: építmény-informatikai mérnök.

## **3. Field of training**

Technical education

## **4. Accepted prerequisites for entering the Master program**

**4.1. By taking total credit value into account:** civil engineering, architectural engineering, mechanical engineering, energy engineering, mechatronics engineering, electrical engineering, computer science engineering BSc study level.

**4.2. By taking the specified credits under 9.3. into account:** diploma of BSc or MSc or programs according to act LXXX of 1993 on Higher Education, which are accepted by the Faculty Committee on Credit Management (based on the knowledge of the program).

## **5. Duration of the program:** 3 semesters

## **6. Number of credits required for the Master of Science degree:** 90 credits

- orientation of the program: practice-oriented (60-70%),
- credit requirements for the thesis: 20 credits,
- minimum number of credits assigned to elective subjects: 5 credits.

## **7. Based on the uniform classification system for fields of training, the program is coded:** 0732.

## **8. Objectives of the Master of Science program and professional competencies**

The objective of the program is to train Construction Information Technology Engineers who, after having acquired the appropriate practice, are capable of independently performing construction information, information technology (IT), IT technical development, management, project management tasks related to civil-, architectural-, mechanical-, electrical engineering using cutting edge IT systems. In addition, they are able to design, build and expertise information systems for complex and specialised engineering facilities. Graduates are prepared to continue their studies in PhD program.

## **8.1. Professional areas of competence to cover**

### **The Construction Information Technology Engineer's**

#### **a) knowledge**

- Knows the general principles, rules and methods of mathematics, natural sciences and information technology required to practice engineering tasks related to construction, facility design and implementation.
- Has fundamental knowledge in the areas of construction, design and implementation of facilities in order to perform design, construction, maintenance, operation, entrepreneurship and authority tasks.
- Has knowledge in 3D modeling of built structures.
- Knows the concepts, procedures, tools, fields of applications and limitations of building information modelling.
- Knows the fundamental organizational and motivational factors and methods for company management and the legal background for exercise of profession.
- Knows and understands information and communication technologies required for the design and construction of facilities.
- Knows and understands the terminology, fundamentals and aspects of other connecting areas to the technical field, especially in the fields of environmental protection, quality assurance, law, economics and management.
- Has the necessary information technology knowledge to develop technical systems and process automation.
- Has in-depth knowledge of software development, computer graphics and image processing, smart systems and databases within the information technology profession.
- Understands the types and capabilities of other information technology tools related to construction.
- Knows the interaction between humans and the built environment.
- Knows advanced principles and typical solutions for energy-efficient and environmentally friendly construction.

#### **b) skills**

- Is able to apply the necessary principles of natural sciences and information technology in the design and construction of structures.
- Selects and effectively applies the appropriate information technology tools to design facilities.
- Designs a particular trade's part of the building information model of a building or facility.
- Produces a 3D model of a building or a structural element.
- Applies and develops processes, models and information technologies used by various trades in the design, construction, and operation of facilities.
- Applies effectively the information and communication technologies required for the design and construction of facilities.
- Applies integrated knowledge, contributes to solving multidisciplinary problems.
- Is able to plan and manage the technical, economic, environmental and human resources integrated.
- Is able to collaborate with experts from different trades, understands their points of view, and able to provide appropriate technical solutions to emerging problems.

- Is able to provide both approximate and accurate estimation of the expected costs, feasibility, technical performance, aesthetic, functional and social values and impact of a planned facility.
- Is able to carefully evaluate and apply new products, structures, technologies.

### **c) attitudes**

- Is open to solve the tasks individually and cooperate with other participants of the project.
- Strives to design effective and sustainably operating building information model.
- Uses the system-based approach for her/his thinking to select an appropriate technical solution which can automatically operate in the long-term and communicate with other IT systems.
- Is willing to acquire the ability of self-learning and self-development.
- Is open to apply new IT tools, methods and procedures related to a particular field.
- Investigates and strives to achieve research, development and innovative goals concerning the given study or work.
- Strives to fulfil sustainable and energy-efficient demands.
- Is committed to observe relevant requirements of safety, health protection, environmental protection, quality assurance and control.
- Is open to apply new, up-to-date and innovative methods and procedures related to the sustainable construction.
- Strives to improve her/his knowledge through continuous learning.

### **d) autonomy and responsibility**

- Makes responsible professional decisions concerning the design, construction, maintenance, operation, entrepreneurship and authority tasks of structures.
- Is willing to initiate solving engineering and IT problems of structures.
- Gets informed on the changes and the latest developments of legal background, technical and administrative solutions of the relevant engineering field.
- Gets informed on the latest trends associated with the built environment required by the economy.
- Has a sense of responsibility that corresponds to sustainability, occupational safety and health, environmental protection. Encourages her/his professional team and employees to practice ethically and responsibly.
- Takes responsibility for her/his decisions and work as well as for those of the professional team under their supervision.

## **9. Features of the MSc course**

### **9.1. Technical features**

9.1.1. Professional disciplines and fields of expertise for the aimed qualifications that build up the MSc specialization:

- knowledge in natural sciences, mathematics and informatics 10-20 credits;
- knowledge in economics and humanities 7-13 credits;
- knowledge in construction information technology 15-25 credits.

9.1.2. Specific skills can be obtained in the professional fields that are demanded by the construction information technology practice. The acquirement of the specific skills of the course can also be accomplished by means of cooperative training. The minimum credits of the elective subjects, including the thesis, are 35-55 credits.

## **9.2. Requirements regarding knowledge of foreign languages**

In order to obtain the MSc degree, an upper-intermediate level (B2), complex, certified language exam recognised by the state is required, or an equivalent school maturity certificate or certificate of any modern foreign language is required, on the stipulation that if this language is not English, then along with the previously mentioned certificate, an intermediate level (B1), complex, certified language exam recognised by the state is required.

## **9.3. Minimal terms of entering the MSc course for those who have a certificate given in the 4.2. section**

The terms of enrolment to the MSc course are that the applicant has to possess from his/her BSc studies at least 30 credits out of the hereunder stated 60 credits:

- knowledge from the fields of natural sciences and mathematics (mathematics, physics, mechanics), 25 credits;
- knowledge from the fields of economics and humanities (economics, law) 10 credits;
- knowledge from the fields of civil engineering (geology, construction materials, soil mechanics, earthworks, foundation engineering, steel structures, reinforced concrete structures, building construction study, roads, railway tracks, basics of environmental engineering, public works, hydraulics, hydrology, hydraulic engineering, water management, surveying, geoinformatics) or electrical engineering (digital design, signals and systems, electronics, electrical engineering, measurement technology) or informatics (programming, theory of algorithms, coding technology, software engineering, databases, basics of networked systems) or mechanical engineer or energy engineer or mechatronic engineer (mechanical engineering informatics, fluid mechanics, thermodynamics, control engineering, energetics, energy in buildings, electrotechnics) or architecture (architectural design, building constructions, architectural drawing and graphics, urbanism, construction management, construction technology, history of architecture, preservation of historic monuments, theory of architecture, theory of design), 15 credits
- knowledge from the field of informatics (CAD and BIM systems, 3D modelling, databases, visualisation technologies, software development), 10 credits.

The missing credits from the above-listed fields have to be obtained according to the code of studies of the particular higher educational institution.