



UNIVERSITY OF DEBRECEN FACULTY OF ENGINEERING

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# Welcome to the Faculty of Engineering

This is an exciting time for you, and I encourage you to take advantage of all that the Faculty of Engineering UD offers you during your bachelor's or master's studies. I hope that your time here will be both academically productive and personally rewarding. Think creatively and be confident.

The Faculty of Engineering of the University of Debrecen is at the forefront of the education and training of engineers in the North-Great-Plain Region of Hungary. It is a dynamically developing Faculty with over 3000 students and a highly-qualified and enthusiastic teaching staff of about 80 members. We offer a great variety of BSc, MSc courses and post-graduate training courses tailored to suit the rapidly changing world of engineering and focusing on European and international trends. In order to optimize the quality of training the Faculty continuously strives to expand the number of industry and educational partners at home and abroad. The Faculty was awarded the Quality Prize in 2011 by the Ministry of Education as recognition of its efforts in this field.

I wish you every success in your studies and hope to meet you personally in the near future.



Best wishes,

A handwritten signature in black ink, reading "Edit Szűcs".

Edit Szűcs

Dean



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## ABOUT DEBRECEN

With 205.000 inhabitants Debrecen is the second largest city in Hungary and the centre of the North Great Plain Region. The Eastern gate of Europe, as Debrecen is often referred to, is also the seat of Hungarian Protestantism, and as such is often called the "Calvinist Rome". The numerous university faculties, colleges and professional schools have turned Debrecen into the country's most important educational centre. More recently, the city's main focus is the development of its industrial park, and centres for knowledge management in information technology, nanotechnology, pharmacy and biotechnology.

Summer is the time of festivals: thousands of people from other parts of Hungary as well as from abroad visit the famous Debrecen Flower Carnival, the Debrecen Jazz Days, the Béla Bartók International Choir Competition and the International Military Band Festival. The new Conference Centre hosts professional and cultural programs. Week by week, many people support the city's most famous sport clubs, especially the football, handball and basketball teams. Those wishing to take a rest are welcome in the Great Forest, where the famous Debrecen Spa Bath and the Mediterranean Aquaticum are located.



## HIGHER EDUCATION IN DEBRECEN

The history of Debrecen's higher education dates back to the 16th century. The Calvinist Reformed College, established in 1538, played a central role in education, teaching in the native language and spreading Hungarian culture in the region as well as in the whole country. The College was a sound base for the Hungarian Royal University founded in 1912. Apart from the three academic faculties (arts, law, theology) a new faculty, the Faculty of Medicine was established, and the University soon became one of the regional citadels of Hungarian higher education.

Today the University of Debrecen is classified as a "University of National Excellence" and offers the highest number of academic programs in the country, hence it is one of the best universities in Hungary. Its reputation is a result of its quality training, research activities and the numerous training programs in different fields of science and engineering in English.

With 14 faculties and a student body of almost 30.000 of which about 3.700 are international students, the University of Debrecen is one of the largest institutions of higher education in Hungary.

This capacity makes it the intellectual center of Eastern Hungary.



## FACULTIES OF THE UNIVERSITY

<i>Faculty</i>	<i>Number of students</i>
Faculty of Humanities	4.100
Faculty of Child and Adult Education	1.800
Faculty of Law	2.700
Faculty of Economics and Business Administration	4.300
Faculty of Informatics	2.400
Faculty of Science and Technology	3.800
Faculty of Engineering	2.860
Faculty of Music	240
Faculty of Agricultural and Food Sciences and Environmental Management	1.800
Faculty of Medicine	3.500
Faculty of Health	1.700
Faculty of Dentistry	600
Faculty of Pharmacy	460
Faculty of Public Health	700



## FACULTY BACKGROUND, HISTORICAL FACTS

The history of the Faculty of Engineering dates back to 1965 when the Technical College was established. In 1972 it was named Ybl Miklós Polytechnic and in 1995 it became part of Kossuth Lajos University. In 2000 the Faculty of Engineering became part of the integrated University of Debrecen.

In 2005 the Bologna System was introduced, which aids the compatibility of the qualifications received at the University of Debrecen with universities all over Europe.

The Faculty of Engineering is at the forefront of education and training of engineers in the North-Great-Plain Region and in the whole of Hungary. It is a dynamically developing Faculty with over 3000 students and a highly-qualified and enthusiastic teaching staff of about 80 members. The teaching staff is involved in numerous domestic and international research and design projects. The Faculty of Engineering is practice oriented and develops skills required for the current conditions of the national and international labor market. The recently opened new building wing with its ultra-modern design hosts several lecture halls, seminar rooms and laboratories equipped with the latest technology. Our students are provided with practical knowledge, training and field practice with the help of the numerous prestigious domestic and multi-national industry partners. The internship periods are excellent opportunities for students to experience theory put into practice at the most renowned industry representatives and to become more successful in the labor market in this highly competitive sector. Students learn to operate in the working environment of multi-national companies and adapt to challenges easily. After graduation they will be able to operate at a strategic decision-making level, placing priority on efficiency and engineering ethics.

The Faculty of Engineering offers a great variety of BSc, MSc courses and post-graduate training courses tailored to suit the rapidly changing world of engineering and focusing on European and international trends. In order to optimize the quality of training, the Faculty continuously strives to expand the number of industrial and educational partners at home and abroad.

The Faculty of Engineering launched the engineering trainings in English in 2011.

The Faculty of Engineering has been a pioneer in the introduction of the Quality Management System at faculty level to measure and evaluate the efficiency of its education and teaching staff in order to improve the quality of education and training from the feedback received. The Faculty was awarded by the Ministry of Education the Quality Prize in 2011 as a recognition of its efforts in this field.

The Faculty of Engineering has a vivid student life. There is a film club waiting for movie buffs and the door of the Faculty library is always open. The library is not only the host of the most recent technical

books, exhibitions and tea afternoons with invited speakers but students can also purchase theatre and concert tickets here from the staff. The Borsos József dormitory is also a hub of activities for students.

The increasing number of foreign students brings cultural and ethnic diversity to the faculty.

Our aim is to aid students to become efficient members of the labor market and enrich the world of engineering in Hungary and abroad with their knowledge and expertise.



## TOTAL NUMBER OF STUDENTS

Number of students at the Faculty of Engineering:	2.860
According to time of study:	
full-time students:	2.210
part-time students:	650
undergraduate students:	1.990
postgraduate students:	220
international students:	45
full time teachers:	98
full college/university professor:	15
lecturers with a PhD degree:	25

## DEPARTMENTS, LABS, INFRASTRUCTURE

At the Faculty there are 8 departments responsible for 11 training programs and for their specializations

	professor	associate professor	senior lecturer	assistant professor	technical staff	administrative staff
Department of Architecture	3	1	1	5	0	1
Department of Basic Technical Studies	2	3	2	3	1	1
Department of Building Services and Building Engineering	1	1	0	7	2	1
Department of Chemical and Environmental Engineering	2	2	1	1	0	1
Department of Civil Engineering	3	3	1	8	5	1
Department of Electrical Engineering and Mechatronics	0	3	2	0	3	1
Department of Engineering Management and Enterprise	2	3	2	4	4	1
Department of Mechanical Engineering	2	3	2	4	6	1

## DATES OF ESTABLISHING THE TRAINING PROGRAMS

1972	Architect
	Mechanical engineering building industrial specialization
1984	Civil engineering
1987	Mechanical engineering building service engineering specialization
1991	Urbanism
1994	Technical management
2001	Environmental engineering
2005-2006	Date of switching to the Bologna (BSc/MSc) system

**BSC PROGRAMS**

- **Architecture BSc** number of students: 315
- **Civil Engineering BSc** number of students: 605  
Specializations:
  - Urban Settings
  - Building Construction
- **Environmental Engineering BSc** number of students: 115  
Specializations:
  - Environmental Technology
  - Environmental Management
- **Mechanical Engineering BSc** number of students: 868  
Specializations:
  - Building Services
  - Automotive Engineering
  - Operational and Maintenance
- **Mechatronics Engineering BSc** number of students: 210  
Specialization:
  - Building Mechatronics
- **Technical Manager BSc** number of students: 423  
Specializations:
  - Industrial
  - Building Constructional
- **Vocational Technical Instruction BSc** number of students: -

**MSc PROGRAMS**

- **Architecture MSc** number of students: 31
- **Building Engineering MSc** number of students: 59  
Specializations:
  - Building operational
  - Building Services
  - Building Energetics
- **Engineering Manager MSc** number of students: 41  
Specializations:
  - Industrial
- **Environmental Engineering MSc** number of students: 63  
Specializations:
  - Built Environment
  - Environmental technology, planning and construction
- **Infrastructural Engineering MSc** number of students: -
- **Mechatronics Engineering MSc** number of students: 6
- **Structural Engineering MSc** number of students: -
- **Teacher of Engineering MSc** number of students: -  
Specializations:
  - Teacher of Architectural Engineering
  - Teacher of Environmental Engineering
- **Urban Systems Engineering MSc** number of students: 42



## TRAININGS IN ENGLISH

- **Civil Engineering (BSc)**
- **Environmental Engineering (BSc)**  
Specializations:  
Environmental Technology
- **Mechanical Engineering (BSc)**  
Specializations:  
Operational and Maintenance
- **Mechatronics Engineering (BSc)**
- **Mechatronics Engineering (MSc)**
- **Technical Management (BSc)**

## POSTGRADUATE PROGRAMS

- **Building Contractor postgraduate program**
- **Building Energy postgraduate program**
- **Lean postgraduate program**
- **Quality Control Management postgraduate program**
- **Railway Track Construction and Maintenance postgraduate program**
- **Technical Diagnostic postgraduate program**
- **Technical Environmental Engineer postgraduate program**
- **Urban Energy postgraduate program**

## FACILITIES AND INFRASTRUCTURE OF THE TRAINING

*Classrooms, auditoriums, laboratories and their instrumentation, workshops.*



The available capacity of the *lecture halls*:

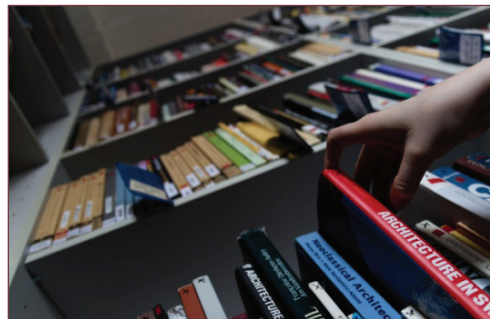
- 24 classrooms and drawing-rooms for training purposes (each with 16-70 seats, altogether 1.258 seats, measures 1.670 m<sup>2</sup>)
- 18 auditoriums (each with 78-256 seats, altogether 1.281 seats, measures 1.396 m<sup>2</sup>)
- The total capacity of full-time students: 3.250.
- Current number of students: approximately 2.860.

*IT, Teaching technology and library supply etc.*

- 3 IT laboratories, for teaching graphics and CAD, seating 30 people each.



The *Faculty library* is a unit of the University and National Library of Debrecen University. The Library lays special emphasis on the extension of its electronic services. Most units of the Library have worked with the integrated library system of Corvina (former Voyager) since 1992. The Library attaches great importance to collecting modern information carriers beside the traditional printed documents. Either by being a member of national consortia or by local subscription the library ensures that the citizens of the University be able to search in the bibliographic and full-text databases of the most important scientific periodicals of each discipline (EBSCO, WEB of Science, Elsevier periodicals, Biological Abstract, PsycINFO, Jstor etc.) It collects processes and services the specialized literature of the taught and researched fields of the sciences. It stores about 40,000 specialized books, textbooks and notes, 140 Hungarian and 25 foreign specialized journals, thousands of standards, extra materials for teaching and planning, product catalogues and brochures.



### *Language learning materials*

The library provides students with language books, CDs and cassettes which help students fulfill the foreign language requirements necessary to finish the major. It pertains to the Hungarian teaching materials too in the case of training foreign students.

### *Different services and benefits which help students graduate*

- Learning tools (course books and notes, technical books in Hungarian and in English)
- Textbook store where students can use their financial aid allocated for notes/textbooks
- Free wireless internet access in the Faculty buildings, including the dormitory

### *Administration unit*

- There is a Registry at the faculty, administration of courses is fully electronic with the NEPTUN system, the retrieval is helped by a register system.

## **ACHIEVEMENTS WE ARE PROUD OF**

### *Prizes*

The Faculty of Engineering has been awarded several prizes for high quality education:

2008 North Great-Plain Quality Prize

2008 Recognized for Excellence

by the Hungarian Association for Excellence

2011 Higher Education Quality Prize

by the Ministry of Human Resources



*Laboratories established by companies*

Thanks to our fruitful relationship with enterprises in our professional fields, firms and companies have established altogether 7 laboratories in the Faculty.

- NI Elvis (Educational Laboratory Virtual Instrumentation Suite) Lab
- Bosch Lab
- Rohde & Schwarz reference Lab
- Schneider Electric Knowledge Center
- KUKA Robotics Lab
- Lenksysteme Hungary Automotive Lab
- FESTO FACT (Festo Authorized and Certified Training) Lab
- SKF and Diagnostics Lab



## Research highlights

### KEY RESEARCH AREAS

The fields of research of the members of the Faculty are comprehensive. They include the examination of the time-dependant mechanical properties of certain engineering materials (silicate-based materials, polymers, metals) and the transport processes of the built environment (building physics, building energy performance, the protection of the built environment, environment-oriented engineering, dynamic examination of transport processes). Research in quality and maintenance management is also significant, just like applied mathematics and IT as well as the fields of architecture and architectural history. A new field that emerged a few years ago concerns intelligent machines, which involves research in the field of production informatics and building automation as an application of mechatronics.

*Smart Materials research project*

Smart materials have properties that can be modified using specific methods and technologies. In the laboratories smart and composite materials are investigated at macro and micro levels and nano-scale properties are also analyzed.

The main objective of the project is to create new materials, (e.g. alloys, composites) for special requirements.

*Person's Comfort Feeling research project*

Nowadays closed spaces are artificially supplied by fresh air. Researchers at the Faculty lay great emphasis on transmitting knowledge, which describes the improvement of the person's comfort feeling in the building with well controlled air technology systems.

*ClimateWater research project*

The research is aimed on the analysis and synthesis of data and information on the likely water related impacts of the changes of the climate with special regard to their risk and to the urgency of getting prepared to combat these changes and their effects.

The research identifies all adapted strategies that were developed in Europe and also globally for handling (preventing, eliminating, combating, mitigating) the impacts of global climate changes on water resources and aquatic ecosystems, including all other water related issues of the society and nature.

## PROJECTS AND GRANTS

### RECENT MAJOR PROJECTS AND THEIR RESULT, CURRENT PROJECTS OF CAPITAL IMPORTANCE

Research activity in the last 5 years

Total supports of the projects: 3 Million EUR

#### *Sustainable energy systems with optimized integration of renewable energy sources (DEnzero)*

Duration: 01.01.2013 – 12.31.2014. Budget: 1.5 million EUR

The basic aim of the project is to draw up suggestions for the Hungarian government to reach the optimal application of the energy strategy. 10 research groups (e.g.: building services, building energetic, environment, climate etc.) are involved in the project. All groups are led by a group supervisor, and the topics of the groups are well harmonized. Several expert researchers are involved in this project from foreign countries.

#### *Innovative development of a solar system with sun-solar panel for flat roof buildings*

Duration: 05.01.2013 – 06.30.2014. Budget: 1.5 million EUR

The aim of this project is to develop an innovative solar system with sun-solar panel for flat roof building in order to retail and institutional buildings to provide energy efficient solutions.

Parts of the planned system: electric power generation solar cell, solar thermal power generation, increasing the efficiency of the solar Sun system, storing power produced by filling storage tanks.

#### *Electric power and thermal water production for powering electric cars by utilizing the effective management system of public and office buildings applying photovoltaic system*

Duration: 05.01.2013 - 06.30.2014 Budget: 2 million EUR

The basic aim of the project in the framework of the R&D project is to develop a building mechatronics-management system for the production of electricity and hot water based on solar energy according to the consumption habits of the buildings.

#### *Development of a commercial vehicle driven by an electric motor for collecting communal waste*

Duration: 05.01.2013 - 06.30.2014. Budget: 2 million EUR

The aim of the project is to develop the prototype of a garbage truck by replacing the internal combustion engine with electric motor supplied with solar cell.

#### *Sustainable building energetic information centre*

KEOP-6.2.0/B/09-2010-0027; Project term: 10.11.2011 – 11.28.2013

Grant awarded 149.681.589 HUF

In this exemplar project several renewable energy sources have been utilized (e.g. heat pumps, solar collectors etc.). This is a so-called "nearly-zero" energy building.



## COOPERATION WITH INDUSTRIAL PARTNERS

- FAG Hungary Ltd.,
- National Instruments Ltd.,
- Michelin Hungary Ltd.,
- Unilevel Hungary Ltd.,
- Manz Hungary Machine Manufacture Ltd.,
- General Electric Ltd.,
- BUMET Hungary Ltd.,
- Curver Hungry Ltd.,
- IT Services Hungary Ltd.
- HL - Hutterer-Lechner Ltd.
- Viessmann Heating technique Ltd.
- REHAU Hungary Ltd.
- LINDAB Hungary Ltd.

### **The field of cooperation:**

**Trainee program** (scholarship program) for students intending to take up employment after graduation at the above companies. The trainee program:

- involves students in carrying out projects in various areas at the plant
- provides students with a topic for their BSc/MSc thesis, supervised by an expert at the company
- students earn credits after completing the 6-week long internship, required by their course curriculum.

Internship program (for Hungarian and foreign students) containing:

- 6 week internship
- thesis

Integrating special topics needed by the company:

- establishing optional courses (module) in the syllabus (max. 4 courses/10 credit points)
- inviting lecturer employed at the company in special topics (new technologies, programs, machines)

Information on the opportunities at companies is disseminated at the following events:

- open day/ excursion organized by the company
- open day at the Faculty of Engineering
- Students are also informed about the opportunities through the Faculty's information channels like the Career Office webpage and the NEPTUN student information system.
- The head of the departments and departmental web pages are valuable sources of information in fields of specific topics.

## FAIRS, CONFERENCES, COMPETITIONS

### INDUSTRIAL FAIR AND SCIENTIFIC CONFERENCE

Every year we organize the "Building Services, Mechanical and Building Industry Days and International Conference" that looks back on 19 years of tradition. More than 100 exhibitors participate in the conference and their feedback reassures us that the experts we train are really needed.

Our Faculty is the **centre of technical life** in the North Great Plain Region.

- Well-known **international companies** situated in Debrecen (e.g. IT Services, National Instruments, FAG, TEVA, Richter Gedeon, etc).
- Due to the training program at the Faculty of Engineering, the city is an **ideal place for further investors**.

**Areas of cooperation** with firms, companies:

- Trainee and scholarship programs
- Common projects and applications
- Internship, graduation
- Organizing open day/excursion at the company
- Establishing optional courses (module) in conformity with the requirements of the company
- Inviting guest lecturers employed at the company for lectures in special topics (new technologies, programs, machines)
- Organizing open days at the Faculty of Engineering

### STUDENTS' SCIENTIFIC COMPETITION

Like every higher education institution in Hungary, the Faculty of Engineering organizes an annual scientific conference for students actively involved in the research activities of the Departments. The best students can take part in the **National Scientific Students' Associations Conference** ("OTDK", 'Országos Tudományos Diákkör' in Hungarian) organized every two years, representing the training fields of the Faculty.

Traditionally, the **Pro Scientia Gold Medal** for outstanding scientific performances is awarded during the conference. The applications for this award are carefully evaluated through several steps of peer reviews. Since 1989, every year 45 students have received this award.

In 2013 *Mrs. Andrea Szabolcsik* majoring in Environmental Engineering was awarded the Pro Scientia Gold Medal.

More information at: [eng.unideb.hu/tdk](http://eng.unideb.hu/tdk)

### STUDENT PROJECTS

Professional societies, companies and universities organize competitions every year for students on both national and international level in several fields.

The most popular competitions are the spaghetti bridge construction, the race car building powered by electric motor or compressed air, robot building and programming, machine design and building.

Our students' achievements are outstanding in these competitions.

#### *Race car competition*

The Bosch Rexroth Ltd. and the Bosch Rexroth Pneumatics Ltd. organized its first Pneomobil competition in 2008 for Hungarian higher education institutes. The competition is so popular that in 2009 it was extended to international level. The number of competitors exceeds 50.

More information: <http://www.pneomobil.hu>, <http://pneomobil.org>



### *Students' machine design and building competition*

Machine design and build competitions are announced by machine manufacturer companies like CLAAS Hungary Ltd., UNILEVEL Hungary Ltd., Robert Bosch Ltd., NI Hungary Ltd., MSK Hungary Ltd. The designing task are solved and implemented by student teams.

In 2013 our students majoring in mechanical engineering won the Claas UniTech Engineering Competition.

### *Electric vehicles development*

Researchers at the Department of Electrical Engineering and Mechatronics developed an alternating current (AC) drive controlled with a frequency converter. It can be used to effectively control the revolution and drive dynamics characteristics of electric car motors. Based on this innovative technology, the DE HIGH VOLTAGE car race student team has been involved in many national competitions with great success (MVM Energy Race, Altrace-Alternative Drive Vehicles Race) and international exhibitions.

More information: [eng.unideb.hu/vmt2](http://eng.unideb.hu/vmt2)

### *Pasta structure competition*

"TörDELő" is a regional and international competition for students and high school students constructing pasta structures organized by the Department of Civil Engineering. The first competition was organized for 8 teams several years ago. In 2013, however, the number of participants exceeded 120, organized in 31 teams.



### *Concrete canoe competition*

The MAPEI Canoe Competition provides students with a practical application of the engineering principles they learn in the classroom, along with important team and project management skills they will need in their careers. The event challenges the students' knowledge, creativity and stamina, while showcasing the versatility and durability of concrete as a building material.



## **INDUSTRIAL AND INSTITUTIONAL CONNECTIONS**

The Faculty is represented in several professional societies by its academic personnel:

- Different divisions of the Hungarian Chamber of Engineers
- Central European Building Physics Association

## GRANTS AND PROJECT AT INTERNATIONAL LEVEL, MAJOR RESEARCH COOPERATION

### *GEOREN Project*

#### **Integrated modeling of sustainability of geothermal systems**

Total budget: 310.000.000 HUF (1.140.706 EUR) Support: 260.000.000 HUF (950.000 EUR)

Duration: 2 years

The object of the project is the theoretical investigation of the utilization of geothermal energy and the optimization of the operation in order to provide the sustainability of the system.

Researchers from Iceland, Italy, Romania, Slovakia and Slovenia were involved in the project.

The partner universities and institutions: University of Maribor, Slovenia; Technical University of Kosice, Slovakia; Polytechnic University of Timisoara, Romania; West University of Timisoara, Romania; National Energy Authority of Iceland; University of Padua, Italy; ÍSOR Iceland Geosurvey Ltd., Iceland; AQUAPLUS Ltd., Hungary

The project was focusing on the following topics:

- Testing and analyzing geothermal water and the structural materials of parts
- Dynamic modeling and simulation of the drilling process of the geothermal well drilling
- Hydrogeothermal systems and its geological aspects
- Optimization of operational parameters in the geothermal system
- LCA analysis of geothermal systems, impact assessment

## MOBILITY PROGRAMS

### *ERASMUS Program*

The ERASMUS Program forms a major part of the EU Lifelong Learning Programme whose primary goal is to encourage and support student and academic mobility in the framework of agreements and cooperation between universities and higher education institutions.

The ERASMUS Program provides a grant for studying and completing internship abroad.

Studying abroad equips students with a range of competences, including improved language skills, which are increasingly valued by employers.

We have around 30 ERASMUS partner universities in Germany, Austria, Italy, France, Finland, Spain, Poland, Slovakia, Romania, Turkey and Latvia.

Most significant partners:

Fachhochschule Lippe und Höxter, Hochschule Wismar, Fachhochschule Technikum Wien, University of Padua, University of Cagliari, University of Montpellier, Universidad Catolica De Avila, Lappeenranta University of Technology, Technical University of Cluj-Napoca, University of Bielsko-Biala, Technical University of Riga, Yildiz Technical University, Erciyes University

A full list of partner universities can be found on the following webpage: <http://mobi.unideb.hu>

### *CEEPUS program*

The CEEPUS Program (Central European Exchange Program for University Studies) aims to promote teacher and student mobility. Students can spend a study period abroad at more than 30 partner universities in Central European countries: Austria, Slovenia, Croatia, Serbia, Romania, Poland, Slovakia and Czech Republic.

The Faculty of Engineering has partnership in 4 Networks, coordinated by:

Poznan University of Technology, Technical University of Cluj-Napoca,  
University of Zilina, University of Maribor

More information about the program is available on the following webpage: <http://www.ceepus.info>



**ARCHITECTURE BSc PROGRAM**

(in Hungarian)

ARCHITECTURE  
FIELD

The objective of the program is to train architects who are able to:

- prepare technical documentation,
- designs, technical drawings and models
- apply computer programs and modeling for architectural designs,
- carry out the functional design of buildings taking the analyses of environmental and physical aspects into consideration, and divide labor on the basis of expertise,
- effectively communicate with and coordinate the work of other architects, designers and the participants of the construction,
- plan and implement construction plans,
- manage, control and follow-up procedures and pay attention to technical, economical, legal and quality management factors,
- become familiar with the knowledge and skills necessary for building maintenance and operation.

Our graduates will develop competence or acquire knowledge in the following areas:

- the history of architecture, theory of architecture, related arts, and contemporary architectural forms,
- the design approach and the course of architectural design, the entire investment process,
- the main historical processes of settlement development and basic environmental shaping, social and economic functions of urban design, basic elements of settlement construction, most important related legal rules and building code procedures, basic proficiency in the official town planning tools and social reconciliation.
- the basic types of support structures, construction material, they are proficient in modeling these,
- the basic tasks and legal procedures concerning occupational safety and health

The curriculum contains the following subject modules:

Basic science subjects:	52 credits
➤ Basics of natural sciences, Mathematics, Technical drawing, Computer engineering, Mechanics, Steel structures, Ferroconcrete structures, Wood, wall, stone structures, Complex structures, Geodesy, Soil mechanics and foundations, Building Physics	
Economics and humanities subjects:	35 credits
➤ Economics for engineers, Management for engineers, Studies adm. authority and law, History of technology, Architectural history, Hungarian architectural history, Hungarian architectural history XX. century, History of Art, Historic building protection, History of religion, Architectural history (Comprehensive exam)	
Professional subjects:	126 credits
➤ Introduction into Architecture, Fundamentals of building design, Design of single-family homes, Design of multi-unit residential buildings, Design of public buildings, Complex design, Building design exam, Urban design, Landscape Architecture, Interior design, Modeling, Architectural drawing, Building materials, Building engineering, Building implementation and organization, Building structures, Building structures exam	
Optional subjects:	min. 12 credits
Thesis:	15 credits

Duration of studies: 8 semesters, contact hours: 2.586

ECTS credits: 240, internship: 8 weeks

Final exam:

- Defending the diploma work (oral presentation and discussion)
- Testing the proficiency in the field of: Architectural Design, Architectural Concepts and Contemporary Architecture



**ARCHITECTURE MSc PROGRAM**

(in Hungarian)

ARCHITECTURE  
FIELD

The objective of the program is to train architects who are able to:

- perform well in all the built environment design and construction tasks, with their qualifications and scientific theory engage,
- provide the management of construction sites and Authority's work,
- have relevant theoretical and practical knowledge on urbanism and architecture and on how they are interrelated, research methods necessary for creating a design project related to the creation of study plans, design-related structural and constructional engineering, construction management and inspection, and knowledge of conservation tasks,
- can perform theoretical and scientific activities relevant to their qualification; manage construction and administrative works
- apply the acquired knowledge in practice, use the problem-solving techniques on new problems and new phenomena, raise original ideas, process the professional knowledge of the discipline, draw accurate judgments and form original opinions, make decisions, draw conclusions,
- can perform well in complex technical and economic processes by integrating research and development in architecture, involving also the quality management system
- obtain design license after a professional internship fixed by legal acts.

Our graduates will develop competence or acquire knowledge in the following areas:

- urbanism and architecture and the relationship between them,
- EU Directive 2005/36/EC of the general and professional knowledge (EU 2005/36/EK)
- the history of architecture and architectural theory, and related arts, technologies and sciences,
- fine arts' influence on the quality of architectural design,
- research methods necessary for creating a design project related to the creation of study plans,
- design-related structural and constructional engineering,
- basic knowledge of hardware and software, engineering programs, at least one user-level application of CAAD program,
- knowledge of at least one foreign language for reading and understanding technical documentation.

The curriculum contains the following subject modules:

Basic science subjects:	5 credits
➤ Structural Design, Environmental Techniques	
Economics and humanities subjects:	10 credits
➤ Theory of Architecture, History of Art, Construction Law, Construction Management	
Professional subjects:	45 credits
➤ Complex design, Habitats-Urbanism, Sociology-Habitat Sociology, Drawing, Architectural Analysis, History of Technology, Aesthetics, Intercultural and Interartistic Civilization, Contemporary Hungarian Architectural Workshops, Interior Design, Landscape Architecture, Protection and Reconstruction of Monuments and Historical Buildings	
Optional subjects:	min. 5 credits
Thesis:	25 credits

Duration of studies: 3 semesters, contact hours: 944

ECTS credits: 90 internship: 4 weeks

Final exam:

- defending the Diploma Work (oral presentation and discussion)
- Testing the proficiency in the field of: Architectural Design, Architectural Concepts and Contemporary Architecture





#### Extra-curricular activities for students

Students have four workshops at their disposal. Each workshop has its own teachers of hand drawing, design and building structure. Students work together in small groups in the workshops for four years, which enables them to follow closely and help each others' work. In this way instructors get to know students better and can provide a more personalized training.

A great many students take part in large numbers in the National Conference of Undergraduate Research and in other designing competitions with good results. Their designs and drawings have been exhibited in the showrooms of Debrecen and Budapest.

The Department's annual competition for photography is always extremely popular with students.



The Department has organized a number of international workshops (led by Czech architects, The Visegrád Four workshop etc.). In certain projects Hungarian architects and architects from Prague work independently and later discuss the projects together in Debrecen or in Prague.

The film club events with thematic film screenings and related discussions held on Monday evenings are also very popular among students.

It has become a tradition that the 8 most outstanding students can participate in a study trip abroad organized by the Department.

## MECHANICAL ENGINEERING BSC PROGRAM BUILDING ENGINEERING SPECIALIZATION

(in Hungarian)

BUILDING ENGINEERING  
FIELD

The objective of the program is to train mechanical engineers who are able to

- design building services equipments and systems
- supervise the preparation and the implementations of building services systems
- solve general problems of research and planning as expected by the labor market, have in-depth theoretical knowledge,
- continue their studies in MSc programs.

Our graduates will develop competence or acquire knowledge in the following areas:

- air handling and water and gas supply,
- planning and operating alternative energy systems,
- insuring the suitable microclimate in the buildings with maximal efficiency and minimal energy,
- plan, realize and operate modern heating-, refrigeration-, air, and water supply systems,
- heat and flow management processes

The curriculum contains the following subject modules:

Basic science subjects:	48 credits
➤ Mathematics, Technical Mechanics, Engineering Physics, Introduction to Mechanical Engineering, Thermodynamics and Heat Transfer, Technical Chemistry	
Economics and humanities subjects:	20 credits
➤ Economics, Quality Management, State Administration and Law, Introduction to Ethics	
Professional subjects:	117 credits
➤ Informatics, Engineering, Heating I, II, Cooling, Air Conditioning and ventilation I, II, Noise Technique, Bio and Pb Gas technique, Laboratory measurements I, II, Water supply, canalization and gas technique I, II, III, Thermal and fluid machines I, II, Building Physics, Building energetics, Comfort, Building Services, Building Energetics, Burning techniques	
Optional subjects:	10 credits
Thesis:	15 credits

Duration of studies: 7 semesters, contact hours: 2,352

ECTS credits: 210, internship: 6 weeks

Final exam:

Defending the Thesis (oral presentation and discussion)

Exam on two subjects chosen by the student

- Heating technology
- Air handling-air conditioning
- Water supply, canalization and gas techniques



### Options for further education

After graduating our students have the opportunity to continue the training either at the Faculty in different MSc programs or at any higher educational institution in Hungary or abroad.

Possible MSc programs at the Faculty after credit supplementing:

- Engineering Manager MSc (in Hungarian)
- Building Engineering MSc (in Hungarian)
- Environmental Engineering MSc (in Hungarian)
- Mechatronics Engineering MSc (in Hungarian and in English)



### Job prospects

- Students may seek employment at companies dealing with planning, implementation, trade, operation.

**BUILDING ENGINEERING MSc PROGRAM**

(in Hungarian)

**BUILDING ENGINEERING  
FIELD**Specializations: **Building Operation – Building Service Systems – Building Energetics**

The objective of the program is to train building engineers who will be experts of buildings regarding project development, contracting, energy efficient operation, maintenance and retrofit.

Our graduates will have a wide overview of the building service systems and building elements and they will be able to deal with the establishment as an extensive, integrated system.

Our graduates will develop competence or acquire knowledge in the following areas:

- working out complex plans and dimensioning HVAC equipments of building service systems of large buildings,
- attesting building energy certifications,
- auditing,
- building diagnostics, monitoring,
- applying the principles of climate responsive design for new buildings and also for renovation

The curriculum contains the following subject modules:

**The Specialization in Building Operation** contains the following discipline groups:

Basics of natural sciences :	26 credits
➤ Mathematics, Applied Statistics	
Mechanical engineering module*	
➤ Selected Topics of Mechanics, Thermodynamics and Fluid Mechanics, Materials of Mechanics	
Architect-Civil engineering module*	
➤ Building Materials, Building Structures	
Electrical engineering module*	
➤ Selected Topics of Electro-techniques, Electrical Engineering, Automatics	
Economics and humanities science:	12 credits
➤ Management, Economics and Law	
Specific compulsory subjects:	22 credits
➤ Systems Technology, Indoor Environment Quality, Building Service Systems and Elements I., Environmental Techniques II., Building Energetics II.	
Field-specific vocational subjects	29 credits
➤ Buildings Diagnostic, Lighting Engineering, Building Control and Safety techniques, Building Service Systems and Elements II., Diagnostics and Operation of HVAC systems, Planning of Construction Process, Accessible Built Environment, Retrofitting of buildings	
Optional subjects	min. 6 credits
➤ Elective courses	
Thesis	25 credits

*\*Students have to take up two modules depending on their previous credits*

**The Specialization in Building Service Systems** contains the following subject groups:

Basics of natural sciences :	26 credits
➤ Mathematics, Applied Statistics	
Mechanical engineering module*	
➤ Selected Topics of Mechanics, Thermodynamics and Fluid Mechanics, Materials of Mechanics	
Architect-Civil engineering module*	
➤ Building Materials, Building Structures	
Electrical engineering module*	
➤ Selected Topics of Electro-techniques, Electrical Engineering, Automatics	
Economics and humanities:	12 credits
➤ Management, Economics and Law	
Specific compulsory subjects:	22 credits
➤ Systems Technology, Indoor Environment Quality, Building Service Systems and Elements I., Environmental Techniques II., Building Energetics II.	
Field-specific vocational subjects	29 credits
➤ Heating Systems III., Building Control and Safety techniques, Ventilation and Air-Conditioning III., Water, Canalization and Gas Supply IV., Complex Design of Building Service Systems	
➤ Diagnostics and Operation of HVAC systems	
Optional subjects	min. 6 credits
Elective courses	
Thesis	25 credits

*\*Students have to take up two modules depending on their previous credits*

**The Specialization in Building Energetics** contains the following subject groups:

Basics of natural sciences:	26 credits
➤ Mathematics, Applied Statistics	
Mechanical engineering module*	
➤ Selected Topics of Mechanics, Thermodynamics and Fluid Mechanics, Materials of Mechanics	
Architect-Civil engineering module*	
➤ Building Materials, Building Structures	
Electrical engineering module*	
➤ Selected Topics of Electro-techniques, Electrical Engineering, Automatics	
Economics and humanities:	12 credits
➤ Management, Economics and Law	
Specific compulsory subjects:	22 credits
➤ Systems Technology, Indoor Environment Quality, Building Service Systems and Elements I., Environmental Techniques II., Building Energetics II.	
Field-specific vocational subjects	29 credits
➤ Buildings Diagnostic, Geothermal Energy Utilization, Diagnostics and Operation of HVAC systems, Solar Energy Utilization, Lighting Engineering, Urban Climatization, Retrofitting of buildings	
Optional subjects	min. 6 credits
➤ Elective courses	
Thesis	25 credits

Duration of studies: 4 semesters, contact hours: 1258

ECTS credits: 120, internship: 4 weeks

Final exam:

- Defending the Diploma Work (oral presentation and discussion)
- Exam on two topics chosen by the student

Building Operation specialization\*:

- 1. Topic: Indoor Environment Quality, Environmental Techniques
- 2. Topic: Buildings Diagnostic, Diagnostic and Exploitation of HVAC Systems
- 3. Topic: Building Service Systems and Elements, Building Surveillance and Safety Techniques.

Building Service Systems specialization\*:

- 1. Topic: Indoor Environment Quality, Environmental Techniques
- 2. Topic: Ventilation and Air-Conditioning III., Diagnostic and Exploitation of HVAC Systems
- 3. Topic: Heating Systems III., Water, Canalization and Gas Supply IV.

Building Energetics specialization\*:

- 1. Topic: Indoor Environment Quality, Environmental Techniques
- 2. Topic: Buildings Diagnostic, Diagnostic and Exploitation of HVAC Systems
- 3. Topic: Building Energetics II., Retrofitting of buildings

*\*Students have to choose two from these topics.*



#### Job prospects:

Students may seek employment at companies dealing with the sizing of buildings, operating buildings and HVAC systems, energy efficient buildings, planning, implementation, trade, operation.

**BUILDING ENERGY POSTGRADUATE PROGRAM**

(in Hungarian)

**BUILDING ENGINEERING  
FIELD**

The objective of the program is to train HVAC, civil, mechanical and architectural engineers, who are able to:

- determine the energy quality of a building,
- prepare energy certificates for buildings,
- enhance the energy efficiency of buildings.

Our graduates will develop competence or acquire knowledge in the following areas:

- physics of building envelopes,
- energy flows in buildings, HVAC systems, lighting,
- EU and Hungarian building energy standards and regulations

The curriculum contains the following subject modules:

General subjects: 30 credits

- building structures, energy sources, energy generation, HVAC systems

Specialized subjects: 20 credits

- rehabilitation of buildings, renewable energy sources, building energy modeling, simulation of energy behavior of buildings

Thesis: 10 credits

Duration of studies: 2 semesters, contact hours: 231

ECTS credits: 60

Final exam:

- Defending the Thesis (oral presentation and discussion)
- Exam on two subjects:
  - Thermotechnics of building structures
  - Energy flows in buildings

**URBAN ENERGY POSTGRADUATE PROGRAM**

(in Hungarian)

**BUILDING ENGINEERING  
FIELD**

The objective of the program is to train engineers who are able to:

- carry out energy audits of buildings and supply systems on an urban scale,
- develop complex studies on energy strategy as regards environmental and climatic consequences,
- coordinate the teamwork of designers,
- support the municipalities in urban scale energy management.

Our graduates will develop competence or acquire knowledge in the following areas:

- fundamentals of urban design,
- building rehabilitation,
- energy management utilities,
- district heating,
- solar and geothermal energy,
- environmental protection,
- urban climate

The curriculum contains the following subject modules:

Basic science subjects: 20 credits

- Fundamentals of urban design, Urban climatology, Environmental protection, Energy management

Economics and humanities subjects: 10 credits

- Energy management, Urban management

Professional subjects: 20 credits

- Solar energy, Geothermal energy, Refurbishment, District heating

Thesis: 10 credits

Duration of studies: 2 semesters, contact hours: 186

ECTS credits: 60

Final exam:

- Defending the Thesis (result of the oral presentation and discussion)
- Exam on two subjects:
  - Building Energetics,
  - Energy supply systems

**Job perspectives:** municipalities, district heating companies, public utilities, urban design studios, auditor companies

## LABORATORY BACKGROUND OF THE BUILDING ENGINEERING FIELD

**Air technology laboratory:** improving the person's comfort feeling in the building with well controlled air technology systems.

*Devices:* portable multifunctional measuring instrument, air mass measuring instrument, Data collectors: temperature, and humidity sensors, CO<sub>2</sub> measuring instrument, Portable tachometer with optical and contact sensor adapter, Infra thermometer with gauge field, Pressure gauge instruments with inner sensor.

**Buildings physics:** measuring the thermal resistance, monitoring air density, thermo technical behavior of buildings. Determining the air permeability of buildings. Measuring and registering temperature and electric signals: 175-H2 logger (4 pieces) (DIN ISO 9001:2000) TESTO 175-T3 logger (1 pieces) (DIN ISO 9001:2000) KIMO KTH-300 logger (23 pieces)

**Gas technology laboratory:** presentation of the structural parts of different gas apparatus. Measuring the performance-consumption and examining the different firm states.

**Heating mechanic laboratory:** conducting measurements with connection to the following practice courses: Laboratory Practices, Diagnostic of Building Engineering Systems, Heat and Fluid Technology Machines.

*Devices:* pump-characteristic curve measuring instrument; measurement bench for investigating the structural, and dynamical hydraulically regularizations. Measurement bench for heat pump.

**Heating technology laboratory:** measuring the features of the pumps under operation. Testing the regulated heating circles as well as the features of a solar collector system during operations.

**Water laboratory:** examinations of the wing-wheeled water meters. The aim of the testing is to determine the initial sensitivity of different sized and aged water gauges; examination of the function parameters of pressure raiser equipment;





**CIVIL ENGINEERING BSC PROGRAM**

(in Hungarian and in English)

**CIVIL ENGINEERING  
FIELD**

Specializations:

- Infrastructural Engineering, Urban Engineering Specialization
- Structural Engineering, Structural Architect Specialization

The objective of the program is to train civil engineers who are able to:

- solve complex civil engineering planning,
- solve problems of design, management, operations, and construction problems in the public sector and in private industry,
- demonstrate that they are up to certain ethical standards and improve their professional standing through lifelong learning,
- demonstrate their potential for leadership, their ability to communicate effectively, and their capacity to work in team.

The educational objectives of the civil engineering program reflect the mission of the Department of Civil Engineering and the importance placed on successful professional practice, the ability to pursue advanced degrees, the assumption of professional and societal leadership roles, and a commitment to lifelong learning. Our graduates will develop competence or acquire knowledge in the following areas:

- ability to design and conduct experiments, as well as to analyze and interpret data;
- ability to design a system, component, or process to meet desired needs;
- ability to use the techniques, skills and modern engineering tools necessary for engineering practice;
- ability to apply knowledge in the following four recognized major civil engineering areas: structural engineering, geotechnical engineering, transportation engineering, water resources engineering with a depth of focus in one or more of the four areas;
- ability to conduct laboratory experiments and to critically analyze and interpret data in the following four recognized major civil engineering areas: structural engineering, geotechnical engineering, transportation engineering, water resources engineering;
- ability to perform civil engineering design by means of design experiences integrated throughout the professional component of the curriculum culminating in a senior design experience.

The curriculum contains the following subject modules:

Basics of natural sciences (NS):	47 credits
➤ Basics of Natural Sciences, Mathematics, Mechanics, Descriptive Geometry, Technical Drawing, Technical Chemistry, Engineering Physics, Informatics for Engineers	
Economics & humanities (EH):	21 credits
➤ State Administration and Law, Introduction to Economics, Microeconomics, Management for Engineers, Quality Management, Introduction to Ethics, European Studies	
Civil engineering compulsory subjects (CEC):	88 credits
➤ Geoinformatics, Geographical Information System, Hydraulics, Hydrology & Hydrogeology, Basics of Environmental Engineering, Public Works, Water Management & Hydraulic Structures, Construction Materials, Geology, Geotechnics, Urban & Regional Development, Transportation Engineering, Building Construction, CAD Modeling, Theory of Design, Steel Structures, Reinforced Concrete Structures, Timber & Masonry Structures, Construction Management, Bridges & Structures	
Infrastructural engineering stream (IES):	38 credits
➤ Geographical Information System, Transportation Engineering, Hydrobiology, Protection of the Aquatic Environment, Hydraulics, Hydrology & Hydrogeology, Construction Management, Public Works, Water Quality Control, Water Resources Management	
Urban engineering specialization (IES-UES):	19 credits
➤ Transportation Engineering, Public Works, Water & Sewage Treatment, Urban Planning, Urban Management	
Structural engineering stream (SES):	39 credits
➤ Theory of Girders, Building Construction, Design of Buildings, Steel Structures, Reinforced concrete Structures, Geotechnics, Construction Management, FEM Modeling	
Structural architect specialization (SES-SAS):	18 credits
➤ Steel Buildings, Reinforced Concrete Buildings, Composite Structures, Engineering Timber Structures, Strengthening of Structures, Design of Buildings	
Optional subjects (OS):	12 credits
Diploma project (DP):	15 credits

Compulsory exams:	0 credits
➤ Mathematics Compulsory Exam, Mechanics Compulsory Exam, Infrastructural/Structural Engineering Compulsory Exam	
Industrial & laboratory practices:	0 credits
➤ Geoinformatics Laboratory (CEC), Industrial Practice (CEC), Public Works & Environmental Engineering Laboratory (IES), Transportation & Urban Engineering Laboratory (IES), Structural Engineering Geoinformatics Laboratory (SES), Material & Structural Engineering Laboratory (SES)	
Diploma project (DP):	15 credits

Duration of studies: 8 semesters, contact hours: 2,628

ECTS credits: 240, internship: 4 weeks

Final exam:

Defending the Diploma Project (oral presentation and discussion)

- Depending on the stream, Exam on two subjects chosen by the student
- Structural engineering stream structural architect specification, infrastructural engineering stream, urban engineering specialization



### Options for further education

After graduation students have the opportunity to continue the training either at the Faculty in different MSc programs or at any higher educational institution in Hungary or abroad. Possible MSc programs at the Faculty after credit supplementing:

- Structural Engineering MSc (in Hungarian)
- Infrastructural Engineering MSc (in Hungarian)
- Urban Engineering MSc (in Hungarian)
- Environmental Engineering MSc (in Hungarian)
- Engineering Manager MSc (in Hungarian)

**URBAN SYSTEMS ENGINEERING MSc PROGRAM**

(in Hungarian)

CIVIL ENGINEERING  
FIELD

The objective of the program is to train urban system engineers who are able to:

- supply settlements or settlement groups, design the environment of towns, perform field operation of infrastructures, operate in the field of urban planning and city architecture,
- perform technical and expert authority activities as well as operations related to municipal supply, maintenance, organization, protection and management of the built environment within the activities of the local government,
- develop concepts and programs and prepare plans for settlements,
- coordinate the development of regions, manage and control such activities.

Our graduates will develop competence or acquire knowledge in the following areas:

- the urban planning of architecture, engineering, ecology, environmental science, sociology, economics, law and administrative discipline
- interpretation and perception of plans and maps by visual expression techniques
- preparation and implementation, coordination of regional programs and regional development, resettlement plans,
- for computer communication, data management and analysis, the use of graphical systems (CAD, GIS) spatial-regional planning
- environmental protection, quality control, consumer protection, the principle of equal access and use
- occupational health and safety, technical and economic legislation

The curriculum contains the following subject modules:

Basic science subjects:	23 credits
➤ Mathematics (MSc), Demography and settlement geography, Economic geography, GIS, Regional statistics, Ecology of settlements.	
Economics and humanities subjects:	14 credits
➤ History of settlements, Urban sociology, Administrative law, Real estate development and management, Governance of settlements.	
Professional subjects:	47 credits
➤ Rural development, Spatial and regional planning, Theory of architecture I., Theory of architecture II., Architectural interpretations I., Urban architecture, Urban planning I., Urban planning II., Contemporary architectural studios, Environmental design, Urban traffic, Urban supplies, Environmental protection of settlement, Prevention of historic monuments and site sin settlements, Regional policy, Municipal financial management, Urbanism.	
Optional subjects:	6 credits
Thesis:	20 credits

Duration of studies: 4 semesters, contact hours: 1.260

ECTS credits: 120, internship: 4 weeks

Final exam:

- Defending the Diploma Project (result of the oral presentation and discussion)
- Two grades based on the written comments of the tutors

**Options for further education**

After graduation students have the opportunity to continue their studies either at the University in different MSc or PhD programs or at any higher educational institution in Hungary or abroad.

**INFRASTRUCTURAL ENGINEERING MSc PROGRAM**

(in Hungarian)

CIVIL ENGINEERING  
FIELD

Specialization: Water and aquatic environmental specialization

The objective of the program is to train infrastructural engineers who are able to:

- coordinate the construction, maintenance and operation, enterprise and regulatory tasks, manage the infrastructure building construction
- participate in technical or other complex processes of economics by making use of their managerial skills
- according to the discipline, resolve the complex road and rail transport systems, urban transport and water infrastructure systems, and water engineering activities related tasks
- forming, managing contributions to the civil engineering infrastructure design
- design aquatic systems and / or act as experts in accordance with the laws and the rules of professional engineering practice.

Our graduates will develop competence or acquire knowledge in the following areas:

- management, engineering ethics, and overall knowledge of the European Union in the field of civil engineering,
- construction, maintenance and operation, enterprise and regulatory tasks, supplying a full range of civil engineering activities, particularly in the infrastructure construction tasks
- environmental protection, quality control, consumer protection, product liability, the principle of equal access, use
- occupational health and safety, technical and economic legislation, as well as basic knowledge of engineering ethics,
- knowledge of the global economic and social processes.

The curriculum contains the following subject modules:

Basic science subjects:	17 credits
➤ Mathematics (MSc), Numerical methods, Database systems, Engineering ecology, Hydro morphology, Modeling of environmental systems	
Economics and humanities subjects:	8 credits
➤ English communication, European studies, Engineering ethics, Management studies (MSc)	
Professional subjects:	40 credits
➤ Soil works of infrastructural systems, Structures of infrastructural systems, Environmental economics, Water and wastewater treatment technologies, Environmental monitoring, Modeling of water systems, Integrated water management planning, Protection of aquatic environment, Hydrology and hydro-informatics, Water economics, Groundwater, Transport processes, Rural development, Water quality control planning practices, Environmental engineering field trip	
Optional subjects:	5 credits
Thesis:	20 credits

Duration of studies: 3 semesters, contact hours: 1200

ECTS credits: 90, internship: 4 weeks (optional for 5 credits)

Final exam:

- Defending the Diploma Project (result of the oral presentation and discussion)
- Two grades based on the written comments of the tutors

**Options for further education**

After graduating our students have the opportunity to continue their studies either at the University in different MSc or PhD programs or at any higher educational institution in Hungary or abroad. Possible MSc programs at the Faculty after credit supplementing:

- Structural Engineering MSc (in Hungarian)
- Urban Engineering MSc (in Hungarian)
- Environmental Engineering MSc (in Hungarian)

**STRUCTURAL ENGINEERING MSc PROGRAM**

(in Hungarian)

CIVIL ENGINEERING  
FIELD

Specialization: Engineering Geology

The objective of the program is to train structural engineers who:

- have knowledge on technical development, research and management, and can perform project management tasks related to civil engineering structures and facilities,
- are able to understand and design complex and specialized engineering facilities,
- can manage all activities related to civil engineering and structural engineering in particular, environmental protection, quality control, consumer protection, product liability, the principle of equal access, use,
- are competent in the area of occupational health and safety, technical and economic legislation, as well as basic knowledge of engineering ethics.

Our graduates will develop competence or acquire knowledge in the following areas:

- building construction and reconstruction of buildings integrating building design, construction diagnostics
- analysis of structures, structural statics, dynamics, nonlinear tests, fracture mechanics, modeling of structures
- special structures and related geotechnical, civil engineering activity and soil structure interaction
- 3D land register, building auditing, real estate development, property management and marketing
- engineering geological activity, interactions between the engineering facilities and stone surrounding analysis

The curriculum contains the following subject modules:

Basic science subjects:	17 credits
➤ Mathematics (MSc), Numerical methods, Database systems, Mechanics (MSc), Mathematical base of finite element method, Building physics (MSc)	
Economics and humanities subjects:	8 credits
➤ English communication, European studies, Engineering ethics, Management studies (MSc)	
Professional subjects:	40 credits
➤ Theory of design (MSc), Interaction of soil and superstructure, Building construction (MSc), Construction materials (MSc), Engineering geology (MSc), Environmental geology, Geotechnics (MSc), Hydrogeology, Geology of settlement, Classification of construction stone, Engineering geology of Hungary, Geomorphology, Engineering geology field trip, Complex engineering geology design, Environmental geochemistry	
Optional subjects:	5 credits
Thesis:	20 credits

Duration of studies: 3 semesters, contact hours: 1.200

ECTS credits: 90, internship: 4 weeks (optional for 5 credits)

Final exam:

- Defending the Diploma Project (result of the oral presentation and discussion)
- Two grades based on the written comments of the tutors

**Options for further education**

After graduating our students have the opportunity to continue the training either at the University in different MSc or PhD programs or at any higher educational institutes in Hungary or abroad. Possible MSc programs at the Faculty after credit supplementing:

- Infrastructural Engineering MSc (in Hungarian)
- Urban Engineering MSc (in Hungarian)
- Environmental Engineering MSc (in Hungarian)

**Career:**

The career paths available to structural engineers are many and varied and can involve a wide range of activities, tools, situations, clients, and venues – from conceptual design of facilities that do not yet exist to forensic study of facilities that have failed to perform as expected, from advanced simulation of complex systems to the management of people and projects, and from private consulting to public service.

The following structural engineering activities can be defined: Bridge Engineer • Civil Engineer • Construction Engineer • Design Engineer • Foundation Engineer • Geotechnical Engineer • Project Engineer • Research Engineer • Soils Engineer • Structural Engineer.



**BUILDING CONTRACTOR POSTGRADUATE PROGRAM**

(in Hungarian)

CIVIL ENGINEERING  
FIELD

is to train building contractor professional engineers with up-to-date knowledge of engineering qualifications who, based on their experience gained in the successful engineering activities and higher level vocational skills, are able to lead and organize building processes, construction companies and construction management of complex projects.

Our graduates will develop competence or acquire knowledge in the following areas:

- have knowledge on technical development, research, management, and project management tasks related to civil engineering structures, facilities and construction engineering,
- can understand and design complex and specialized engineering facilities,
- can manage all activities related to construction engineering, structural engineering tasks in particular, environmental protection, quality control, consumer protection, product liability, and the principle of equal access,
- are competent in the area of occupational health and safety, technical and economic legislation, as well as basic knowledge of engineering ethics.

The curriculum contains the following subject modules:

Building science subjects:	30 credits
➤ Construction technology I., Construction technology II., Geotechnics, Structures, Construction technology III.	
Organizational and management subjects:	36 credits
➤ Management skills, Law, Building leadership, Organization, Project management, Enterprise management	
Economic subjects:	34 credits
➤ General economic skills, Pre-calculation and pricing, Quotations and tendering procedure, Enterprise management skills I., Enterprise management skills II.	
Thesis:	20 credits



Duration of studies: 4 semesters, contact hours: 460

ECTS credits: 120, internship: -

Final exam:

- Defending the Thesis (result of the oral presentation and discussion)
- Two grades based on the written comments of the tutors

## **RAILWAY TRACK CONSTRUCTION AND MAINTENANCE POSTGRADUATE PROGRAM**

(in Hungarian)

**CIVIL ENGINEERING  
FIELD**

The objective of the postgraduate program is to train engineers who are able to:

- coordinate and manage the construction, maintenance, and operation of civil engineering tasks, particularly in the case of railways construction and maintenance
- participate in technical or other complex processes
- contribute to management systems
- manage complex rail transportation system and urban transportation related tasks
- manage the railways infrastructure design
- act as designers and / or experts in accordance with the laws and the rules of the corresponding engineering chambers.

Our graduates will develop competence or acquire knowledge in the following areas:

- management, engineering ethics, and overall knowledge of the European Union in the field of railway engineering,
- construction, maintenance and operation, enterprise and regulatory tasks, particularly railway construction and maintenance tasks
- environmental protection, quality control, consumer protection, product liability particularly in the railway construction and maintenance tasks.

The curriculum contains the following subject modules:

Professional subjects	50 credits
➤ Mechanized railway construction, Rail track maintenance work, Welded superstructure, Modern railway structures, Construction and investment practices, IT tools I, IT tools II, Schedule for rail track rehabilitation, Railway track diagnostics, Maintenance of welded superstructure, Management and law.	
Thesis:	10 credits

Duration of studies: 2 semesters, contact hours: 180

ECTS credits: 60, internship: -

Final exam:

- Defending the Thesis (result of the oral presentation and discussion)
- Two grades based on the written comments of the tutors

## **LABORATORY BACKGROUND OF THE CIVIL ENGINEERING FIELD**

### **Laboratory of Geoinformatics and GIS**

- Trimble R6 GNSS Surveying System, Leica GNSS Surveying System, 1 piece of Leica Builder 509 Total Station, Leica TC400 Total Station, Leica TC600 Total Station, Leica D5 Laser Distancemeter with digital pointfinder, Leica Disto Laser Distancemeter, Prexiso Laser Distance Meters, Leica Sprinter 105M Electronic Levels, Leica Runner Automatic (optical) Levels, Leica NA70 Automatic (optical) Levels, Leica LNA10 Laser Levels, ITR5 CAM softwares, etc.

### **Laboratory of Geotechnics**

- Ovens, Calcining furnaces, Odometer devices, Proctor devices, Equipments for shear tests, Many other handy and other tools for testing soil materials, etc.

### **Laboratory for testing materials and structures**

- Concrete impermeability tester, Concrete freezers (prEN 12390-9, MSZ EN 1338, -39; -40), Adhesive strength testing, 8l air content measurements, Concrete shrinkage measurement, Plastic templates for cube test (150×150×150mm), Steel templates for cube tests (150×150×150mm), Steel template for beam tests (150×150×600mm), Steel templates for beam tests (100×100×500mm), Steel templates for beam tests (120×120×360mm), Ultrasonic equipment for determining concrete strength, Schmidt-hammers, Mortar mixers, Moisture meter for wall structures, Pycnometers, Drills (Bosh GBH 2-20 D Professional), Slump tester for fresh concrete, Handy moisture meter for aggregation, universal tensile and compressive test machine with the capacity of 500 kN, Bending frame for flexural test of structural elements with the capacity of 300 kN, Rapid Air 475 porosity tester system, Zyklos 75 concrete-mixer, ELE ADR Auto 3000 testing mashine for compressive tests, ADR Auto 100 bending frame for flexural tests, Ferroskan 250, Testing mashine with the capacity of 20kN, vibro tables for fresh concrete.

## ENVIRONMENTAL ENGINEERING BSC PROGRAM

(in Hungarian and in English)

ENVIRONMENTAL  
ENGINEERING FIELD

Specializations:

- Environmental technology
- Environmental management

The objective of the program is to train environmental engineers who are able to:

- apply up-to-date knowledge in natural sciences, engineering, business management,
- recognize and prevent environmental hazards occurred in different fields,
- mitigate and eliminate environmental problems and damages,
- utilize natural resources rationally, develop and operate cleaner technologies,
- neutralize hazardous waste having knowledge in the field of nature and land conservation, regional policy and environmental management,
- plan, organize and control environmental projects and participate in engineering work creatively.

Our graduates will develop competence or acquire knowledge in the following areas:

- theoretical and practical skills associated with the protection of the environment, and the practical application thereof at the required level,
- understanding basic research streams, practical methods and solutions, ability to pursue research and development activity independently,
- ability to conduct environmental investigations (environmental analysis, monitoring),
- skill to analyze and evaluate technical, economic and social effects related to the environment,
- ability to investigate and analyze the effects of national and regional concepts and programs on the environment,
- investigation of the qualitative and quantitative features of environmental elements and systems, compilation and realization of measurement plans, evaluation of data obtained,
- understanding, selection and control of methods and technologies ensuring sustainable development.

The curriculum contains the following subject modules:

Basic science subjects: 45 credits

- Mathematics, Engineering Physics, General Chemistry, Geology, Introduction to Biology, Ecology

Economics and humanities subjects: 20 credits

- Economics, Quality Management, State Administration and Law, Introduction to Ethics, European Studies

Professional subjects: 118 credits

- Industrial Safety, Geoinformatics, Protection of Aquatic Environment, Nature and Landscape, Basics of Meteorology, Hydrology, Environmental Status and Impact Assessment, Unit operation, Noise and Vibration Protection, Waste Management, Air Pollution Control, Soil Protection, Measurement Techniques and Monitoring of Environment, Water Management and Water Quality Protection

Optional subjects: 12 credits

Thesis: 15 credits

Duration of studies: 7 semesters, contact hours: 2532

ECTS credits: 210, internship: 2 and 6 weeks

Final exam:

- Defending the Thesis (oral presentation and the discussion)
- Exam on two subjects chosen by the student Air Pollution Control, Water Management and Water Quality Protection, Soil Protection, Nature, Landscape and Aquatic Environment Protection, Noise and Vibration Protection, Waste Management, Environmental Operations, Environmental Management, Environmental Status and Impact Assessment

### Options for further education

After graduation environmental engineers, BSc, may continue their studies at MSc programs related to the environmental engineering field.





**ENVIRONMENTAL ENGINEERING MSc PROGRAM**

(in Hungarian)

ENVIRONMENTAL  
ENGINEERING FIELD

Specializations:

- Built environment
- Environmental technology, planning and construction

The objective of the program is to train environmental engineers who are able to:

- apply up-to-date knowledge in natural sciences, engineering, business management,
- recognize and prevent environmental hazards occurred in different fields,
- mitigate and eliminate environmental problems and damages,
- utilize natural resources rationally, develop and operate cleaner technologies,
- neutralize hazardous waste having knowledge in the field of nature and land conservation, regional policy and environmental management,
- plan, organize and control environmental projects and participate in engineering work creatively.

Our graduates will develop competence or acquire knowledge in the following areas:

- theoretical and practical skills associated with the protection of the environment, and the practical application thereof at the required level,
- understanding basic research streams, practical methods and solutions, ability to pursue research and development activity independently,
- ability to conduct environmental investigations (environmental analysis, monitoring),
- skill to analyze and evaluate technical, economic and social effects related to the environment,
- ability to investigate and analyze the effects of national and regional concepts and programs on the environment,
- investigation of the qualitative and quantitative features of environmental elements and systems, compilation and realization of measurement plans, evaluation of data obtained,
- understanding, selection and control of methods and technologies ensuring sustainable development.

The curriculum contains the following subject modules:

Basic science subjects:	24 credits
➤ Mathematics, Engineering Physics, Environmental Chemistry and Toxicity, Geosciences knowledge, Environmental Biology and Nature Protection, Ecology	
Economics and humanities subjects:	10 credits
➤ Economics, Quality Management, Environmental Law and Management, Research Methodology	
Professional subjects:	55 credits
➤ Environmental Engineering Measurement Technology, Monitoring, Environmental Health, Environmental Modeling, Environmental Operations, Environmental Resource Management, Environmental State Assessment, Auditing, Environmental Management Systems and Life Cycle Analysis, Safety and Environmental Risk	
Optional subjects:	6 credits
Diploma Work:	25 credits

Duration of studies: 4 semesters, contact hours: 1455

ECTS credits: 120, internship: 4 weeks

Final exam:

- Defending the Diploma Work (oral presentation and the discussion)
- Exam on two subjects chosen by the student
  - Principal Professional Subjects:
    - Environmental Impact Assessment and Audit
    - Environmental Operations III.
  - Special Professional Subjects (according to the specializations):
    - Water and Soil Protection
    - Built Environment and Renewable Energy

**Options for further education**

After graduation environmental engineers, BSc, may continue their studies at PhD programs related to the environmental engineering field.



#### Job prospects

- specialized sectors (industry, agriculture, transport, etc.).
- adaptation of technologies, design sub-tasks;
- local governments of the areas;
- education and public opinion formation and propaganda;
- environmental protection administration;
- monitoring and environmental assessment;
- identify sources of pollution.

Graduates from the MSc programme in Environmental Engineering are professional and versatile engineers, qualified for Hungarian, European and international careers.

## TECHNICAL ENVIRONMENTAL ENGINEER POSTGRADUATE PROGRAM (in Hungarian)

ENVIRONMENTAL  
ENGINEERING FIELD

The objective of the program is to train technical environmental engineers who are able to:

- identify potential environmental hazards using their modern ecological, technical and environmental management skills,
- assess, prevent and reduce environmental damage,
- manage remediation projects,
- develop and apply appropriate technologies to prevent environmental pollution.

Our graduates will develop competence or acquire knowledge in the following areas:

- theoretical and practical skills associated with the protection of the environment,
- understanding basic research streams, practical methods and solutions, ability to pursue research and development activity independently,
- ability to conduct environmental investigations (environmental analysis, monitoring),
- ability to investigate and analyze the effects of national and regional environmental concepts and programs,
- investigation of the qualitative and quantitative features of environmental elements and systems, compilation and realization of measurement plans, evaluation of the obtained data,
- organization and management of local governmental activities in the field of environmental protection.

The curriculum contains the following subject modules:

Basic science subjects:	30 credits
➤ Environmental Chemistry and Analytics, Applied Biology and Ecology, Environmental Economics, Environment Protection, Environment Control	
Core professional subjects:	50 credits
➤ Noise and Vibration Protection, Soil Protection, Water Management and Water Quality Protection, Air Pollution Control, Unit Operation, Renewable Resources, Waste Management	
Specialized professional subjects:	30 credits
➤ Artificial Industrial Environment, Environmental Law, Basics of Economical Energy Use, Environmental Impact Studies, Environmental Licensing Procedures, Health and Safety	
Thesis:	10 credits

Duration of studies: 4 semesters

Contact hours: 3.600 (360 institutional hour and 3.240 individual preparation)

ECTS credits: 120, internship: -

Final exam:

- Defending the Thesis (oral presentation and discussion)
- Exam on two subjects:  
Noise and Vibration Protection, Soil Protection, Water Management and Water Quality Protection, Air Pollution Control, Unit operation, Waste Management, Environmental Impact Studies, Environmental Licensing Procedures

## LABORATORY BACKGROUND OF THE ENVIRONMENTAL ENGINEERING FIELD

- Air and Noise Protection Laboratory: measurements of in situ noise and vibration tests, data processing with IMMI noise mapping software. Main devices and instruments: 20 PC, basic softwares for modeling noise and vibration measurements (IMMI, SAMURAI) and environmental processes (MATLAB, Control System Toolbox, Simulink Toolbox), Soundbook universal multi-channel acoustic measuring system, four channel analyzer with Samurai software for vibration and noise measurements, PDV 100 portable digital vibrometer, SINUS 3D seismometer, Larson Davis 831 sound level meter
- Biomechanical material test Laboratory: determination of mechanical properties of polymer structural materials and biomaterials in contrast with stress by a biaxial servo hydraulic material test machine (INSTRON 8874).
- Water Quality Protection Laboratory: Main devices and instruments: DIONEX ICS3000 ion chromatographic system, Shimadzu Vcfn TOC instrument, BOD OXITOP IS 12 measurement, Nanocolor Linus spectrophotometer, with thermo block, TURB-555 IR Turbidimeter, Classical analytical methods

## MECHANICAL ENGINEERING BSC PROGRAM

MECHANICAL  
ENGINEERING FIELD

Specializations:

- Operation and Maintenance (in Hungarian and in English)
- Automotive Engineering (in Hungarian)
- Building Services (in Hungarian, see Building Engineering field)

The objective of the program is to train mechanical engineers who are able to

- operate and maintain machines, vehicles and mechanical devices,
- introduce engineering technologies and apply them, organize and control work phases, mechanical development;
- solve general problems of research and planning as expected by the labor market and have in-depth theoretical knowledge
- continue their studies in the second cycle.

Our graduates will develop competence or acquire knowledge in the following areas:

- introducing and applying modern technologies and computational engineering methods and systems (manufacturing technologies, CAE)
- operating and developing mechatronics systems (electrotechnics and electronics, measuring and automatics, hydraulics and pneumatics),
- operating and maintaining machines and mechanical devices (mechanical system engineering, heat and fluid machines),
- organizing and controlling operational processes, mechanical development,
- planning the construction and designing the machine parts, devices and apparatus (machine elements, CAD, finite element method),
- solving general problems of research and planning as expected by the labor market (studies of administration and law, basics of quality assurance, management for engineers, safety engineering),
- carrying out diagnostic testing, assessing reliability of machines and devices (fracture mechanics, non-destructive testing and diagnostics)

The curriculum contains the following subject modules:

Basic science subjects: 48 credits

- Mathematics, Technical Mechanics, Engineering Physics, Operation and Theory of Machines, Thermodynamics and Fluid Mechanics, Technical Chemistry

Economics and humanities subjects: 20 credits

- Economics for Engineers, Microeconomics, Basics of Quality Management, Management for Engineers, State Administration and Law, Introduction to Ethics

Professional subjects: 117 credits

- Informatics, Descriptive Geometry, Technical Drawing, Machine Elements, CAD and CAE, 3D Computer Aided Design, Material Science, Technology of Structural Materials, Electrotechnics and Electronics, Measurements and Automatics, Thermal and Fluid Machines, Manufacturing Processes, Logistics, Industrial Safety

Field-specific vocational subjects:

*Operational and Maintenance Specialization:* Steel Constructions, Hydraulics and Pneumatic Machines, Fracture Mechanics, Manufacturing Planning, Diagnostics, FEM, PLC, Material Handling and Robotics, Drivetrain Optimization, Machine Repairing, Maintenance Engineering

*Automotive Engineering Specialization:* Steel Constructions, Fracture Mechanics, Internal Combustion Engines, PLC, FEM, Automotive Constructions, Maintenance of Service-court, Power Transmission Devices of Vehicles, Hydraulic and Pneumatic Systems of Automotive, Automotive Electronics and Diagnostics

Optional subjects: 10 credits

Thesis: 15 credits

Duration of studies: 7 semesters, contact hours: 2,352

ECTS credits: 210, internship: 6 weeks

Final exam:

- Defending the Thesis (oral presentation and discussion)
  - Exam of two subjects chosen by the student
- Operation and Maintenance specialization:  
Machine Repairing, and one subject chosen by the student:  
Material Handling and Robotics  
or Maintenance Engineering
- Automotive Engineering specialization:  
Internal Combustion Engines,  
and one subject chosen by the student:  
Automotive Electronics and Diagnostic or  
Power Transmission Devices of Vehicles



## TECHNICAL DIAGNOSTICS POSTGRADUATE PROGRAM

(in Hungarian)

MECHANICAL  
ENGINEERING FIELD

The objective of the program is to train mechanical engineers who are able to

- assess the up-to-date diagnostic testing based on their professional knowledge and their knowledge of natural sciences,
- choose the most appropriate method for solving an arising technical problem,
- apply the available diagnostic gauges and measuring programs,
- plan and develop maintenance systems, and carry out particular diagnostic measuring

Our graduates will develop **competence or acquire knowledge** in the following areas:

- damage theory of machines, remote surveillance of machines,
- operation and maintenance of machines and mechanical devices (mechanical system engineering, heat and fluid machines),
- applying maintenance strategies, organizing and controlling maintenance procedures,
- carrying out diagnostic testing, assessing the reliability of machines and devices (fracture mechanics, non-destructive testing and diagnostics),
- solving general problems of research and planning as expected by the labor market (studies of administration and law, basics of quality assurance, management for engineers, safety engineering).

The curriculum contains the following **subject modules**:

Basic science subjects:

34 credits

- Mathematics, Databases, Economics, Quality Management, Basics of Maintenance Engineering, Tribology, Damage Theory, Diagnostic Modeling.

Professional subjects:

76 credits

- Fracture Mechanics, Non-Destructive Testing, Basics of Vibration Diagnostic, Reliability, Dynamic Modeling of Mechanical Systems, Advanced Maintenance strategies, Industrial Application of Diagnostics Measuring, Diagnostics of Mechatronic Systems, Measuring and its Apparatus, Damage Theory, Inspection and Maintenance, Advanced machine repairing, On-board Diagnostic of Mobile Machines, Accredited Material Testing

Thesis: 10 credits

Duration of studies: 4 semesters, contact hours: 840

ECTS credits: 120, internship: -

Final exam:

- Defending the Diploma Work (oral presentation and the discussion)
- Exam on two subjects:
- Advanced Maintenance strategies
- Industrial application of diagnostic measuring

### Options for further education

After graduation students have the opportunity to continue their studies either at the Faculty in different MSc programs or at any higher educational institution in Hungary or abroad.

Possible MSc programs at the Faculty after credit supplementing:

- Engineering Manager MSc (in Hungarian)
- Building Engineering MSc (in Hungarian)
- Environmental Engineering MSc (in Hungarian)
- Mechatronics Engineering MSc (in Hungarian and in English)

After graduation students have the opportunity to continue the training in postgraduate programs as well to obtain a post graduate diploma.

### Job prospects

- machine industry
- building trade industry
- vehicle industry and transport
- agriculture production and packaging technology.



## MECHATRONICS ENGINEERING BSC PROGRAM

(in Hungarian and in English)

MECHATRONICS  
ENGINEERING FIELD

Mechatronics is a relatively new branch of science and engineering and is defined as "a combination of mechanical engineering, electronic engineering, computer engineering, software engineering, control engineering, and systems design engineering in order to design and manufacture useful products". It is a multidisciplinary field of engineering, that is to say it rejects splitting engineering into separate disciplines.

The objective of the program is to train good mechatronic engineers who have interdisciplinary knowledge and are skilled in a very wide scope of bordering and pervading branches of technology, since it is a very difficult and demanding profession. Several market surveys show that mechatronics engineering is one of the most sought-after professions nowadays and it will be even more needful in the coming decades.

Our graduates will develop competence or acquire knowledge in the following areas:

- Mechanical engineering and material science,
- Electrical and electronic engineering,
- Computer engineering and computer science,
- Automated systems and control engineering,
- Telecommunication and optoelectronics,
- Robotics.

The curriculum contains the following subject modules:

Basic science subjects:	48 credits
➤ Mathematics, Technical Mechanics, Engineering Physics, Introduction to Mechanical Engineering, Thermodynamics and Heat Transfer, Technical Chemistry	
Economics and humanities subjects:	20 credits
➤ Economics, Quality Management, State Administration and Law, Introduction to Ethics	
Professional subjects:	117 credits
➤ Informatics, Descriptive Geometry, Technical Drawing, Machine Elements, CAD, CAE, 3D Computer Aided Design, Material Science and Testing, Technology of Structural Materials, Electrotechnics and Electronics, Measuring and Automatics, Fluid Mechanics and Hydraulics, Mechatronics, PLC programming, Digital techniques, Robot techniques, Building automation	
Optional subjects:	10 credits
Thesis:	15 credits

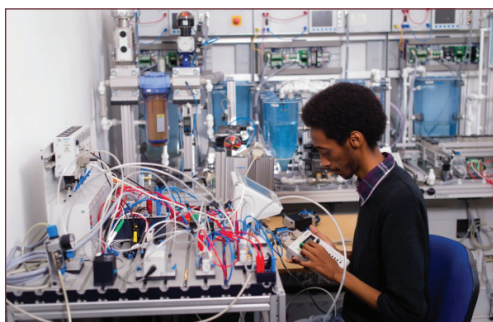
Duration of studies: 7 semesters, contact hours: 2,352

ECTS credits: 210, internship: 6 weeks

Final exam:

Defending the Thesis (oral presentation and discussion)

- Topics of CAD and CAE techniques, Programmable logic controllers, Electrical machines and drives
- Topics of Measuring and automatics, Building Automatics



## MECHATRONICS ENGINEERING MSC PROGRAM

(in English)

MECHATRONICS  
ENGINEERING FIELD

The Department of Electrical Engineering and Mechatronics, University of Debrecen (Hungary) has a joint Master of Science Program in Advanced Mechatronics Systems with the Department of Mechatronics and Robotics University of Oradea (Romania).

The objective of the program is to train mechatronic engineers who need to be comfortable and competent with cutting-edge technologies in mechanical and electrical and electronic engineering. Graduates of the program will be able to design, construct and maintain intelligent machines, micro-machines, smart structures, intelligent systems, control systems and consumer products such as cameras, washing machines or fully automated robotic assembly line or they may be involved with defense technology and systems.

Our graduates will develop competence or acquire knowledge in the following areas:

- mechanics,
- electronics,
- design,
- signal analysis and processing,
- computer systems,
- computer science,
- sensor and actuator technology,
- automatic control,
- electrical system design,
- robotics and microprocessor technology

The curriculum contains the following subject modules:

The curriculum of the Advanced Mechatronics Systems Master study program, prepared in accordance with national regulations and those of the University of Oradea, contains advanced knowledge courses (DCA), thorough knowledge courses (DA) and courses of synthesis (DS). The curriculum is linked to the curricula of related undergraduate study programs in the field, especially the programs of Mechatronics and Robotics.

Since the accreditation process was carried out at the University of Oradea, please find all updated information at the following link:

<http://imtuoradea.ro/huromecha/platform>

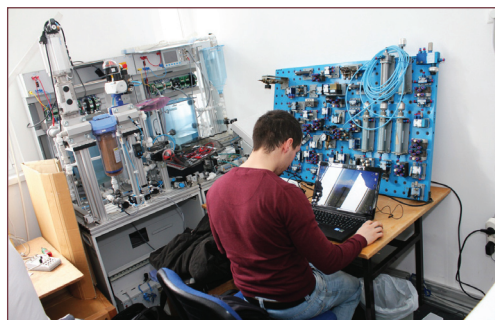
Duration of studies: 4 semesters, contact hours: 784

ECTS credits: 120

To obtain the Master degree, students of the Advanced Mechatronic Systems study program must accumulate the following number of credits:

- 110 credits for required courses
- 10 credits for optional courses
- 10 credits for thesis presentation.

A total of 14 hours per week in semester 4 have been allocated for students to prepare their thesis and prepare for the final exam.



## MECHATRONICS ENGINEERING MSc PROGRAM

(in Hungarian)

MECHATRONICS  
ENGINEERING FIELD

The objective of the program is to train mechatronics engineers who are comfortable and competent with cutting edge technologies in both Mechanical and Electrical and Electronic Engineering. They may design, construct and maintain intelligent machines, micro-machines, smart structures, intelligent systems, control systems and consumer products such as cameras, washing machines or fully automated robotic assembly lines or they may be involved with defense technology and systems.

Our graduates will develop competence or acquire knowledge in the following areas:

- mechanics,
- electronics,
- design,
- signal analysis and processing,
- computer systems,
- computer science,
- sensor and actuator technology,
- automatic control,
- electrical system design,
- robotics and microprocessor technology

The curriculum contains the following subject modules:

- |  |            |
|--|------------|
| Basics of natural sciences:  | 26 credits |
| ➤ Mathematics, Application of differential equations, Theory of Optimal Control, Selected Chapters from Electronics, Building Structures, Dynamics of Mechanical Systems, Material Science, Heat and Fluid Technology. |            |
| Economics and Humanities:  | 12 credits |
| ➤ Management, Studies of adm. authority and law  |            |
| Specific compulsory subjects:  | 28 credits |
| ➤ Digital Servo Drives, Measuring and modeling, Control Theory, Real-time embedded system programming, Image process, Electronics Technology, Computer simulation.   |            |
| Field-specific vocational subjects: Building Mechatronics Specialization:  | 18 credits |
| ➤ Building Service Systems and Elements I, Building Control and Safety Technology, Design of Building Mechatronics Systems.  |            |

Thesis: 30 credits

Duration of studies: 4 semesters, contact hours: 1560

ECTS credits: 120, internship: 4 weeks

Final exam:

Defending the Diploma Work

(oral presentation and discussion)

- Mechatronic subject topics: Measuring and modeling, Dynamics of Mechanical Systems
- Electrotechnics-Electronics subject topics: Digital Servo Drives, Selected Chapters from Electronics, Building Structures
- Building mechatronic subject topics: Building Control and Safety Technology, Design of Building Mechatronics Systems





## LABORATORY AND TUTORIAL WORKSHOP BACKGROUND OF THE MECHANICAL ENGINEERING AND MECHATRONICS ENGINEERING FIELDS

**Biomechanical materials testing lab:** for testing prosthesis', plastics' and light metals' joints. Applied equipment: INSTRON 8874 universal biaxial materials testing machine.

**LabView teaching room:** The basic teaching of LabView is carried out by 8 colleges trained by National Instruments (NI), in the teaching room supplied with 40 PCs. This lab is equipped with the latest technology of NI.

**LEGO MINDSTORM teaching room:** Thanks to LEGO Hungary, 8 pieces of LEGO MINDSTORM robots are available for teaching the basics of the robot actuation and sensing technologies.

**Machine elements lab:** oscilloscope, photo elastic bench, Spider 8 amplifier, DMC 9012 amplifier, CATMAN evaluating software, force transducer, torque transducer, inductive displacement transmitter, test pads.

**Machine repairing lab:** hand tools, turning lathe, Castolin ROTOTEC type flame spraying pistol, EUTALLOY Super Jet type flame spraying pistol, column-type drilling machine.

**Machining shop:** 5 machine lathes, 2 milling machines, gear-cutting machines, generating milling cutters, centre grinder, web-framed cross-cut saw, EMCO PC Mill type CNC drilling machine, CKE 6136i type CNC turning machine.

**Material testing lab:** OLYMPUS GX41, NEOPHOT-2 and EPIGNOST-2 type metal microscopes.

**Measuring lab:** calliper gauge, micrometer calliper gauge, base tangent length micrometer, optical dividing head.

**Mechanical technology lab:** tensile-testing machine, ZD 20 type hardness tester, impact-tester, Brinell microscope, fatigue-testing machine.

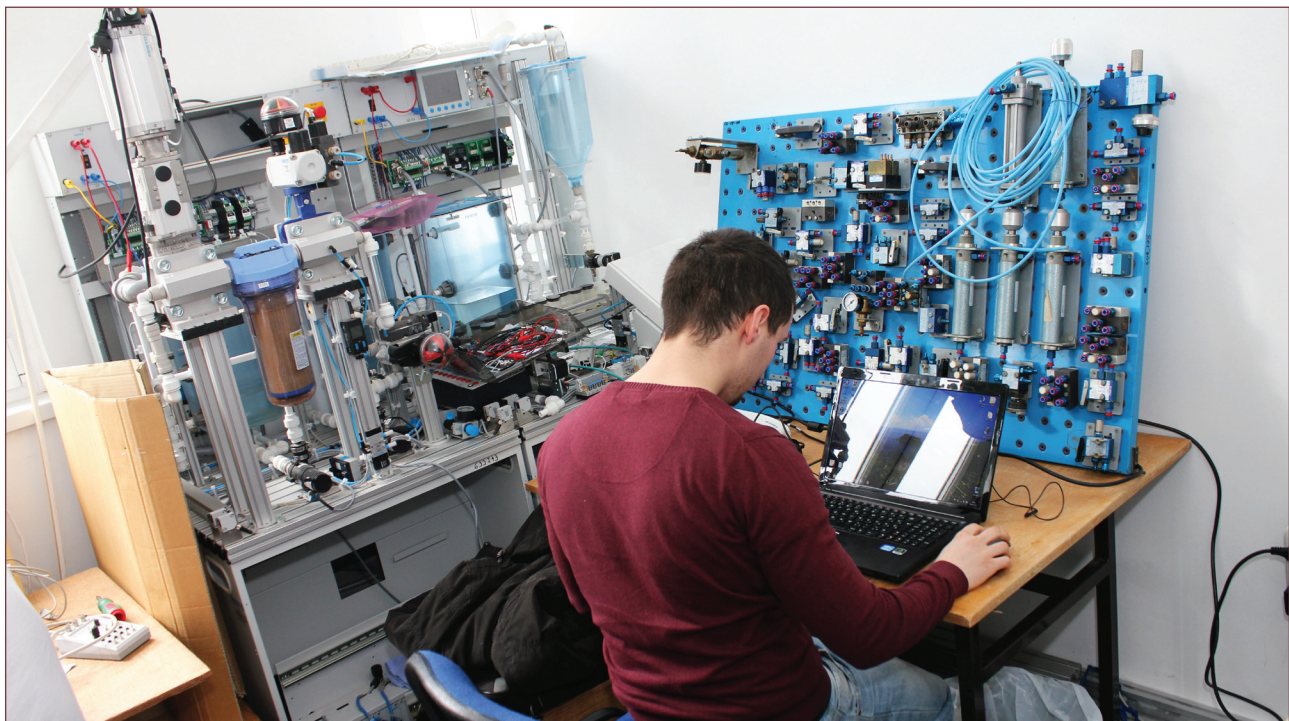
**Metallographic lab:** NEOPHOT type 2 and EPIGNOST type 2 microscopes, grinding- and polishing machines, power supply and auxiliary tools for electrolytic etching

**SKF and diagnostics lab:** manual OILCHECK equipment, CMVP type 10 vibrometer pen, CMVP type 30 SEE pen, shock impulse analyzer with PRO32-2 and PRO46-2 software, Testo 816 type acoustimeter, infrared distance thermometer, UNIBALANCE 4 type balancing equipment, informatics background

**Welding workshop:** 8 gas welder workstations, 6 manual arc welding workstations, 3 consumable-electrode welding workstations, 3 argon-shielded tungsten-arc welding workstations.

**X-Ray lab:** MXR type equipment, Liliput type radiation source, VA-J-15 type radiation-measuring assembly, densitometer, processing gauge, radiographic materials testing, magnetic crack detection, ultrasonic testing, liquid-penetrant testing.

**ZF Lenksysteme Hungary Automotive Laboratory:** The laboratory is equipped with ZF Lenksysteme Hungary's products, mountable steering systems and steering columns.



### **Laboratories of the Building Mechatronics Research Center**

**Building mechatronics research laboratory:** The purpose of the laboratory is the elaboration of methods to carry out the intelligent evaluation of measurements, intervention and planning. The competence of the laboratory includes the integrated parts of building automation, building supervision and security techniques including the operation of necessary sensors, regulators and interveners, which is defined as building mechatronics.

**Hydraulics laboratory:** The lab presents the most modern hydraulic systems and research in the field of hydraulics and the teaching of hydraulic subject-matters on the basis of the programs elaborated by FESTO Ltd. Didactic, resp. BOSCH-Rexroth. The laboratory has been set up and is sponsored by BOSCH-Rexroth Ltd. and FESTO Didactic Ltd.

**Laboratory of electronic engineering and electronics (Rohde & Schwarz reference lab):** The main competence of the laboratory is the measuring of electric quantities in the field of mechatronics, mechanical engineering and chemical mechanical engineering by means of digital and analogue circuits. There are 10 measuring stations in the laboratory, which means that 20 students can carry out measurements at the same time.

**Laboratory of re-configurable mechatronics controllers:** The purpose of the laboratory is the research and further development of intelligent controllers by using freely configurable digital electronic tools.

**Measurement and Control Engineering Laboratory:** The following tools are of cardinal importance in the laboratory for the support of teaching and research activities:

- storing oscilloscope
- power-supply unit
- digital manual instruments
- plotter
- function generator
- data collection and signal conditioning unit

**MPS manufacturing line laboratory:** In the lab students apply the program elaborated by FESTO Ltd. Didactic in the field of pneumatics, electro-pneumatics, hydraulics, electro-hydraulics, PLC technique, driving technique, mechatronics and sensor technique to study the operation of manufacturing lines.

**MPS PA laboratory:** The lab facilitates the acquisition of research processes of the flow of industrial liquids and the control of closed and open systems. FESTO Didactic's Learning System for process automation and technology is orientated towards different training and educational requirements.

**NI Elvis (Educational Laboratory Virtual Instrumentation Suite) Lab:** The NI Educational Laboratory Virtual Instrumentation Suite (NI ELVIS) features an integrated suite of 12 of the most commonly used instruments in the lab – including the oscilloscope, digital multimeter, function generator, variable power supply, and Bode analyzer – in a compact form factor for the lab or classroom demonstrations. Based on NI LabVIEW graphical system design software, NI ELVIS, with USB plug-and-play capabilities, offers the flexibility of virtual instrumentation and allows for quick and easy measurement acquisition and display.

**Pneumatics laboratory (FESTO FACT - Festo Authorized and Certified Training Center):** The lab is equipped with the didactic programs of FESTO Ltd. in the field of pneumatics, electro-pneumatics, hydraulics, electro-hydraulics, PLC technique, driving technique, mechatronics and sensor technique for teaching the pneumatics systems.

**Robotics laboratory:** The lab contains 16 workstations of robot technology, allowing 32 students to work simultaneously. There are altogether 16 PLC controlled robots at the 16 workstations.

**Schneider Electric knowledge center:** provides all teaching, research, expert and advisory activities concerning the products of Schneider Electric and the examination of the possibility of their non-conventional use. The laboratory is suitable for the following activities:

- Teaching of industrial controls by means of small and medium PLCs and realization of real industrial processes on twido demonstration tables built with PLCs of type M340.
- Regulation of driving technical models by programming frequency changers (ATV11, ATV31 and ATV71).
- Complex engineering tasks by connecting operating models into the network.

### **IT laboratories and software**

- |                       |                            |
|-----------------------|----------------------------|
| ➤ AutoCAD® Map 3D     | ➤ Autodesk® Robot™         |
| ➤ AutoCAD®2010        | ➤ ECOTECT                  |
| ➤ Solid Edge          | ➤ LabVIEW                  |
| ➤ FEMAP v9.3          | ➤ RobotStudio              |
| ➤ Autodesk® Inventor® | ➤ Fanuc Oi MATE TC Control |
| ➤ AutoCAD® Electrical |                            |

**TECHNICAL MANAGER BSC PROGRAM**

(in Hungarian and in English)

**TECHNICAL MANAGEMENT  
FIELD**

The objective of the program is to train technical managers who are equipped with knowledge of sciences, economics and leadership skills and possess engineering and informatics skills topped with good command of English to manage complex management and economics related tasks, such as planning, organizing and implementing technological procedures and assess and evaluate the results.

Our graduates will develop competence or acquire knowledge in the following areas:

- monitoring production and service procedures from technical, economic, human and social perspectives and communicating with experts from different fields,
- preparing and implementing business plans,
- preparing engineering and economic decisions for decision making processes,
- working out and realizing innovation,
- making judgments and forming opinions, making decisions and drawing conclusions,
- planning, organizing, coordinating production systems and procedures,
- solving engineering value analysis tasks,
- quality management of production systems and technologies,
- improving economic and quality efficiency indicators.

The curriculum contains the following subject modules:

- |   |             |
|---|-------------|
| Basic science subjects:   | 50 credits  |
| ➤ Mathematics, Mechanics for Managers, Representation Techniques, Introduction to Biology, Engineering Physics, Statistics, Engineering Informatics, Materials Science, Technical Chemistry, Security System Techniques   |             |
| Economics and humanities subjects:  | 30 credits  |
| ➤ Microeconomics, Macroeconomics, Business Economics, Introduction to Accounting, Philosophy, Psychology, Applied Economics, Quality Management   |             |
| Professional subjects:  | 103 credits |
| ➤ Technical Management, CAD and CAE techniques, Business law, Geo Informatics, Marketing, Macroeconomics Finance, Corporate Finance, Corporate Systems, Production Management, Product Management, Introduction to Mechatronics, Human Resource Management, Strategic Management, Descriptive Geometry, Technical Elements, General Mechanics, Maintenance, Project Management, Communication, Analysis and Controlling, Project Work, Logistics, Material Handling and Robotics, Innovation Management, Technology of Structural Materials |             |
| Optional subjects:  | 12 credits  |
| Thesis:   | 15 credits  |

Duration of studies: 7 semesters, contact hours: 2.622

ECTS credits: 210, internship: 4 weeks

Final exam:

- Defending the Thesis (oral presentation and the discussion)
- Exam on two subjects chosen by the student
  1. Technical module: Logistics I-II.
  2. Management module: Marketing, Quality management, Business economics, Production management, Project management, Corporate finance



## ENGINEERING MANAGER MSC PROGRAM INDUSTRIAL SPECIALIZATION

(IN HUNGARIAN)

TECHNICAL MANAGEMENT  
FIELD

The objective of the program is to train and educate technical managers who are equipped with scientific, engineering, informatics, economics and organizational knowledge and with a good command of a foreign language to manage complex engineering-economics tasks, plan and implement technical and economic processes and evaluate the results.

Our graduates will develop competence or acquire knowledge in the following areas:

- putting the acquired theoretical knowledge into practice and applying problem solving skills;
- reviewing production and service processes from different perspectives such as engineering, economic, human and social perspectives and facilitating communication among the representatives of the different fields of expertise;
- planning and implementing business plans;
- preparing tasks to facilitate engineering and economic decision making procedures and making decisions
- evaluating procedures, making judgments, forming opinion, making decisions and drawing the necessary conclusions;
- quality management of production systems and technologies;
- improving quality and efficiency indicators

The curriculum contains the following subject modules:

Basic science subjects:	30 credits
➤ Quantitative Methods, Mechanics for Managers II., Results and Applications of Modern Physics, Basics of Nanotechnology, Ecological Planning, Econometrics,	
Economics and humanities subjects:	20 credits
➤ Organizational Development, Economic Law, Leadership Competence Development, Leadership Accountancy	
Professional subjects:	30 credits
➤ Engineering Technological Elements I., Advanced Quality Management, Engineering Technological Elements II., Risk and Reliability, Integrated Informatics Systems Control,	
Optional subjects:	10 credits
Thesis:	30 credits

Duration of studies: 4 semesters, contact hours: 1276

ECTS credits: 120 , internship: min.4 weeks



Final exam:

- Defending the Diploma Work (oral presentation and the discussion)
- Exam on two subjects chosen by the student
  1. Integrated Technical subject topics: Engineering Technological Knowledge I.; Engineering Technological Knowledge II.; a subject from Module I. and a subject from Module II.
  2. Integrated Management subject topics: Operating Integrated Informatics Systems, Advanced Quality Management; Leadership Competence Development; Production and Service Management

**LEAN POSTGRADUATE PROGRAM**

(in Hungarian)

**TECHNICAL MANAGEMENT  
FIELD**

The objective of the program is to train engineers and other professionals who are able to:

- have general knowledge and skills related to "lean philosophy" and the application of the LeanKey method,
- are familiar with all phases of operations and can rationalize production and service in a goal-oriented way,
- can apply methods to reduce production losses and apply lean principles at their own organizations in the fields of production and logistics,
- can formulate a lean philosophy and achieve improvement in the operation of the whole organization, thus producing considerable savings which makes the targeting of new market segments possible.

Our graduates will develop competence or acquire knowledge in the following areas:

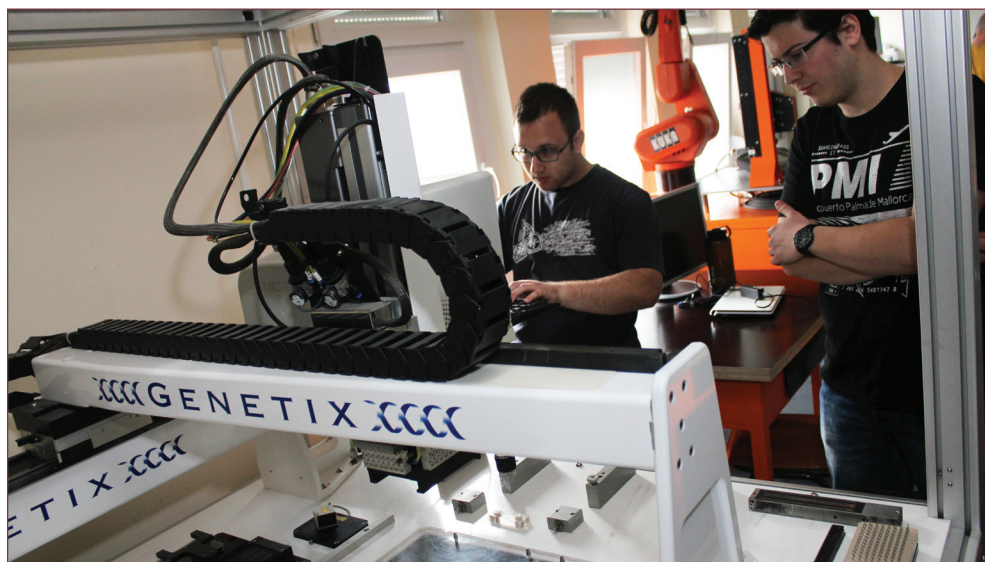
- practice oriented task assessment, systematic problem solving, rationalization of production processes and expert participation in lean system development, introduction and operation of lean systems,
- rationalization of production processes, continuous development, application loss reduction methods,
- development and operation of lean systems, management tools and methods,
- practices of quality development, maintenance management,
- performance analysis and company assessment,
- rationalizing production in an Organizational unit independently by applying lean methods, and all related processes

The curriculum contains the following subject modules:

Basic science subjects:	20 credits
➤ Lean Management Elements, Quality Management, Quality Development Supporting Techniques, Lean Management I., Lean Management Methods I.,	
Professional subjects:	35 credits
➤ Production and Operation Management, Measuring, Evaluation, Organizational Theory and Organizational Behavior, Lean Management II, Lean Management Methods II., Process Management, Performance Analysis and Company Assessment, Measuring, Evaluation, II., Maintenance Management	
Thesis:	5 credits

Duration of studies: 2 semesters, contact hours: 224

ECTS credits: 60



Final exam:

Defending the Thesis (oral presentation and discussion)

Exam on two subjects chosen by the student:

1. Quality Management; Quality Development Techniques; Production Management
2. Lean Management; Lean Management Methods; Maintenance Management

## QUALITY CONTROL MANAGEMENT POSTGRADUATE PROGRAM

(in Hungarian)

TECHNICAL MANAGEMENT  
FIELD

The objective of the program is to train engineers who are able to:

- plan, introduce and operate quality management systems independently as well as manage company management systems in a specific organizational unit (MIR, KIR etc.),
- perform independent consultation and auditory activities as these are included in the postgraduate specialization training,
- perform internal and external audits and be active members in the auditory group.

Our graduates will develop competence or acquire knowledge in the following areas:

- practice oriented task assessment, systematic problem solving,
- independent development and operation of quality management,
- expert participation in the development of quality management system,
- introduction and implementation of TQM systems,
- techniques required for the introduction and operation of quality management system,
- standards and regulations,
- auditing,
- basics of quality management, management systems,
- metrology,
- information technology systems supporting quality management.

The curriculum contains the following subject modules:

Basic science subjects:	20 credits
➤ Applied Mathematical Statistic Methods, Standardization and Law, Organizational Quality Management Systems, Techniques Supporting Quality Development, Leadership Skills, Production Management,	
Professional subjects:	35 credits
➤ Measuring Evaluation I., Product Quality Design and Development, Auditing Techniques, Organizational Quality Systems II., Techniques Supporting Quality Development II., Maintenance Management, Reliability, Measuring, Evaluation II.	
Thesis:	5 credits

Duration of studies: 2 semesters, contact hours: 224

ECTS credits: 60

Final exam:

- Defending the Thesis (oral presentation and discussion)
- Exam on two subjects:
  1. Organizational Quality Management Systems;
  2. Quality Management Techniques

# „GREEN ENERGY” Higher Education Cooperation

## ZENFE

TÁMOP 4.1.1.C-12/1/KONV-2012-001

**Duration:** 01.04.2013 - 31.03.2015. (24 months)

**Total Budget:** 1 300 million HUF

**Project leader:** University of Debrecen – Faculty of Engineering,  
dr. Szűcs Edit (Sub-Budget: 331 million HUF)

**Project partners:** College Károly Róbert (Gyöngyös),  
University of West Hungary (Sopron),  
University of Pécs (Pécs),  
University of Szeged (Szeged)

**Professional Coordinator:** dr. Grasselli Gábor

**Project Manager:** Gregán Orsolya, Szén Mónika

**Financial Manager:** Rácz Nóra Dóra



The objective of the „GREEN ENERGY” Higher Education Cooperation project no. TÁMOP 4.1.1.C-2012/1/KONV-2012-0012 (ZENFE) is the support of coordination of five higher educational institutes and regional sectoral organizations.

ZENFE aims at the development of the competitiveness of Hungary, establishment of new workplaces and the modernization of living conditions, using the opportunities of science and innovation of higher education in the fields of green economy and green energy.

The purpose of ZENFE is to establish a long running, competitive, modern, and internationally successful sectoral cooperation scheme of higher educational institutions in order that the project members enlarge the knowledge base of green energy industry, harmonizing and fostering their scientific, educational and service activities, and strengthening the competitiveness of the communities, enterprises, institutions and graduated students.

The activities of ZENFE are supported by the Virtual Institute ZEVI initiated by the project along with the following key points:

1. organizational development,
2. development of training programs, and mentor services,
3. widening the international relations,
4. operating the career centres,
5. cooperation of institutes and micro regions
6. special activities in sector.

With the new sectoral cooperation, and organizational development, a complex knowledge base and educational infrastructure will be established in green economy and green energy which enables the optimal technical and economical usage of resources of nature taking into account the changing environmental conditions.

**SZÉCHENYI** 2020



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