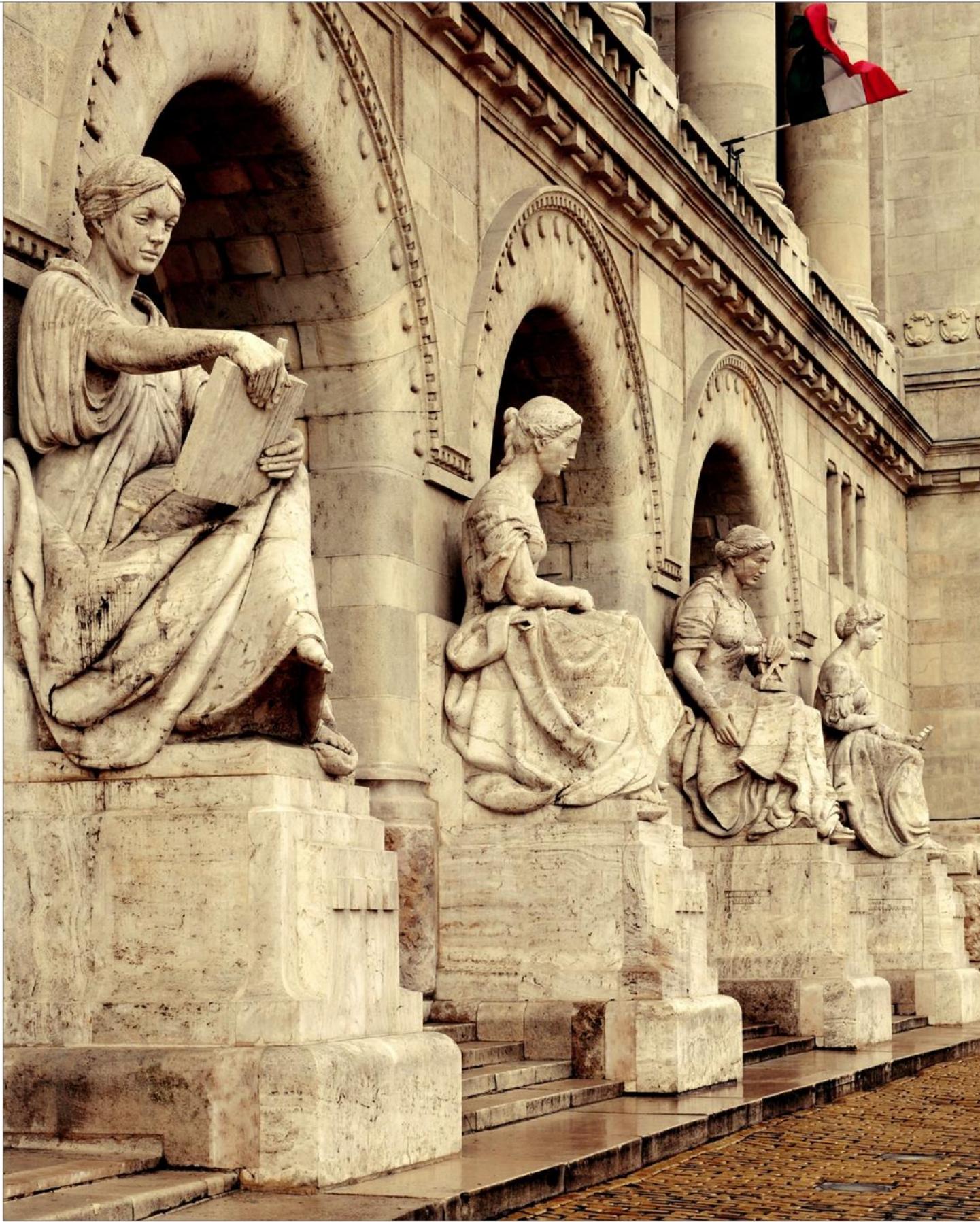


Bachelor Master Elite education



Academic Programs 2014-2015



Budapest University of Technology and Economics



Budapest University of Technology and Economics

Academic Programs

2014-2015

Bachelor Master Elite education

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Welcome message

This guide to the academic program has been composed to give a survey of the undergraduate, graduate and postgraduate courses of Budapest University of Technology and Economics (BME). The guide will thus also reflect the expertise and knowledge of our university in the professional fields they teach.

The basic task of the BME is to provide engineering education. However, we also offer high quality courses in various aspects of economics, natural sciences and humanities. These courses were designed to meet the requirements of today's society, especially those of the economy, and are constantly upgraded with these concrete needs in mind.

We are aware of the expectation on us not only to produce graduates who can excel in their professional fields at an international level, but also to educate intellectual adults who have the talent, diligence, devotion and creativity to make contribute to the future development of both Hungary and their chosen disciplines within the university.

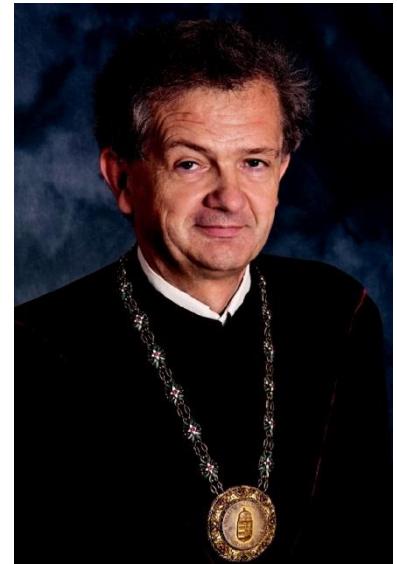
We are working hard to meet these expectations and doing our utmost to ensure that – as a result of their knowledge and skills – our graduates are highly valued on the job market and can compete at the highest level in companies and institutions. To do this we strive to provide our students with the necessary conditions for learning and developing their human qualities and professional skills. Our goal is to allow students to realise their full professional and intellectual potential, to reach the highest level that their abilities and dedication permits, and to prepare them for both an intellectual existence and for the tasks which intellectuals face.

We realise that to meet these expectations the BME must continue to act as a key institute in the national and international scientific, technical and economical fields and maintain its close relations with the scientific, research and economic community, with professional organisations and with other players in higher education.

Our mission, which is inseparable from education, is to further knowledge, to conduct scientific research, initiate research and maintain the BME's status as a serious research centre. As a participant in international research programs and as a leader in directing domestic research the activities of BME encompass the entire process of innovation, basic and applied research, technical and commercial product- and service development and complex quality management, while also striving to apply the results of this research.

The BME has a significant educational capacity which is well balanced among the undergraduate courses (providing a broad basic knowledge), graduate courses (ensuring deep theoretical and specialist knowledge) and doctoral courses. We can thus assure the vast majority of our students that if they are motivated and work hard enough they can accomplish both the first and the second levels, thus gaining knowledge and skills in excess of the former graduates. The best students among them can also be assured that they will be given every assistance in attaining their doctorates.

I recommend this brochure to readers in the hope that they may – based both on their experiences and on this booklet – be able to suggest the educational programs and courses of BME to all those prospective students whose knowledge and abilities make them suitable to join one of them.



Dr. Gábor Péceli *rector*

Forms of Training

Budapest University of Technology and Economics (BME) has joined the harmonisation process of the European higher education started with the Bologna Declaration. BME offers undergraduate, graduate and doctoral programs as well as courses for postgraduates and adults. Many of our academic programs are also offered in foreign languages.

Undergraduate courses (BSc/BA)

These courses provide students with the general knowledge of the given field including also the applications. At least 30 ECTS credits must be gained with individual work. Courses last for 6 – 8 semesters, the minimum requirement is 180 – 240 ECTS credits accordingly. The BSc/BA diploma is a certificate while finding a job and also a licence for further studies.

Graduate courses (MSc/MA)

The BSc/BA diploma is the prerequisite to start any master course that is not necessarily in the same field as the undergraduate course. Master courses give deep theoretical knowledge and special knowledge in a narrow field. Courses last for 3 – 4 semesters, the minimum requirement is 90 – 120 ECTS credits accordingly. About one third of the credits must be gained with individual work. Students can be involved in the projects of their supervisors thus acquiring professional skills.

PhD and DLA courses

BME introduced the PhD (Doctor of Philosophy) courses in 1991, first in Hungary. Since 1996 the Faculty of Architecture offers DLA (Doctor of Liberal Arts) courses. Graduates applying for PhD and DLA courses must have an MSc/MA diploma with at least ‘good’ qualification, must have comprehensive knowledge in their field and some preliminary scientific (PhD) or architectural (DLA) results.

Postgraduate courses

There are postgraduate courses for undergraduates and graduates. These courses provide students with professional skills in a special field.

Courses in foreign languages

BME offers some of its subjects and courses – covering the same knowledge and resulting in the same number of ECTS credits – also in English, French and German. Special emphasis is put on courses given in English in particular courses belonging to MSc/MA studies. The main objective of our French education is to prepare students for training in Francophone countries. In German we offer studies for the first four semesters. The best students have the opportunity to spend the fifth semester and/or the last semester (writing the diploma theses) in Karlsruhe.

BME is involved in many international programs and networks, has cooperation agreement with a great number of foreign universities for education and for internship.

Out of the student mobility programs the most significant is the Erasmus program of the EU, BME is involved in it since 1998. Recently more than 500 BME students have spent some time abroad yearly for studying or for gaining professional experiences. There are quite different possibilities ranging from one-week 2 ECTS credit short courses to two-year training resulting in two diplomas. The international reputation and acceptance is indicated by the fact that BME hosts about the same number of foreign students.

The University's very successful „study abroad” type of project is based on the Brazilian „Science Without Borders” scholarship programme. In the framework of this programme financed by the Brazilian partner, coordinated on state level by the Hungarian Rectors' Conference in the academic year 2014-2015 more than

550 Brazilian students participated in the 1 year practice orientated English language programme. The programme is expected to continue also in the upcoming years.

Student- and staff exchange is also promoted by our international relations which span over the world. We have active **cooperation with 67 foreign universities** in the field of education and research. Especially important are the German, French, English, Japanese and American connections. BME is a member of many international organisations, the most important ones are: EUA (European University Association), CESAEER (Conference of European Schools for Advanced Engineering Education and Research), SEFI (European Society for Engineering Education), Central-European regional cooperation with the technical universities in Vienna, Prague and Bratislava (4TU League), and the Cooperation Platform of Central and East European Metropolitan Universities of Technology.

Continuing engineering education, Adult learning, Learning innovation

To enhance the impact of engineering education, as well as to satisfy the demands of the industry, BME has developed an impressive offer of continuing and postgraduate learning.

Several faculties are represented in this pool of training courses with the Institute of Continuing Engineering Education and the Centre for Modern Languages being the most significant training providers. The „University Adult Learning Database” helps the overview and supports the marketing of the courses: www.felnottkepzes.bme.hu.

The Centre for Learning Innovation and Adult Learning (OIFK) - operating within the Institute for Applied Pedagogy and Psychology (APPI) - is responsible for the administration and management of the University as an adult learning institution, including the harmonization of the adult learning system of the University with the new legislation of 2013. The Centre's activities are supported by the University's Advisory Board for Adult Learning, involving high level corporate stakeholders.

APPI is leading and developing lifelong learning activities of the University. Learning innovation and adult learning related activities of OIFK are closely connected with the developments of ICT enhanced learning. Learning modernization at the University has been supported by international (EU) and national projects. The Secretariat of the most comprehensive European association in open and distance and e-learning, the European Distance and E-Learning Network (EDEN) is hosted at the OIFK. It is fostering access to contemporary professional development and research, sharing information and generating new partnerships.

The Institute of Continuing Engineering Education of BME was founded in 1939 as the first of its kind in Europe (www.mti.bme.hu). The trainings are not part of the school system, if requested they can be organized on company grounds. The Institute can also boast with its remarkable international activities. It plays an active role in the following organizations:

FEANI - Fédération Européenne d'Associations Nationales d'Ingénieurs

SEFI - European Society for Engineering Education

IACEE - International Association for Continuing Engineering Education

WFEO - World Federation of Engineering Organizations

The Institute is involved in the adjudication of EUR ING degree of Hungarian engineering graduates and in 2000 it was awarded with the 'UNESCO Chair' title. Until now no other European institute for continuing engineering education has this distinction.

Doctoral schools and their leaders

- **Pál Vásárhelyi PhD School in Civil Engineering and Earth Sciences**, *Civil Engineering; Earth Sciences*
Prof. János Józsa | <http://www.me.bme.hu/doktisk/>
- **Géza Pattantyús-Ábrahám PhD School in Mechanical Engineering**, *Mechanical Engineering*
Prof. Gábor Stépán | <http://www.gpk.bme.hu/PhD/index.php>
- **Pál Csonka PhD School in Architecture and Engineering**, *Architectural Engineering*
Prof. Gábor Domokos | <http://www.szt.bme.hu/index.php/cimlap>
- **DLA School in Architecture**, *Architecture (DLA)*
Prof. Ferenc Cságoly | <http://dla.bme.hu>
- **George A. Olah PhD School in Chemistry and Chemical Technology**, *Chemical Sciences; Bio-, Environmental- and Chemical Engineering*
Prof. László Nyulászi | <http://www.ch.bme.hu/en/education/PhD/>
- **PhD School in Computer Science and Information Technology**, *Informatics*
Prof. János Levendovszky | <https://www.vik.bme.hu/doktorandusz/91.html>
- **PhD School in Electrical Engineering**, *Electrical Engineering*
Prof. István Kollár | <https://www.vik.bme.hu/doktorandusz/45.html>
- **Kálmán Kandó PhD School in Transportation Engineering**, *Transportation Engineering; Mechanical Engineering (in cooperation with Géza Pattantyús-Ábrahám PhD School)*
Prof. József Bokor | <http://kozlekedes.bme.hu/hu/kjk/doktori/428>
- **PhD School in Physics**, *Physical Sciences*
Prof. György Mihály | <http://dept.phy.bme.hu/phd/>
- **PhD School in Mathematics and Computer Sciences**, *Mathematics and Computer Sciences*
Prof. András Recski | <http://doktori.math.bme.hu/>
- **PhD School in Psychology (Cognitive Science)**, *Psychology*
Prof. Lajos Izsó | http://www.cogsci.bme.hu/doktori_iskola.php
- **PhD School in Business and Management**, *Business and Management*
Prof. Dietmar Meyer | <http://www.kornygazd.bme.hu/doktori/>
- **PhD School in Philosophy and History of Science**, *Philosophy*
Prof. Tihamér Margitay | http://www.filozofia.bme.hu/doctoral_school

Faculty of Civil Engineering

Dean: Prof. László Dunai

founded in 1782

BSc in Civil Engineering

Length of study: 8 semesters

Program objectives: The goal of the BSc program is to train qualified civil engineers with a bachelor degree and command of foreign languages who are able to complete tasks in construction, maintenance and management, enterprise and specialized authority, to solve design tasks and simple development tasks related to the degree individually and to cooperate in complex design projects. Graduates may attain status of Professional Engineer and Professional Certificated Engineer after accomplishing the prescribed practice period according to the branch and specialisation of the completed course.

Eligible specialisations in the Bachelor program in Civil Engineering:

Branch of Structural Engineering: Buildings • Bridges and Structures • Geotechnics • Building Construction

Branch of Infrastructural Engineering: Transportation Facilities • Water Engineering • Municipal Engineering • Environmental Engineering

Branch of Geoinformatical Engineering: Civil Engineering Geodesy • Geoinformatics

Competencies and skills: Expectations of practical training to the labor market, according to the goals of the program: Attaining status of Professional Engineer after having obtained due professional practice in the whole range of civil engineering profession, but especially according to the branch and major completed. Engineering management activity, technical construction inspection activity in the whole range of civil engineering. Activities of construction, maintenance, operation, enterprise and authorities in the whole range of civil engineering. Municipal engineering activities. Individual handling of simpler development tasks according to the branch and major. Substantive contribution to more complex design problems under guidance.

MSc in Structural Engineering

Length of study: 3 semesters

Program objectives: The goal of the program is to train civil engineers with a master degree who are competitive in the international job market and are able to solve task of technical development, research, coordination, and project management individually in the field of structural engineering related to civil engineering structures, and to design and expertise complicated and special engineering structures.

Competencies and skills: Graduates are able to acquire further knowledge in their specialty and to individually attend, control and supervise challenges of construction, design, development and research according to their major. After getting the relevant Professional Engineer status, they can attend the tasks of experts and authorities.

Specialisations: Building Construction and Reconstruction • Structural and Geotechnical Engineering • Engineering Geology • Computational Structural Engineering

MSc in Infrastructural Engineering

Length of study: 3 semesters

Program objectives: The goal of the program is to train infrastructural engineers with a master degree who are competitive in the international job market and are able to solve task of technical development, research, coordination, and project management individually in the field of infrastructural engineering related to civil engineering structures, and to design and expertise complicated and special engineering structures.

Competencies and skills: Graduates are able to acquire further knowledge in their specialty and to individually attend, control and supervise challenges of construction, design, development and research according to their major. After getting the relevant Professional Engineer status, they can attend the tasks of experts and authorities.

Specialisations: Highway and Railway Engineering • Hydraulic and Water Environmental Engineering

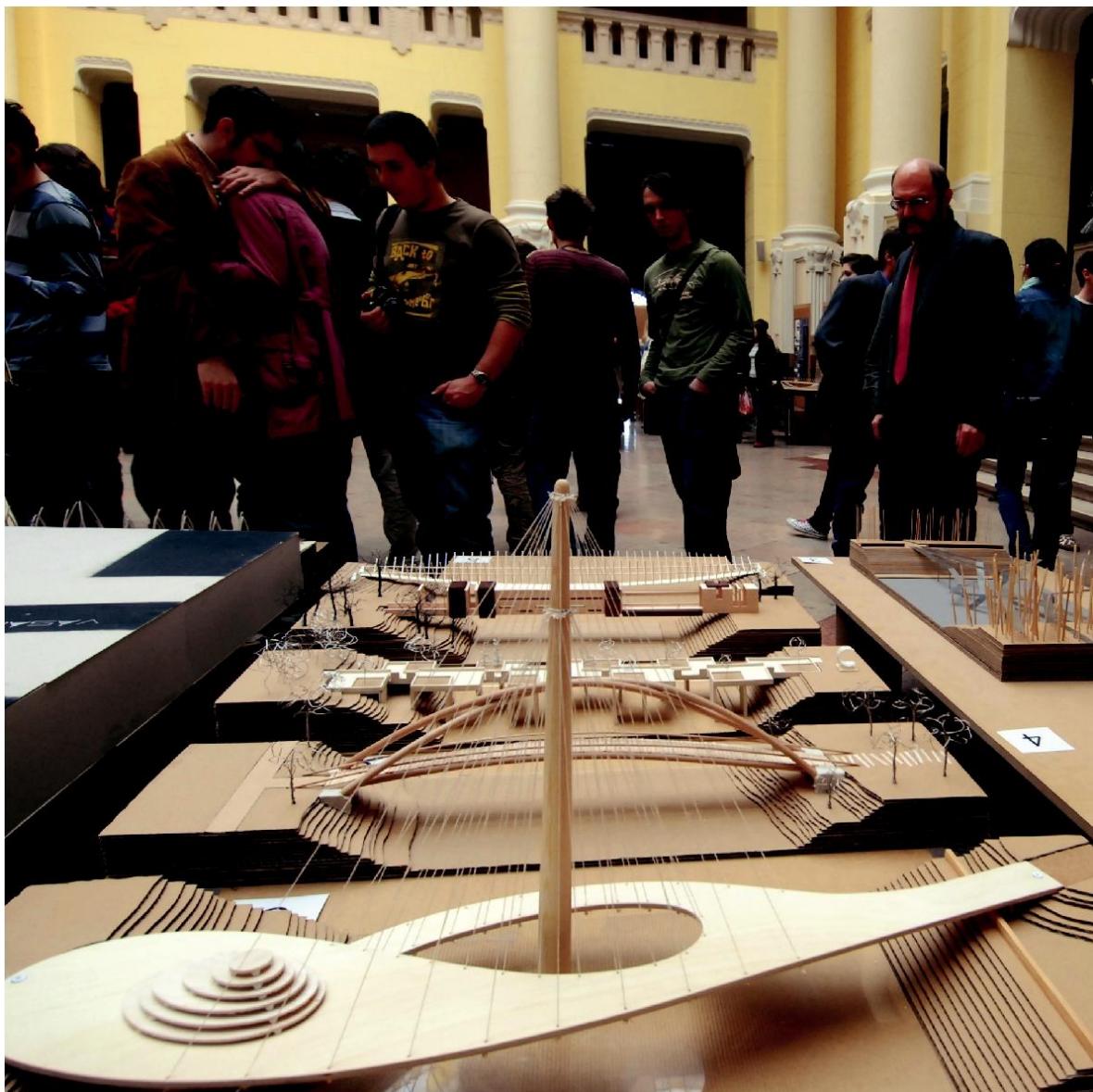
MSc in Surveying and Geoinformatics

Length of study: 3 semesters

Program objectives: The goal of the program is to train surveying and geoinformatics engineers with a master degree who are competitive in the international job market and are able to solve tasks of technical development, research, and coordination individually in the field of land surveying and geoinformatics related to civil engineering structures, and to design and expertise geodesic tasks of complicated and special engineering structures and other land surveying, cartographic and geoinformatic tasks.

Competencies and skills: Graduates are able to acquire further knowledge in their specialty and to individually attend, control and supervise challenges of construction, design, development and research according to their major. After getting the relevant Professional Engineer status, they can attend the tasks of experts and authorities.

Specialisations: Surveying and Geoinformatics



Faculty of Mechanical Engineering

Dean: Prof. Tibor Czigány

founded in 1871

BSc in Mechanical Engineering

Length of study: 7 semesters

Program objectives: The aim is to educate mechanical engineers who are able to operate and maintain machines and mechanical equipment, to introduce and apply machine technologies, to organize and direct work, to solve average complexity tasks in the field of technical research and design and also possess theoretical knowledge in order to continue the education in the second cycle (MSc).

Competencies and skills: *Possessing the BSc degree, mechanical engineers are able to* execute constructional design of machine elements, machines, equipment, devices, structures; to work out and direct production and assembly technology of machine, metal and/or polymer structures and their elements; to direct machine technology processes, to organize the serving of machines; to apply environmental friendly technologies; to create artificial industrial environment; to design and produce environment protective equipment, to prepare, organize and direct environment protection issues technically; to design building service equipment, to prepare, organize and direct construction; to design, construct and maintain fluid, heat and fluid engineering processes.

Specialisations: Materials engineering • Process technology • Mechanical Engineering Development • Machine production technology • Building services • Machine design

BSc in Mechatronics Engineering

Length of study: 7 semesters

Program objectives: The aim is to educate engineers who are able to control and direct production, assembly and quality management processes that involve mechatronic devices, equipment; to control and direct quality management processes; to design simple mechatronic devices; to operate and maintain mechatronic systems based on the acquired complex knowledge in the field of natural science, electronics, machine informatics and economics.

Competencies and skills: *Possessing the BSc degree, mechanical engineers are able to* operate, produce and maintain mechatronic systems and to design simple mechatronic systems.

Specialisations: Design of mechatronic devices • Machine industrial modeling • Integrated engineering (in English) • Mechatronics of production systems • Biomechatronics • Optomechatronics

BSc in Energy Engineering

Length of study: 7 semesters

Program objectives: The aim is to educate energy engineers who are able to design, realize and operate the safe and economic energy supply of the national economy, and within that towns, factories, facilities and homes after having sufficient practice and acquiring general, professional, IT and language knowledge required for this field.

Competencies and skills: *Possessing the BSc degree, energy engineers are able to* apply negotiation and leadership skills related to engineering activities; to prepare technical design and documentation using IT tools; to analyze, design, execute and operate energy technologies; basic energy management, entrepreneurship and organizational knowledge; to fulfil basic safety and quality management requirements regarding energy engineering machines, devices and technologies, electric, heat and atomic energy measurement methods, energy related environmental technologies.

Specialisations: Thermal engineering • Power engineering • Atomic energy engineering • Building energy engineering • Chemical energy engineering

BSc in Industrial Design Engineering

Length of study: 7 semesters

Program objectives: The aim is to educate engineers who are able to react efficiently and in a flexible way to the challenges of the market economy; to do independent, creative work in all phases of product development using their technical, aesthetical, human as well as economic knowledge and skills; to manage the cycles of product life span, material, organizational and human resources necessary for product development; to carry out organizational and directing activities in the product development innovation process in the field of industrial product design, production and distribution.

Competencies and skills: *Possessing the BSc degree, industrial design engineers are able to apply analysis, synthesis, design and evaluation techniques; to utilize the learned methods and techniques; to initiate and execute project in team work, primarily in multidisciplinary environment; transferring information, ideas, problems and solutions for the professional and non-professional public, also in an international environment; design products at a comprehensive level considering the aesthetic, usage, market, timely, facility safety and constructionability aspects; to specify, document, visualize and present an object; to put a design project together (design, task distribution, team work, cooperation etc.); to understand the concept of the work carried out on their professional field in a complex and unpredictable environment; to describe the specific aspects of the work and their opinion about it.*

MSc in Mechanical Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate mechanical engineers who are able to work out, model, and then to design, operate and maintain the concepts of machines, mechanical equipment and processes; to develop new materials, machine industrial and production technologies and to apply them considering the impact on the environment; to fulfill leadership, directing and organizational tasks; to carry out research, design and innovation tasks; to do national and/or international level engineering projects.

Competencies and skills: Possessing the MSc degree, mechanical engineers possess basic knowledge in the following fields: natural science (mathematics, physics, IT and engineering basic science), leadership, engineer ethics, language and communication, comprehensive law, environment protection and quality management. This basic knowledge influences and creates engineering habit.

MSc in Mechanical Engineering Modelling (in English)

Length of study: 4 semesters

Program objectives: The aim is to educate engineers who are able to apply the theoretical background, numeric and experimental methods of high level modeling solutions of technical tasks that arise in different mechanical engineering fields and can be solved based on mechanics, fluid mechanics, thermodynamics and electronics.

Competencies and skills: *Possessing the MSc degree, engineers possess knowledge of natural sciences (mathematics, mechanics, fluid mechanics, thermal engineering and electronics) that is essential in mechanical engineering research and development work; are able to model using up-to-date experimental and numeric methods, to model processes of machines and devices that change as a function of time, to analyze processes, to apply modeling methods in research and development task solution in the field of mechanical engineering design and technology*

MSc in Mechatronics Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate engineers who are able to design new mechatronic devices and systems using the general and specific knowledge acquired in the field of natural sciences that relate to mechatronics; to develop and integrate mechatronic systems; to carry out and coordinate research and development tasks aimed at the mechatronic field.

Competencies and skills: *Possessing the MSc degree, mechanical engineers possess basic knowledge in the following fields: natural science (mathematics, physics, IT and engineering basic science), leadership, engineer ethics, language and communication, comprehensive law, environment protection and quality management. This basic knowledge influences and creates engineering habit.*

MSc in Energy Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate energy engineers who are able to work out the concept, design and operate energy supply systems of factories, facilities, governmental buildings and homes and to overview and operate large energy supply, distributor and usage systems. They are also able to model energy engineering processes, to describe and solve models mathematically and to introduce them in practice for leadership, management, organizational and authority issues in the field of energy engineering.

Competencies and skills: Possessing the MSc degree, energy engineers are able to design complex energy engineering systems based on system approach and process-oriented way of thinking; to analyze, design, construct and operate the processes of energy engineering technologies and equipment; to apply system and control technology knowledge and measurement methods in the field of energy engineering technological processes.

MSc in Industrial Design Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate engineers who are able to react efficiently and in a flexible way to the challenges of the globalizing market economy; to do independent work in all phases of product development using their technical-scientific, economic, human, language as well as design knowledge and skills; to lead creative teams in small, middle and large size enterprises, in both national and international environments.

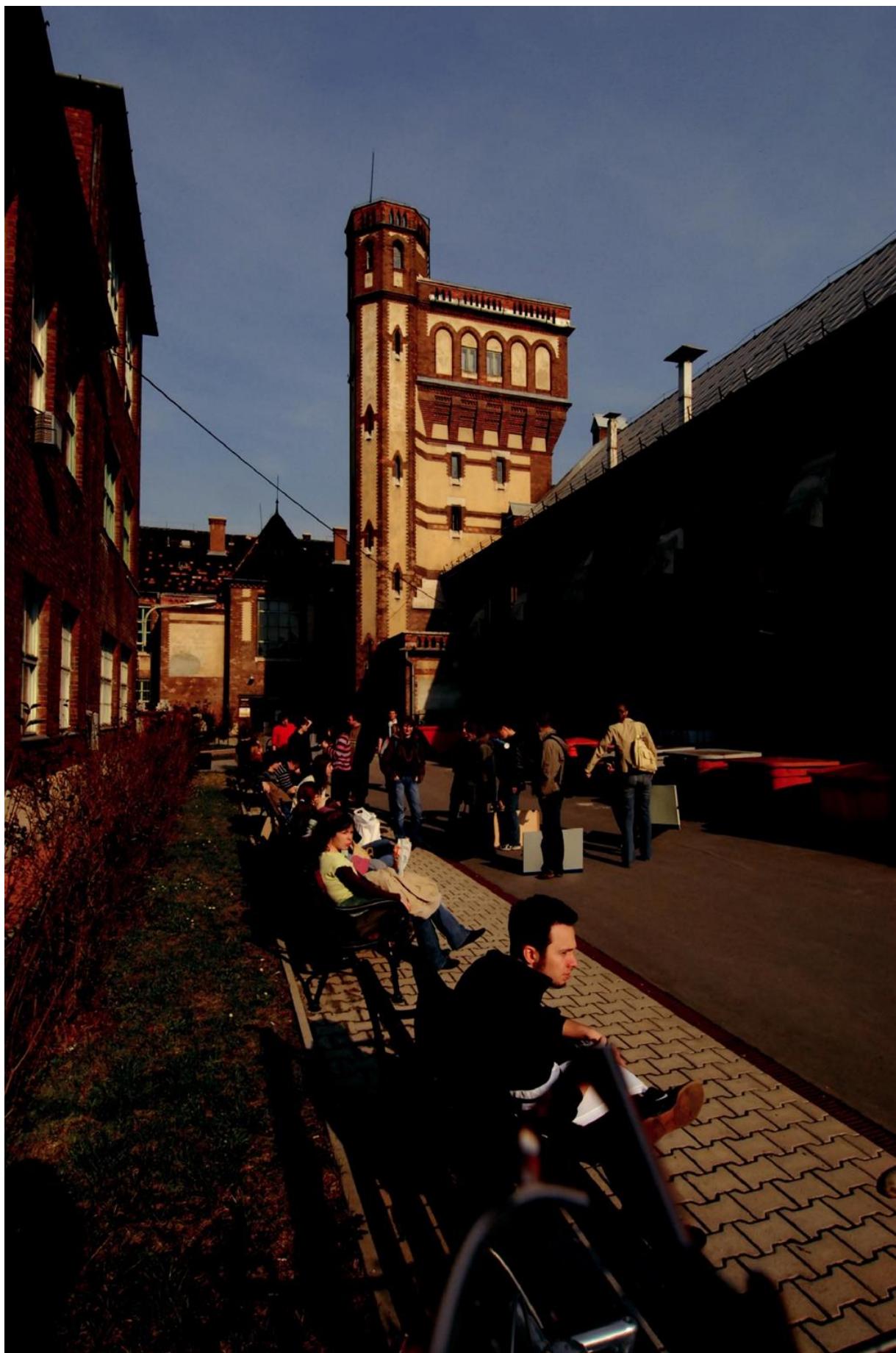
Competencies and skills: Possessing the MSc degree, industrial design engineers are able to design new and original products and product/service combinations in order to fulfill the needs of individual customers based on the balanced interest of the designer, the user, industry and society with special regards to the international ethical norms and expectations; to overview, execute and lead the whole product development process both individually and as a member of a group – often in an international environment.

MSc in Building Service and Process Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate engineers who are able to work out the concept, model, then design, operate and maintain building service and technological devices; to execute tasks regarding building service and technological systems, IT, control and safety issues of system elements and apply them with environmental aspect; to fulfill tasks of technical development, research, design and innovation.

Competencies and skills: Possessing the MSc degree, engineers are able to model building service and machine technological processes, to describe the models mathematically, to solve them and apply in practice; to design, give expert advice, construct, operate, maintain and control the whole building service system of buildings, as well processes and machines.



Faculty of Architecture

Dean: Prof. Csaba Molnár

founded in 1873

BSc in Architecture

Length of study : 8 semesters

Program objectives: *The aim of the BSc programme is to train architects primarily for the field of general construction activity (design, implementation, production, service, enterprise, specialised authority work, certain parts of the tasks of design and research), who will be able to fulfil the listed technical tasks *under guidance*, based on their knowledge of natural sciences, technologies, art, economy, as well as their human, linguistic and other related skills; and who will be in possession of an adequately deep theoretical knowledge to be capable of continued study in a graduate programme.*

Competencies and skills: *Under guidance, architects being in possession of BSc basic degree are able:* to prepare the technical documentation for a building process, to apply the related rules and standards of representation, to prepare architectural drawing, modelling and presentation; • to work with computer and engineering programs by virtue of being in possession of fundamental hardware and software knowledge, to use at least one CAAD program at the user level; • to deal with the physical and environmental effects or problems arising from building, to take into consideration technical aspects and applications of building structures that are widely used; • to prepare the static and construction plans of load bearing structures of smaller building on their own; • to read and interpret the constructional technical plan documentation without fail; • to divide the tasks related to architectural activity by the different professions, to co-operate with the working groups concerned with the design and construction process; • to adapt collectively the technical, economical, quality control and legal knowledge required for the planning, organisation, control, follow-up and supervision of building realization processes; • to apply the technical, economical and organisational knowledge required for facility management, maintenance and operation of the buildings; • to get to know and understand new technologies, structures and products.

Five year integrated architect education

Length of study: 10 semester

Program objectives: *The aim of the MSc programme is to train architects to be able to perform all architectural and constructional duties related to the formation of settlement- and area-formation, and in general the formation of built environments. Within this, they will be able to perform the architectural and structural tasks of buildings and building complexes, to guide and supervise construction works, to fulfil maintenance and renovation jobs, to perform the task of monument protection, to pursue theoretical, scientific and educational activities fitting their qualifications and within their field to control the works of building administration and authority.*

Competencies and skills: *Designer architects being in possession of MSc degree: are able to* prepare the technical documentation for a building process, to apply the related rules and standards of representation, to prepare architectural drawing, modelling and presentation; • *are familiar with* the history of architecture and different architectural theories as well as with related arts, technologies and sciences; • *are familiar with* the fine arts which have influence on the quality of the architectural design; • *know* the relation between urban and architectural design after acquiring the skills necessary for the design; • *are familiar with* the direct relation between humans and buildings, or buildings and their environment, and understand the necessity that buildings and the spaces in-between them should be adjusted to human needs and scales; • *know* the role of the profession and of architects within society, they should recognise and determine social needs, especially in the preliminary plans that take social factors into consideration; • *know* the research methods related to the preparation of the plan or needed for the design of the project; • *are in possession of* structural, constructional and engineering knowledge in connection with building design; know and recognise the physical problems and technologies that fit the functions of the buildings in order to create comfortable interiors providing protection against the elements; • *are familiar with* industries, organizations, standards and processes which play important role in the realization of design concepts and in integrating the architectural plans into the general plans; • *are able to satisfy* the users demands within the limitations of financial factors and building regulations.

MSc in Real Estate Development Architecture

Length of study: 3 semesters

Program objectives: *The aim of the MSc programme is to train real estate development architects to be able to perform development and facility procedures in relation with real estate and the formation of built environments, to prepare real estate development (investment) and architectural plans, to plan, organise, control and supervise the maintenance, operation, extension and construction procedures from the conception of development to the run of the establishment. They will be capable of managing the real estate processes and to fulfil the expert's, administrative and consulting tasks (in relation with the construction-aimed investments). The participants of the programme will be enabled to attend the PhD programme which is built on this one.*

Competencies and skills: *Real estate development architects being in possession of MSc degree:*

- comply with the requirements of exercising the profession of architecture under the terms of the relevant Directive of the European Union Committee;
- *are in possession of real estate development, facility management, real estate marketing and other professional and methodical knowledge; and to the required degree they are familiar with real estate market(s) and the legal and financial environment determining it;*
- *know how to prepare real estate development strategies and plans, and how to co-ordinate project realization;*
- *are familiar with the methods of project-management, property assessment, decision support, market analysis, marketing, economical and financial calculations, cost-benefit analyses, strategic planning, facility management, risk assessment, quality control and communication.*

MSc in Structural Architecture

Length of study: 3 semesters

Program objectives: *The aim of the MSc programme is to train structural architects to be able to solve the structural problems in relation with the construction of the buildings, to prepare building structural and bearing structural plans, to organise, control and supervise the construction, and to perform all duties of building maintenance, renovation and monument protection that are related to structural planning. The participants of the course will be enabled to attend the PhD programme built on this programme and to perform theoretical and scientific activity within the field of their qualification.*

Competencies and skills: *Structural architects being in possession of MSc degree:*

- comply with the requirements of exercising the profession of architecture under the terms of the relevant Directive of the European Union Committee;
- *are in possession of the professional and methodical knowledge of structural planning and of Building Constructions.*

MSc in Architecture

Length of study: 3 semesters

Program objectives: *The aim of the MSc programme is to train architects to be able to perform all architectural and constructional duties related to the formation of built environment, to pursue theoretical and scientific activities fitting their qualifications and within their field to control the works of building administration and authority. After a period of professional practice prescribed by specific law, they can achieve the professional certificate for architectural design. The participants of the course will be enabled to attend the DLA (or in special cases the PhD) programme which is built on this programme.*

Competencies and skills: *Designer architects being in possession of MSc degree:*

- comply with the requirements of exercising the profession of architecture under the terms of the relevant Directive of the European Union Committee;
- *are able to prepare the technical documentation for a building process, to apply the related rules and standards of representation, to prepare architectural drawing, modelling and presentation;*
- *are familiar with the history of architecture and different architectural theories as well as with related arts, technologies and sciences;*
- *are familiar with the fine arts which influence the quality of the architectural design;*
- *know the relation between urban and architectural design after acquiring the skills necessary for the design;*
- *are familiar with the direct relation between humans and buildings, or buildings and their environment, and understand the necessity that buildings and the spaces in-between them should be adjusted to human needs and scales;*
- *know the role of the profession and of architects within society, they should recognise and determine social needs, especially in preliminary plans that take social factors into*

consideration; • *know* the research methods- related to the preparation of the plan or needed for the design of the project; are in possession of structural, constructional and engineering knowledge in connection with building design; • *know* and recognise the physical problems and technologies that fit the functions of the buildings in order to create comfortable interiors providing protection against the elements.

MSc in Architecture and Urban Design

Length of study: 3 semesters

Program objectives: *The aim of the MSc programme is to train urbanist architects to be able to perform all duties related to masterplanning and in general to the formation of built environments, to prepare the architectural and structural design of buildings and building complexes, to organise, control and supervise the construction works. They will be capable of completing building maintenance, renovation and monument protection jobs, to elaborate urban development concepts, to make masterplans for settlements or settlement districts, to form the environment, to perform and to control the works of value protection, building administration and authority. After a period of professional practice prescribed by specific law, they can achieve the professional certificate for either an architectural designer or an urban designer. The participants of the course will be enabled to attend the DLA and the PhD programme which is built on this programme.*

Competencies and skills: *Urbanist architects being in possession of MSc degree:*

- *comply* with the requirements of exercising the profession of architecture under the terms of the relevant Directive of the European Union Committee;
- *are familiar* with the adequate theoretical and practical knowledge of urbanism and architecture as well as the mutual connection between them;
- *are familiar* with the direct relation between humans and buildings, or buildings and their environment, and understand the necessity that buildings and the spaces in-between them should be adjusted to human needs and scales;
- *know* the role of the profession and of architects within society, they recognise and determine social needs, especially in preliminary plans that take social factors into consideration;
- *know* the research methods related to the preparation of the plan or needed for the design of the project.

MSc in Visual Environment Design

Length of study: 4 semesters

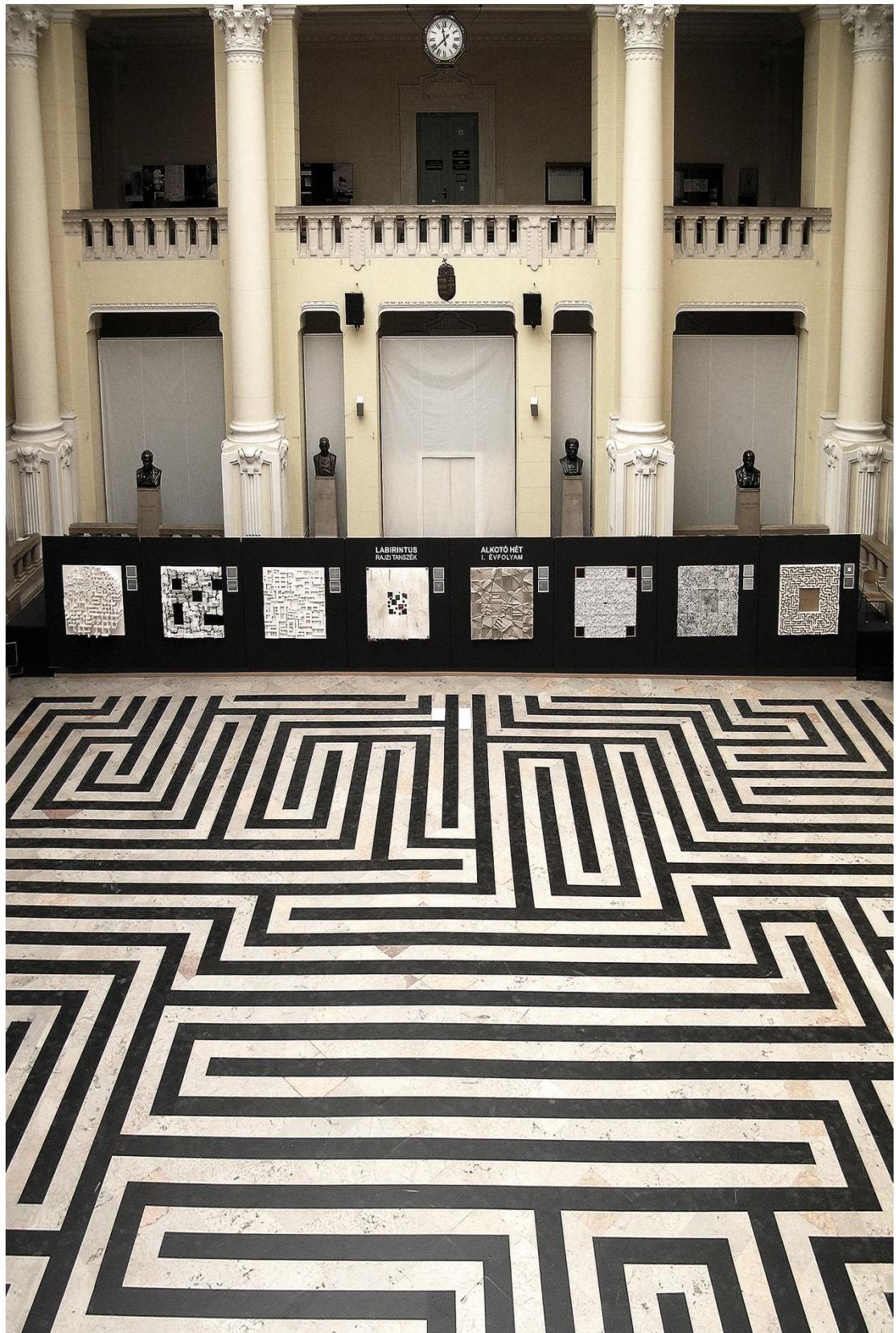
Program objectives: the aim is to enable engineers to design innovative and genuine products, as well as combinations of product and service related visual systems, while meeting the needs of clients and consumers at a high artistic quality, in compliance with international ethical and aesthetic standards and the requirements of visual environment design. The comprehensive industrial design – scientific – technical skills and the human, economic and language competences help them carry out and manage design processes as either a team member or a team leader, often in international working environment. Our program prepares participants to perform managerial tasks, conduct research and development projects, and individual training, as well as to continue the visual environment design studies in the frame of a doctoral program.

Competencies and skills: *Our graduated Visual Environment Design Engineers possess comprehensive skills and knowledge in:*

- the theory and practice of visual environment design
- drawing, modeling and visual culture
- social, environmental, aesthetic, ethical and economical context
- leadership
- digital communication and analysis
- environmental sensitivity, quality assurance, consumer protection, product liability, equal accessibility, health and safety at the workplaces, technical and economical legislation and the basic design ethics
- problem solving methodologies in research and scientific work
- global and local social and economical processes.

They are capable of:

- broad and profound scientific, artistic and design knowledge based analytic thinking
- synthesizing tenets and solving creative problems in complex topics
- understanding and answering design challenges
- raising original ideas
- individual learning and training, developing their skills to the next level
- leadership in business and research, including managerial functions
- complex handling of technical – economical – artistic and human resources
- cooperating with engineering practitioners, economic professionals and artists
- working in international environment and applying social, cultural and artistic sensitivity and communication skills acquired through team work and international studies.



Faculty of Chemical Technology and Biotechnology

founded in 1873

Dean: Prof. Ferenc Faigl

BSc in Chemical Engineering

Length of study: 7 semesters

Program objectives: The BSc degree course in chemical engineering provides the appropriate skills and knowledge in chemistry, chemical engineering and economic sciences. The degree holder should be able to manage chemical technologies, conduct analytical tests, intermediate and final quality control, and can take part in R&D of new technologies products and processes. The language knowledge of the chemical engineer is suitable for understanding technical documentation at least in one foreign language. Part of the education is specialisation in a branch. The knowledge provided by getting the BSc degree is a necessary prerequisite for an MSc course enrollment.

Competencies and skills:

- Sufficient knowledge and practice in chemical, chemical engineering and economic sciences for a safe and environmentally conscious management of chemical technologies, or in any related services or business activity.
- Practical laboratory skills and ability to learn new laboratory methodologies.
- Ability for getting sub-tasks in development and planning of technology systems, in development of new methods and products, as well as in research of chemical and related sciences.
- Competence in computing and informatics and in the application of databases.
- Language knowledge for understanding technical documentation at least in one foreign language.
- Sufficient scientific, task-specific and economic knowledge to apply for MSc or other courses.

BSc in Biochemical Engineering

Length of study: 7 semesters

Program objectives: The aim of biochemical engineering education is to provide specialists capable to integrate the knowledge from chemical, biological and engineering sciences. The well educated specialists can manage these technology systems and theirs staff, can make analytical tests, intermediate and final quality control, can take part in research and development and also in planning. Their knowledge can be applied in agriculture, service, trade and state administration too. Their language knowledge is suitable for understanding technical documentation at least in one foreign language. Part of the education is specialisation in a branch. The knowledge provided by getting the BSc degree is a necessary prerequisite for an MSc course enrollment.

Competencies and skills:

- Sufficient knowledge and practice in chemical, biological, biochemical engineering and economic sciences to manage biological/biotechnology systems in a safe and environmentally conscious manner, to get task in sales and services.
- Sufficient skills in laboratory and semi-industrial scale work, ability in learning new methods.
- Ability for getting task in development and planning of technology systems, in development of new methods and products, in research of biological, chemical and related sciences.
- Competence in computing and informatics and in the application of databases.
- Language knowledge for understanding technical documentation at least in one foreign language.
- Sufficient scientific, task-specific and economic knowledge to apply for MSc or other courses.

BSc in Environmental Engineering

Length of study: 7 semesters

Program objectives: Environmental engineers have an up-to-date knowledge in natural sciences, technology, economics and management. They can recognize different environmental dangers and can manage the damage averting activity. They can solve rational consumption of natural resources using up of environmental source of energy, forming and managing poor of waste technology. They have knowledge in field of natural and land conservation and environmental policy. Their general engineering qualification and language knowledge guarantees the possibility of communication and team-work with national and foreign specialists. They are suitable for planning, managing and controlling of environmental projects. On the basis the knowledge obtained during their education they may become suitable for applying for MSc courses.

Competencies and skills:

- Ability for creating and making measure plans for operating quantity and quality parameter of environmental elements and systems and estimate data.
- Knowledge of methods of environmental damage averting, ability to participate in damage averting.
- Planning and managing and optimization of water purification and wastewater technologies.
- Solving of water management tasks, contribution in planning and water management.
- Selecting, estimating, testing and controlling of environmental processes (technologies, methods and equipments).
- Ability for performing administrative, self-governing, environment protected authority and expert sphere, and for making program of local environment protection.
- Getting engineering task in organization, who manage environment protected systems.

MSc in Chemical Engineering

Length of study: 4 semesters

Program objectives: Chemical engineer MSc has a high level knowledge in natural sciences, engineering, informatics and economics and also in humanities and foreign languages making them suitable to carry out R&D tasks as well as high level management activities in chemical and related industries. Participants of education can take chance to apply PhD courses.

Competencies and skills:

- High level qualification and practice for safe and environmentally conscious management of chemical technology systems, and in related sales and services.
- Ability for getting self-contained task in development and planning of technology systems, in development of new products and methods, in research of chemical and related sciences.

MSc in Biochemical Engineering

Length of study: 4 semesters

Program objectives: The aim of education is to educate biochemical engineers, suitable for getting activity in field of planning, research and development and professional management in food industry, biotechnology, environment and safeguarding of public health by their high level knowledge in science, technology, informatics and economics. Participants of education can take chance to apply PhD courses.

Competencies and skills:

- High level qualification and practice to safe and environmentally conscious management of biotechnology systems and, to get task in sales and services.
- Ability for getting self-contained task in development and planning of biotechnology systems, in development of new products and methods, in research of biotechnological and related sciences.

MSc in Environmental Engineering

Length of study: 4 semesters

Program objectives: The aim of education is to make well-educated engineers, who are suitable for getting activity in field of planning, research and development and professional management in environment protection and environmental policy by their high level knowledge in science, technology, informatics and economics. Their general engineering qualification guarantees their participation in team-work. Participants of this education can take chance to apply PhD courses.

Competencies and skills:

- High level qualification and practice to manage and to select technics, technologies, processes and equipments, which guarantee the maintaining environment.
- Ability for getting self-contained task in development and planning of environment protected systems.
- Take part in organization of environment protection.

MSc in Engineering in Pharmaceutical Industry

Length of study: 4 semesters

Program objectives: The aim of education is to make well-educated engineers, who are suitable for getting activity in field of planning, research and development and professional management in pharmaceutical, plant protecting and chemical industry by their high level knowledge in science, technology, informatics and economics. Participants of this education can take chance to apply PhD courses.

Competencies and skills:

- High level qualification and practice to manage chemical and pharmaceutical technology systems in a safe and environmentally conscious manner, ability to provide task-related services or sale.
- Ability for getting self-contained task in development and planning of technology systems, in development of new products and methods, in research of chemical pharmaceutical and related sciences.

MSc in Engineering in Polymer and Textile Technology

Length of study: 4 semesters

Program objectives: The aim of education is to make well-educated engineers, who are suitable for getting activity in field of planning, research and development and professional management in plastic and textile industry by their high level knowledge in science, technology, informatics and economics. Participants of this education can take chance to apply PhD courses.

Competencies and skills:

- High level qualification and practice for safe and environmentally conscious management of plastic and textile technology systems, and in related sales and services.
- Ability for getting self-contained task in development and planning of technology systems, in development of new products and methods, in research of polymer and fiber chemistry and related sciences.



Faculty of Electrical Engineering and Informatics

Founded in 1949

Dean: Prof. László Vajta

BSc in Electrical Engineering

Length of study : 7 semesters

Program objectives: The goal is to train electrical engineers equipped competences in natural sciences, engineering sciences and information sciences such that they are capable to complete electrical engineering tasks. Students are also provided with skills in humanities and economical sciences and with proficiency in foreign languages. Graduated students may participate in the design, development and exploitation of electrical devices, equipments, complex systems and installations including the calibration, certification and inspection of such systems. Graduated students may also participate in activities such as the servicing and management of products and processes relative to the manufacturing of the above mentioned systems.

Students participating in the degree program are prepared to perform creative engineering design in a restricted field. Students are also prepared to enter into the Master of Science Degree Program in Electrical Engineering.

Available options: Embedded Information and Control Systems; Infocommunication Systems; Microelectronics Design and Technology; Sustainable Electric Energetics.

Competencies and skills:

The BSc degree program provides the graduated electrical engineers with the following competences and skills:

- design and manufacturing of analogous and digital circuits using electronic components and microelectronic technology
- design, analysis and troubleshooting of electronic devices and systems
- computer manipulation and programming
- selection and application of hardware and software elements in microprocessor and microcontroller based control systems
- practical application of measurement principles of electric and non-electric quantities
- completion of tasks requiring the use of major materials and technologies available in the industry
- application of process control devices
- completion of tasks related to electrical power production, transmission and transformation
- completion of electrical engineering tasks related to telecommunication and infocommunication systems

BSc in Computer Science Engineering

Length of study : 7 semesters

Program objectives: The goal is to train software engineers capable to install, exploit and maintain systems and services based on a broad variety of information technologies including the design and development of program and data structures related to such systems. Thanks to the theoretically well based competences and skills taught to the students, the program also prepares them to continue their studies in the Master of Science Degree Program in Software Engineering.

Students are also prepared to enter into the Master of Science Degree Program in Computer Science Engineering.

Specialisations: Infocommunication; IT System Design, Software Engineering; Enterprise Information Systems

Competencies and skills: The Bachelor of Science degree program provides the graduated software engineers with the following competences and skills:

- design, development and realization of engineering products requiring information technologies
- application of operative and practical engineering methodologies to install and exploit systems based on information technologies
- programming using the object oriented paradigm and visual development environment
- use of software development methodologies and tools
- modeling of information systems, simulation based analysis of performance and reliability parameters of information systems

- installation, configuration, debugging, maintenance, and development of general purpose, operating systems based on recent technologies
- programming of client-server systems, WEB programming
- process-based functional design and development of business information systems using some kind of enterprise modeler tool
- design, development and exploitation of decision support systems
-

MSc in Electrical Engineering

Length of study: 4 semesters

Program objectives: The goal is to train engineers who are provided with high level knowledge such that they are capable to design, develop and integrate electronic and computer devices and equipment and to join, coordinate or lead team of professionals performing fundamental or applied research and development activates in the related area. Engineers holding this degree are also prepared to continue their studies at the PhD level.

Competencies and skills: Major specialization in the program: Embedded Systems, Control Systems, Microelectronics and Electronics Technology, Multimedia Systems and Services, Engineering of Computer-based Systems, Wireless Systems and Application, Electric Power Systems, Minor specialization: Applied Electronics, Applied Sensors, E-Mobility, Buildings Electricity, Audio and Studio Technology, Intelligent Robots and Vehicles, Smart City, Optical Networks, Application of Field Programmable Gate Arrays, Smart System Integration, Engineering of Nuclear Safety

MSc in Computer Science Engineering

Length of study: 4 semesters

Program objectives: The goal is to train engineers capable to design, develop and integrate new information systems based on their broad knowledge acquired in the related fields of applied natural sciences, information processing and engineering technologies. Such engineers are also prepared to carry out, coordinate or lead research activities related to informatics and to continue their studies as a PhD student.

Competencies and skills: Major specialization in the program: Integration of Mobile Networks and Services, Internet Architecture and Services, Applied Informatics, Visual Informatics, Critical Systems, Minor specialization: Data Service and Media Informatics, IT Security, Mobile Software Development, Cloud and Parallel Computing, Intelligent Systems, Theory of Computation, Physical Protection for IT Systems

MSc in Business Information Systems

Length of study : 4 semesters

Program objectives: The goal is to train specialists who are able to understand, model and analyze complex business processes. The knowledge obtained in the course of the studies helps to uncover the problems related to business and economic systems and to develop alternative solutions. Students graduating from this program are prepared to identify and to analyze the requirements of information systems supporting value added business procedures and to develop and manage such systems. Furthermore, the graduated specialists can also participate in the development and research activities related to such systems and to continue their studies for a PhD degree.

Competencies and skills: Speciality tracks in the program: Financial Informatics; Enterprise Level Information Processes; E-Government and Public Services; Analytical Business Intelligence; Service Development and Management.

MSc in Biomedical Engineering

Length of study: 4 semesters

Program objectives: The aim is to educate biomedical engineers having interdisciplinary theoretical knowledge and also practical skills necessary for its application. Studies can be started with a first degree in engineering, informatics, natural sciences, or – a special feature of the course – in medical field. Based on their basic knowledge students are educated to be able to work on various fields of biomedical engineering or to continue their studies as a PhD student.

Competencies and skills: Biomedical engineers have high level knowledge in life- and physical sciences as well as in technical, economical and human field. During the master course they have substantial individual work and also learn to solve different biomedical engineering related problems in a team. They are able to be involved in research and development and also to supervise groups composed of medical and technical experts.



Faculty of Transportation Engineering and Vehicle Engineering

founded in 1951

Dean: Prof. István Varga

BSc in Transportation Engineering

Length of study: 7 semesters

Program objectives: The education of transportation engineers, who are able to design, arrange, operate and control transportation and goods-forwarding processes, to fulfil the related official and management tasks, as well as the works related to the selection, operation and maintenance of equipments realising processes, including the elements of infrastructure, informatics and control systems, as well. Possessing the obtained knowledge, the BSc graduated transportation engineers will be able to continue their studies in the second cycle of engineering education (leading to an MSc degree).

Specialisations: Specialization in road transportation processes • Specialization in railway transportation processes • Specialization in air transportation processes • Specialization in water-way transportation processes • Specialization in goods transportation processes • Specialization in sediton management.

Competencies and skills: *The transportation engineers received a basic certificate (BSc) – taking into consideration also the specialisations – are able:*

- to recognise the demands for transportation and transportation and goods-forwarding, to determine the relationships to be applied,
- to exert active detailed cognition of transportation- and goods-forwarding processes, to manage the processes mentioned together with their technical realisation,
- to design processes in accordance with the function of transportation and goods-forwarding systems, to select the technical components and to manage the operation of the system,
- to keep in operation vehicles and mobile machines serving the transportation process, to make the control systems operated, to take into consideration the environmental factors,
- to perform designing, organising and keeping in operation duties,
- to carry out public service and marketing activities.

BSc in Vehicle Engineering

Length of study: 7 semesters

Program objectives: The education of *vehicle engineers*, who are able to keep in operation road vehicles, railway vehicles, aircraft and ships, as well as building machines and materials-handling machines in a system oriented way, taking into consideration the characteristics of the transportation and transport-logistics processes; furthermore to solve the basic tasks of engineering, concerning their design, development, manufacturing and repair. They can perform special missions with emphasized regard to transport safety, environment protection and energy planning. Possessing the obtained knowledge, the BSc graduated vehicle engineers will be able to continue the studies in the second cycle of engineering education (leading to an MSc degree).

Specialisations: Specialisation in railway vehicles • Specialisation in road vehicles • Specialisation in aircraft • Specialisation in ships • Specialisation in buildings machines • Specialisation in automated materials-handling equipments and robotics • Specialisation in vehicle manufacturing • Specialisation in vehicle mechatronics • Specialisation in vehicle superstructures.

Competencies and skills: *Possessing the basic certificate, the vehicle engineers – taking into consideration also the prospec-tive specialisations - are able:*

- to recognise the necessary equipments for the realisation of transportation and logistic processes,
- to organize, arrange, control the safety, the powerful and environment-protective operation of vehicles, vehicle systems, mobile machines, materials-handling machines and machine systems,
- to perform the basic engineering tasks related to the designing, manufacturing, repair, as well as organisation of vehicles and mobile-machinery,
- to provide and organize the official work related to installation and operation of vehicles and mobile-machinery.

BSc in Engineering Logistics

Length of study: 7 semesters

Program objectives: Education of BSc level logistics engineers, who are apt to analyse, to organise, to control and to resolve engineering tasks of logistic processes and systems in a basic level with regard to the management of material-flows and connected information-flows realising among the companies concerned. They are prepared to develop and to take part in manufacturing and quality control, as well as to control the operation of logistic machinery, tools and equipments of elements of logistic systems. Possessing the obtained knowledge, the BSc graduated logistics engineers will be able to continue their studies in the second cycle of engineering education (leading to an MSc degree).

Specialisations: Specialization in logistic processes • Specialization in spedition • Specialization in technical logistic.

Competencies and skills: *The logistic engineers received a basic certificate (BSc) – taking into consideration also the specialisations – are able:*

- to recognise the necessary means to realise the logistic system and the transportation and material-flow process in the industrial production and economic systems;
- to organise, to arrange and to manage the operation of logistic systems;
- to elaborate basic engineering tasks concerning design, manufacturing and repairing of parts of logistic systems and their organization;
- to apply integrated knowledge in specialization of transportation, of mobile machines, of process-theory, of industrial production processes, of electronics and of informatics;
- to connect the component-processes of logistic systems and the partial-units which physically realise them.

MSc in Vehicle Engineering

Length of study: 4 semesters

Program objectives: The MSc level education of vehicle engineers, who are prepared to develop, to design, manufacture, research of operation processes, as well as to keep in operation, to maintain and repair railway vehicles, road vehicles, agricultural vehicles, ships, aircraft, building machines and materials-handling machines taking into consideration the requirements of safety, environmental-protection and energy management.

Competencies and skills: Possessing the MSc degree, vehicle engineers are able:

- to realise a system oriented and process analysing way of thinking directed on vehicles and mobile-machinery, having role in transportation processes;
- connected with the specialization selected, to carry out state assessments, to develop, design, organise and control complex systems of vehicle technology.

MSc in Engineering Logistics

Length of study: 4 semesters

Program objectives: The MSc level education of logistics engineers, who are prepared to analyse, to design, to organise and to control of logistic processes and systems with regard to the management of material-flows and connected information-flows realising among the companies concerned. They are prepared to design, to develop and to take part in manufacturing and quality control, as well as to control the operation of logistic machinery, tools and equipments of elements of logistic systems.

Competencies and skills: *Possessing the MSc degree, logistic engineers are able:*

- to interconnect the component-processes of logistic systems and the component-units performing the physical realisation of the former systems,
- connected with the specialization selected, to carry out state assessments, to develop, design, organise and control complex logistic systems.

MSc in Transportation Engineering

Length of study: 4 semesters

Program objectives: The MSc level education of transportation engineers, who are prepared to analyse, to design, to organise and to control of transportation processes and systems taking into consideration the principles of economics and system orientation. They are prepared to carry out management and official tasks, as well as to select and keep vehicles and equipments in operation as elements of transportation systems, including the elements of infrastructure and informatics systems, too.

Competencies and skills: *Possessing the MSc degree, transportation engineers are able:*

- to recognise connections between systems and processes of transportation, to evaluate and to handle them in the framework of system theory, as well as to apply the principles and methods;
- connected with the specialization selected, to carry out state assessments, to develop, design, organise and control complex transportation systems.

Faculty of Natural Sciences

Dean: Prof. János Pipek

Founded in 1998

BSc in Physics

Length of study: 6 semesters

Program objectives: Physicists are employed in many different positions in developed countries, and increasingly in Hungary as well. Students of the Physics BSc Program become familiar with the foundations of natural and technical sciences, and also learn mathematics, informatics, measurement methods and efficient problem solving techniques. Physicists graduating from the Budapest University of Technology and Economics acquire these techniques and become able to continue their studies in different fields of scientific research and technical development, moreover, they may find jobs in technology, economy or business. The curriculum substantially exceeds national minimum requirements and corresponds to international standards for a BSc degree in Physics. The facilities and scientific-tutorial background of the Institute of Physics and the Institute of Nuclear Techniques offer unique opportunities in areas like low temperature physics, acousto-optics, holography or the nuclear training reactor. A further advantage of our Physics BSc program is the special practical, engineering background provided by the Budapest University of Technology and Economics.

Competencies and skills: Mathematics and informatics are essential tools for physicists; consequently, excellent training is necessary in these areas. Starting from first year, there are laboratory classes in the curriculum joined to theoretical and experimental physics that provide a sound scientific background. Additionally, there are further subjects in economics, natural and social sciences. Two specializations are offered: **Physicist** and **Applied Physics**. The “Physicist” specialization, with its robust theoretical foundations, is recommended for students who are interested in basic research. The curriculum of the “Applied Physics” specialization is much more focused on practice-oriented subjects to promote eventual immediate employment of young professionals with a BSc degree. The option to continue studies in our Master Program, respectively in the PhD school afterward, is available to students in both specializations. The curriculum of the two specializations is the same in the first three semesters, and then they gradually start to diverge starting from the fourth semester of studies.

BSc in Mathematics

Length of study: 6 semesters

Program objectives: Following the tradition of the world’s famous technical universities, the predecessor of the Faculty of Natural Sciences of the Budapest University of Technology and Economics launched its Mathematics program in 1997. The previous 5-year program has been changed for the newly started Mathematics BSc program and the two MSc programs. Mathematicians who graduate from here are interested in practical problems and will be able to use their knowledge creatively. In addition to being familiar with abstract fields of mathematics, they are able to collaborate and communicate with representatives of other professions. Very likely the developing Hungarian economy will require such experts. Our Mathematics program fits organically into the list of other mathematics-demanding application-oriented programs offered by the Budapest University of Technology and Economics such as informatics, economics, material science, etc., in addition to the traditional engineering programs.

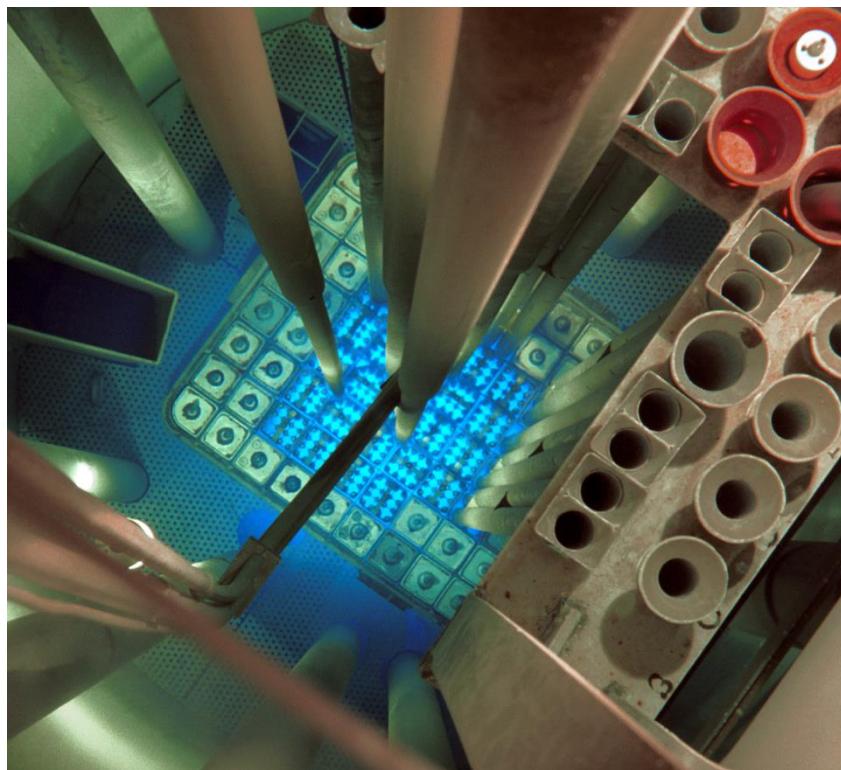
Competencies and skills: The basic fields covered by our Mathematics BSc program include algebra, mathematical analysis, geometry, numerical methods, probability theory and statistics, physics, economics and social sciences, as well as subjects of the specialization. Our students study fundamental topics of mathematics during the first three semesters. In the fourth semester, students are offered two options: the **Theoretical Mathematics** specialization is recommended for those who are interested in developing a deeper understanding of some branches of mathematics and in doing theoretical research and are probably going to continue their studies in a Mathematics MSc program. The **Applied Mathematics** specialization is recommended for students who are eager to apply their knowledge in industry or finance. Therefore, we have prepared courses that are related to information technology, economical and financial mathematics, or technology. Students graduating from either specialization are allowed to continue their studies in one of our Mathematics Master programs. Students who earned a BSc degree in Mathematics can find employment in industry or finance or after further studies may apply for research positions.

MSc in Physics

Length of study: 4 semesters

Program objectives: Our Master in Physics program provides facilities to become professionals in basic research, in R&D, or either in theoretical or experimental fields. Our graduates obtain knowledge based on broad foundations that can be used extensively in research institutes and modern companies, in environment protection as well as in modeling complex processes, like ecosystems or even financial analysis. Continuation of the studies is possible within the Graduate School of Physics.

Competencies and skills: Students who chose the specialization “**Research Physicist**” get acquainted with theoretical tools of modern physics and with state of the art experimental methods. Students in specialization “**Applied Physics**” study material testing techniques, material science, optics. Graduates from specialization “**Nuclear Techniques**” may use their knowledge in energetics, medical applications, radiation and environment protection. The specialization “**Medical Physics**” transfers knowledge of creative use and development of modern medical instruments.



MSc in Applied Mathematics

Length of study: 4 semesters

Program objectives: The primary goal of the program is to prepare students for applying mathematics in different fields of industry or economy at a high level, as there is an increasing need for professionals who are able to use mathematical thinking in these areas, are able to communicate with engineering and economics experts, and have trained in applications. At the same time, the program provides an opportunity for students who decided to become researchers to continue their studies in a PhD program.

Competencies and skills: Students choosing the “**Applied Analysis**” specialization will meet applications of mathematical analysis in natural sciences, finance and industry. Graduates from the “**Operations Research**” specialization are able to create models for problems in controlling systems or optimization. Students who specialized in “**Financial Mathematics**” can analyze financial processes or insurance problems and are able to interpret the results. Graduates from the “**Stochastics**” specialization can recognize and study random laws in various phenomena. The language of education is English in the specializations Financial Mathematics and Stochastics.

MSc in Mathematics

Length of study: 4 semesters

Program objectives: The primary goal of this program is to prepare students for high level research and for further studies in a PhD program. The number of positions for mathematicians has increased during the past few years. Large international firms deploy divisions in Hungary because they can find professionals with deep knowledge of Mathematics. Developing technologies, extended services (bank and insurance sector) will also need more specialists.

Competencies and skills: Students choosing **no specializations** get acquainted with fundamental results in algebra, analysis, combinatorics, geometry, operations research, number theory, stochastics and statistics as well as with the necessary background in informatics. Graduates from the specialization „**Analysis**” will study several contemporary branches of Mathematics arising in theoretical Physics and some applications of Analysis in natural sciences, industry and finance. Students who specialized in „**Optimization**” will be given a solid foundation in Mathematics and a wide overview of the main topics in Optimization, through chains of courses. Applications will also be presented. Graduates from the Mathematics MSc program will find employment mainly at institutions, universities and companies doing research in pure Mathematics. They may also continue their studies at the Graduate School of Mathematics and Computer Science of our Faculty.

MSc in Cognitive Studies

Length of study: 4 semesters

Program objectives: The aim of the master program is to train researchers capable of performing complex analyses of human cognitive processes relying on the methods of natural science. Graduates will be able to perform research tasks in the area of cognition combining elements from biological (neuroscience, experimental psychology, developmental studies), formal (mathematics, logic, philosophy, linguistics) and engineering (machine systems, computer science and technology) disciplines. Their knowledge and competences will allow them to pursue doctoral studies or work in various applied domains, including IT industry, biotechnology and measurement development.

Competencies and skills: Graduates will acquire competency in the component domains of cognitive science: the general framework of cognitive psychology and the related fields of computer science, mathematics, neuroscience, linguistics and some philosophical subdisciplines such as epistemology and logic. They will have a practical knowledge of computer technology and analysis. They will be familiar with widely used problem solving technologies needed for research, and with the professional ethical norms of the different domains.

Faculty of Economic and Social Sciences

founded in 1998

Dean: Prof. János Kövesi

BA in Applied Economics

Length of study: 6 semesters

Program objectives: Fundamental knowledge in micro- and macroeconomics, formal techniques, about sectoral interdependences and the functional structure of economies will qualify the graduates to take part successfully in the processes of economic analysis. They will be able to realize problems, to find approaches for solving them and to formulate suggestions for decision making. The acquired knowledge is a good background for the participation in a master program in economics.

Competencies and skills: The graduates have knowledge in the following fields:

Fundamental economic categories, their interdependence and basic mathematical and statistical methods in analysis; economic processes and the role of economic institutions; principles of activities in different fields of economic and social life; understanding of economic policies; creativity in solving problems; economic, social and legal systems of the EU member-states as well as of the European Union itself.

BA in Management and Business Administration

Length of study: 6 + 1 semesters

Program objectives: The aim of the course is the development of administrative, sociological, applied economics and methodological skills and knowledge, as well as the development of their practice oriented applications. Preparation for participating in the business world and to equip them to be able to progress to the Master level.

Competencies and skills: Graduates will be familiar with:

The fundamental principles of management, their main interrelations, factors affecting management and applicable means of affecting them; the tools and methods of resource and production management and their guiding principles in terms of planning, analysis, evaluation and execution; the creation, structures, formation of systematic behaviours, and the fundamental principles and methods of change of organisations and institutions.

BA in Communication and Media Studies

Length of study: 6 semesters

Program objectives: The aim of the program is to develop practice-oriented skills and a solid understanding of media and communication systems; their interconnected relationship to and influence on culture and society, and of the major scenes, institutions and processes of communication. The program prepares students for their advanced studies on the MA level, or for a career in administrative, business or cultural communication. Specializations offered in the program are; communication analysis, communication technology, environmental communication, international communication and visual communication.

Competencies and skills: Graduates of the BA program develop skills for successful problem recognition and problem solving; they can identify, critically analyze and process the information and arguments that are necessary for solving problems in various areas of communication and media. They can effectively demonstrate the results of their analyses to professional and non-professional audiences using the most current presentation technologies. Students also develop strong cooperative, innovative and communicative skills, along with critical self-reflection, a sense of responsibility, effective and result-oriented thinking. These skills and attitudes make them excellent candidates for positions in various areas of communication, media, social services, mediation and public relations.

Engineering Management BSc

Length of study: 7 semesters

Program objectives: The aim of the course is to equip students with the scientific, technical, economic, organisational skills to be able produce integrated solutions in the areas of products and services for materials, informatics, finance and human resources. Furthermore, students will possess adequate theoretical knowledge to continue their studies at the next level, that is at Master's degree level.

Competencies and skills: Graduates at bachelor's level will be familiar with:

Fundaments and interrelations of technical and management fields; the physical, human, economic and social relationships in production and service processes; the technical, economic and management activities within organisations and their interrelations; the knowledge necessary to set up production and service enterprises; the theoretical background and possible applications of technical and management disciplines and related disciplines, for example, sociology, psychology, law; the regulations concerning environmental protection, health and safety, quality control, industrial law, as well as consumer protection.

Modules: Management • environmental management • product management • financial management

Vocational Technical Instructor

Length of study: 7 semesters

Program objectives: The aim is to train technical instructors who are already in the possession of a qualification belonging to a qualification branch included in the National Qualifications Register when entering the training programme, which will later affect the selection of a special branch as well. Due to their theoretical and practical knowledge acquired during the selected special branch training programme they will be able to design, organize as well as provide the instruction of practical subjects, to carry out laboratory practical activities related to the professional subjects and company-based workshop practical activities. Preparation for higher vocational education and training, adult education and further education is also included in the programme.

Competencies and skills: In the possession of the bachelor degree technical instructors know the technological fundamentals, the tools and procedures and the safety regulations appropriate for the selected special branch of studies. Those in the posession of the degree have cooperation, conflict management, contact making and communication competencies, further-more they are able to realize effective cooperative activity carried out with the students and by the students.

Special branches: Electronics • Architecture • Mechanics • Informatics • Light Industry • Environmental Protection-Water Management • Transport, Chemistry

BA in International Business

Length of study: 6 + 1 semesters

Program objectives: To train economic professionals able to negotiate in at least two foreign languages at a high level, who will be able to conduct, direct and organise international business activities having gained the requisite economic, sociological, administrative, applied economic and methodological knowledge and specialist skills. Furthermore, students will possess adequate theoretical knowledge to continue their studies at the next level, that is at Master's degree level.

Competencies and skills: Graduates of International management will be equiped to:

Analyse the movement of international goods and services as well as finance; supervise the parallel development of regional and domestic relations; independantly conduct international relations; practical apply management functions; able to work individually and in teams; apply negotiating, presentation and persuasive techniques; identify and solve problems, while designating and prioritising the tasks involved.

They will possess independent problem, recognition and solving skills, critical analytical skills and the ability to innovate and produce proposals (initiatives), networking skills, be able to adapt and cooperate, as well as possess oral and written communication skills, tolerance, and the ability to accept differences.

MA in Economics

Length of study: 4 semesters

Program objectives: The program's aim is to educate students in relevant fields of economics, including the mathematical methods for economic analysis. After having been graduated they will be qualified for the labor market in Europe as well as in other parts of the world. The knowledge in theory and methodology will enable them to investigate economic problems with high creativity and social responsibility. Their employment will be possible in the public and private spheres and in the academic sector, including here the possibility for Ph D studies.

Competencies and skills: The graduates have knowledge in the following fields:

Microeconomics; mathematics applied to economics; basic macroeconomic models; basic econometrics; simulation of economic problems; research methodology especially in the field of economics; techniques for solving theoretical and analytical activities; professional-ethical norms and their application.

Master of Business Administration

Length of study: 4 semesters

Program objectives: MBA (Master of Business Administration) programs have existed in Hungary since the early 1990s. The intention of the MBA was to provide students whose professional expertise was in a non business discipline the skill set necessary to be successful managers. Today the demand for professionals with such qualifications is very high. The popularity of the MBA degree is based on a model that prepares students for careers in business and management, regardless of their primary field of expertise.

Competencies and skills: The schedule of our part-time programs is unique. Classes total approximately eight hours of lecture time a week during the two semesters. Fall semester is from September to December, and Spring semester is from February to May. The same classes are offered twice a week, on Fridays and Saturdays, so students can select classes that most conveniently fit their schedule. The MBA program offers two specialization: Management and Finance.

MSc in Marketing

Length of study: 4 semesters

Program objectives: The discipline of Marketing has had a significant presence at BME for the past fifteen years. From the beginning Marketing was an important addition to many post graduate curricula. Later it was integrated into the MBA Program and then added to the engineering management program. The primary goal of the Marketing Program is to provide professionals currently, or prospectively, employed in marketing activities in business and non-business organizations the skill set necessary for success.

Competencies and skills: The goal is accomplished by imparting to students significant theoretical and practical knowledge permitting the development of marketing strategies, identifying appropriate marketing methods consistent with strategy, and developing supporting marketing processes. Providing students the widest possible knowledge base to become better professionals and accomplished experts in several business fields is another goal of our Marketing program.

MA in International Economy and Business

Length of study: 4 semesters

Program objectives: Basic knowledge in economics, international economics, economic policy and in relevant parts of business sciences will enable the graduates to work successfully in economic practice and at several levels of domestic and international economic institutions. Activities will cover all phases of this process from the problems' realization through the organization and administration of all steps to solve them until the preparation of final decision making. Appropriate knowledge will enable graduates to start their participation in PhD programs.

Competencies and skills: Determinants of social and economic situations on the local, regional national and international level; methods for decision making in economics, international economics and business, and in the processes going on in the world economy; creativity for research, further studies, including methods for solving problems; developing of strategies for planning, management and regulation in the fields of international economics and business; team work.

MSc in Finance *Length of study: 4 semesters*

Program objectives: The development of a finance curriculum dates to 2001 as part of the program of study introduced for economics majors. The goals of the Master of Science in Finance are to help the financial professional make creative, economic-minded decisions, to analyze and predict financial markets, and to make appropriate financial decisions using sophisticated methodological techniques rooted in sound financial theory.

Competencies and skills: The Master of Science in Finance Program is a full-time program and follows the general university schedule. Students may choose from three specializations: Corporate Finance, Investments and Monetary Policy and Public Finance. Here, we also strive to provide our students the broadest possible knowledge base to become accomplished successful managers, to become experts in several business fields and to continue their academic studies at the PhD level, should they desire.

MSc in Regional and Environmental Economic Studies *Length of study: 4 semesters*

Program objectives: The aim of the course is to train such professionals, who, in possession of their theoretical and practical skills, are capable of the analysis of spatial and ecological processes, can recognise interactions and problems, can participate in the development of regional and environmental policy, strategies and programmes in a creative and innovative manner, and are able to exercise their knowledge in both regional and environmental sciences.

Competencies and skills: Graduates of the MSc course have knowledge of: the fundamental micro- and macroeconomic, regional, urban, moreover environmental, economic, geographic and sociological sciences; the problem-solving techniques required to complete their tasks, the criteria and conditions of the application of their acquired skills; the methods of obtaining professional information from literature; the skills and methods of recognising and analysing practical problems in the areas of spatial development, urban development and in the management of the environmental economy.

MSc in Accounting *Length of study: 4 semesters*

Program objectives: The goals of the Master of Science in Accounting are to educate professionals in the operation, control, and analysis of the accounting function and to link theoretical and practical knowledge in a meaningful way so as to provide management professionals the skills and abilities necessary to lead complex organizations. The result of this process is the development and staffing of middle and senior level management positions with leaders competent in accounting practices. We do this for both domestic and foreign enterprises.

Competencies and skills: In addition, as with our Master degree in Marketing, we strive to provide our students the broadest possible knowledge base to become accomplished successful managers, to become experts in several business fields and to continue their academic studies at the Ph.D. level, should they desire. The students can choose from two specializations: Management Accounting and Audit and Control.

MSc in Management and Leadership *Length of study: 4 semesters*

Program objectives: The Master of Science in Management and Leadership also finds its origins with the economics curriculum launched in 2001 and with the curriculum for engineering management begun in 1996. The Production Management and Logistics specialization was important to the former, and the Quality and Technology specialization was important to the latter. A third influence on BUTE's graduate program in management and leadership was the Quality and Production Management specialization in the MBA program.

Competencies and skills: Though our Management and Leadership Program consists of the Specialization of Production and Operations Management our purpose beside this structure is to educate professionals who are able to analyze, plan, organize and manage working processes of organizations operating both in the private and in the public sector and who are able to identify, analyze and solve newly arising problems and who at the same time are receptive to innovation and creative thinking.

MSc in Engineering Management

Length of study: 4 semesters

Program objectives: The goals of the Program are to educate management professionals who are able to plan and organize working processes both from technical and economic viewpoints, to control the execution and to analyze and evaluate results by means of methodological, technical, information technological, economic, business and foreign language skills and abilities. Students graduating the program possess the basic knowledge of technical, business and management fields and of their relationships.

Competencies and skills: We also strive to provide our students with the skills and abilities to become able to use various problem solving techniques, to understand the working of production and service processes from economic, human and social point of views, to communicate with experts of different professional fields and to prepare and execute strategic plans. This course is a full-time. Students can choose from four specializations: Management, Finance, Environmental Management and Product Management.

Teacher of Engineering MA

Length of study: 4 semesters

Program objectives: The aim is to prepare the students for teaching theory-based subjects in education provided both within and outside the school system, as well as in accredited vocational education and training programmes based on higher technical training, to prepare for pedagogical research, design and developmental tasks in the field of technical education, furthermore to provide the base for the acquisition of vocational education and training related academic qualification.

Competencies and skills: The teachers in the possession of their professional preparedness during their professional practice are suitable for developing the pupil's personality, for supporting the formation and development of learner groups, for designing the pedagogical process; by using their scientific knowledge for the development of the pupil's educational level, skills and abilities, for efficiently developing the competencies needed for lifelong learning, for organizing and managing the learning process, for using various tools of pedagogical measurement and evaluation, for professional cooperation, for committing themselves to professional development and self-education.

Teacher of Economics MA

Length of study: 4 semesters

Program objectives: The aim is to prepare teachers for teaching theory-related subjects in education provided both within and outside the school system as well as in accredited vocational education and training based on their tertiary training in economics, for pedagogical research, design and developmental tasks in technical education in the field of economics, further-more to provide the base for the acquisition of vocational education and training related academic qualification.

Competencies and skills: The teachers in the possession of their professional preparedness during their professional practice are suitable for developing the pupil's personality, for supporting the formation and development of learner groups, for designing the pedagogical process; by using their scientific knowledge for the development of the pupil's educational level, skills and abilities, for efficiently developing the competencies needed for lifelong learning, for organizing and managing the learning process, for using various tools of pedagogical measurement and evaluation, for professional cooperation, for committing themselves to professional development and self-education.

MA in Communication and Media Studies

Length of study: 4 semesters

Program objectives: The aim of the program is to provide students with an excellent understanding of the various aspects of media and communication, their interconnected relationship to and influence on culture and society, and of the major scenes, institutions and processes of communication. The MA program prepares students for advanced PhD level studies, or for a career in the management of administrative, business or cultural communication.

Competencies and skills: The program develops a solid understanding of the nature and processes of communication and media systems; their economic, legal and cultural regulations and influences, and the

problems raised by the convergence of media systems and the global (media) market. Students also develop management competencies in problem solving; recognizing and analyzing problems, designing solutions and completing projects with effective task sharing methods.

MA in Psychology

Length of study: 4 semesters

Program objectives: The goal of Psychology Master Program is to train students to become competent professionals in various fields of psychology. To provide students with multiple opportunities to apply theoretical and practical knowledge of psychology in understanding and developing individuals, teams and organizations. To enrich students with practical knowledge, being able to lead efficient professional activities in the fields of applied psychology, without professional supervisor. On long term, students interested in research may continue their studies at the Work and Organizational PhD program.

Competencies and skills: The students gain a broad knowledge of the following areas: history and relevant views of psychology; basic knowledge of applied psychology and relevant principles of sub fields; methods of psychology; the ethical aspects of data processing; the methods of scientific research, professional training, and efficient communication; the specific professional knowledge and methods of the chosen fie.

