



# UNIVERSITY OF DEBRECEN CENTRE OF ARTS, HUMANITIES AND SCIENCES



*Undergraduate,  
Graduate and PhD Degree Programs  
at the Faculties of Informatics, Science and Music  
for International Students in English*

## HUNGARY



# The City of Debrecen

With 220 thousand inhabitants Debrecen is the second largest city in Hungary and the centre of the North Great Plain Region. The Eastern gate of Europe - as Debrecen is often referred to is also the seat of Hungarian Protestantism, and as such is often referred to as the “Calvinist Rome”. The numerous university faculties, colleges and professional schools have turned Debrecen into the country’s most important educational centre. More recently, the city’s main focus is the development of its industrial park, and centers for knowledge management in information technology, nanotechnology, pharmacy and biotechnology.



The main square in front of the Great Reformed Church is the real centre of “the city of gatherings”. There are fountains, blooming trees, many coffee terraces and it is an intimate scene of outdoor performances. The beautiful Csokonai Theatre and Déri Museum both play an important role in the flourishing cultural life, which characterizes the city. Summer is the time of festivals: a lot of people from other parts of Hungary as well as from abroad visit the famous Debrecen Flower Carnival, the Debrecen Jazz Days, the Béla Bartók International Choir Competition and the International Military Band Festival. The new Conference Centre hosts professional and cultural programs. Week by week, many people support the city’s most famous sport clubs, especially the football, handball and basketball teams. Those wishing to take a rest are welcome in the Great Forest, where the famous Debrecen Spa Bath and the Mediterranean Aquaticum are located.





# The University of Debrecen

The history of Debrecen's higher education dates back to the 16th century. The Calvinist Reformed College, established in 1538, played a central role in education, teaching in the native language and spreading Hungarian culture in the region as well as in the whole country. The College was a sound base for the Hungarian Royal University established in 1912. Apart from the three academic faculties (arts, law, theology) a new faculty, the faculty of medicine was introduced, and the University soon became one of the regional citadels of Hungarian higher education. With fifteen faculties organized into 3 centers and a student body of over 25 thousand the University of Debrecen is one of the largest institutions of higher education in Hungary. Besides the international recognition and received standard of scientific research and education, the most important virtue of the University of Debrecen is its ability to adapt to the claims and expectations of society. This capacity makes it the intellectual centre of Eastern Hungary.





# The Centre of Arts, Humanities and Sciences

The Centre of Arts, Humanities and Sciences is a multidisciplinary coordinating unit within the University of Debrecen comprising seven academic faculties, two secondary and one primary schools and a number of interfaculty units (for instance, the European Studies Centre, student hostels, the Sports and Physical Education Centre, the nursery and day care establishments). Entrusted with economic self-government within the University, it serves as a coordinating and mediating forum, which represents unified interests in negotiations with external institutions. This training and economic coordination encompasses the research, innovation, development, education, teacher training, and external relations. The Centre is the professional base of teacher training at the University level.

The integrated University of Debrecen draws meaning from its three centers (the Centre of Agriculture, the Medical and Health Sciences Centre and the Centre of Arts, Humanities and Sciences), which, through their cooperation, ensure the multidisciplinary background, which in turn guarantee the University a leading role as a research and education institution.





# International Foundation Year

For those students who require additional instruction or review in sciences and in English language we offer foundation year courses to prepare them to study in their chosen degree program. Students successfully finishing the Foundation Year program are *guaranteed admission* into any engineering, or science program.



Offering a range of courses, including intensive English language study, which bridges the gap between the students' current qualifications and background and the knowledge and skills required for honors courses, the International Foundation Year provides students with the necessary skills to proceed to study their chosen discipline.

Education of basic science subjects – biology, physics, mathematics and chemistry is quite demanding in Hungarian High Schools. The Foundation Year program is recommended for those applicants who do not have enough knowledge in biology, physics, chemistry, mathematics or in any of these subjects according to Hungarian standards, and need further studies and a period for acclimatization before entering an engineering or science program. In addition to these basic scientific subjects, courses in professional English and Hungarian languages are also included in the program.

Subject	Contact hours
<i>Language courses</i>	
English	120
Hungarian	60
Professional English	60
<i>Science courses (elective)</i>	
Biology	240
Chemistry	240
Mathematics	240
Physics	240
Informatics	240
<b>Total</b>	<b>720</b>

The preparation of foreign students, to enable them to successfully learn subjects at the University of Debrecen, is carried out according to the curriculum of the foundation year. During this time, several subjects will be taught to students: standard English language, professional English language, Hungarian language for foreign students, and optionally, – depending on prospective studies, – biology, chemistry, mathematics, physics. The language courses may be supplemented by laboratory exercises.

# Faculty of Informatics

## Undergraduate Degree Programs

The Faculty of Informatics of the University of Debrecen boasts the only accredited university-level educational program for IT specialists in the East-Hungarian region. Eight professors, 13 associate professors (senior staff), 17 assistant professors (staff), 15 teaching assistants and 15 graduate computer scientists working at the faculty's five departments (Department of Applied Mathematics and Probability Theory, Information Technology, Computer Graphics and Library Informatics, Informatics Systems and Networks, Computer Science), represent a formidable pool of intellectual potential, which has earned recognition even at international level. The faculty is well equipped with several computer laboratories and an almost inexhaustible research library with about 30000 books and 250 journals in mathematics and computer science. The building is equipped with a high-speed data network constructed from structured, cross-wired EIA/TIA cabling with a bandwidth of 100 Mbit/s.



### Software Engineering, BSc

#### Objectives and Perspectives

The aim of the program is to train IT professionals who, possessing the solid theoretical grounding necessary to further develop their skills over the long term, are capable of performing, at an advanced level, the typically software-oriented development, implementation and servicing tasks related to IT equipment and systems, working either independently or as part of a team. Participants in this course will also learn the interaction and modeling skills required to solve IT tasks in all main areas of application.

#### Requirements

Duration of studies: 6 semesters
Number of teaching (contact) hours: 1,800
Number of required ECTS credits: 180

#### Natural Science and basic vocational training (120 credits)

**Subjects:** Discrete Mathematics, Calculus, Introduction to Informatics, Logical Basics of Informatics, Automata and Formal Languages, Computer Architecture, Assembly Languages, Combinatorics and Probability Theory, Operating Systems, High Level Programming Languages, Data Structures and Algorithms, Computer Statistics, Database Systems, System

Engineering, Introduction to Computer Graphics, Numerical Mathematics, Operation Research, Programming Environments, Programming Environments, Programming Technologies, Theory of Computing, Basics of Artificial Intelligence, Developing Database Systems, Translator Programs, Technology of System Development, Network Architectures and Protocols, Internet Tools and Services, Design and Analysis of Algorithms.

### Compulsory vocational subjects of choice (16 credits)

Artificial Intelligence Languages, Knowledge-based Systems, Theory of Logical Programming, Selected Chapters in Artificial Intelligence, Developing Database Systems, OO Data Models, Advanced DBMS, Server Administration, High-Speed Local and Urban Networks, Actual Problems in Network Communication, Performance Evaluation of Networks, Computer Graphics, Graphical Systems, Spatial Informatics Systems, Multimedia, Theory of Information, Neural Networks.

#### Graduate Study Opportunities

MSc in Software Engineering (see p. 17)

## System Engineering, BSc

### Objectives and Perspectives

The aim of the program is to train IT engineers who have the skills needed to plan, develop and service technical installations that utilize IT-based solutions, especially with regard to technical and infrastructural systems and services, as well as their data and software systems. Students obtain practical engineering techniques associated with the installation and commissioning of IT infrastructure

#### Requirements

Duration of studies: 7 semesters

Number of teaching (contact) hours: 2,100

Number of required ECTS credits: 210



Advanced compulsory vocational subjects and optional vocational subjects are grouped into specializations. Students who select a particular specialization may only obtain the compulsory 40 credits from subjects associated with their chosen specialization.

### Compulsory Subjects

Discrete Mathematics, Calculus, Logical Basics of Informatics, Introduction to Informatics, Computer Architectures, Physics, Electronics, Data Structures and Algorithms, High Level



Programming Languages, Operating Systems, Practice in Electronics, Database Systems, Introduction to Computer Graphics, Probability Theory and Mathematical Statistics, Signals and Systems, Network Architectures, Digital Technologies, Theory of Computing, Practice in Programming, Basics of Artificial Intelligence, Corporate Information Systems, Models of Information Systems, Basics of the Security in Informatics, Technology of Control, Models of Corporate Information Systems, Decision Support Systems.



### **Electives in Social Sciences**

Economics, Economics of Enterprises, Law and State Studies, EU Studies, Management.

### **Specializations:**

#### ***Info-communication Networks***

Telecommunication Systems, Performance Evaluation of Networks, Practice, Information and Coding Theory, Data Security, High-Speed Networks, Multimedia.

#### ***Measurement and Process Control***

Methods of Simulation in Computer Systems, Technologies of Measurement, Practice, Sensors and Controllers, Computer Aided Measurement and Process Control, Microcontrollers, Technological Image Processing, DSP, Digital Signal Processing and Signal Processors.

#### ***Corporate IT Systems***

Logistics, Quality and Reliability, Maintenance and Management, Production Management, Communication in Business, Practice, Management Information Systems, Informatics in Production, Law in Informatics, Office Automatization.

### **Graduate Study Opportunities**

MSc in Software Engineering (see p. 17)

# Faculty of Science

## Undergraduate Degree Programs

### Chemical Engineering, BSc

#### Objectives and Perspectives

Our objective is to train professionals who possess the general knowledge, technical intelligence, mastery of at least one foreign language, the basics of natural, social and engineering sciences, which are essential for the practice of the chosen profession.

It is likewise important that students acquire the most essential skills in technology and safety, environmental protection, management and social sciences. Concrete practical methods as well as the capability to apply acquired skills will help them to get accustomed to the professional requirements and standards of their future workplace. They will be capable of understanding/controlling production processes, preparing quality insurance and technical services and solving tasks regarding planning and development.

Through the learning of basic legal, economic and management skills, students will be trained to carry out projects concerning production and marketing. In addition, senior students will possess the necessary theoretical and practical expertise to solve problems appearing in the processes of the chemical and related industries, can furthermore plan and operate complex technological systems and carry out research and development tasks.



#### Requirements

Duration of studies: 7 semesters

Number of teaching (contact) hours: 2,100

Number of required ECTS credits: 210

#### Compulsory subjects

*General and scientific foundations* (mathematics, physics, general and inorganic-, macromolecular-, colloid- and bio- chemistry)

*Economic and human sciences* (basics of legal, economic and management sciences)

*Basics of professional knowledge* (physical- and analytical- chemistry, informatics and computer models, mechanics, unit operations, chemical technology, safety)

*Higher engineering* (petrol chemistry, plastics, environmental technology, radiochemistry, quality management, instrumental analytical methods and quality assurance)

*Thesis*

#### Elective subjects

e.g. chemical technology of hi-tech materials, production of plastics etc.

### Graduate Study Opportunities

#### *MSc programs in development:*

- Chemistry
- Chemical Engineering
- Materials Engineering
- Materials Science
- Environmental Engineering
- Environmental Science
- Bioengineering



## Electrical Engineering, BSc

### Objectives and Perspectives

The aim of the Electrical Engineering BSc program is to provide a comprehensive education that prepares our students for a successful engineering practice and advanced studies. Students learn about the basic physical laws governing our environment, materials science and technology at macro- micro- and nanometer scales, as well as mathematics and informatics. They acquire practical knowledge in computer engineering and electronic technology, microelectronics and energy systems, optical materials and automation. Apart from basic and applied knowledge, students will be trained in e-commerce, planning, solving and managing problems efficiently. A solid basic education in the Electrical Engineering BSc program provides a foundation for a successful career in industry and prepares students for further studies in engineering and informatics.

#### Requirements

Duration of studies: 7 semesters

Number of teaching (contact) hours: 2,910

Number of required ECTS credits: 210

### Major Subjects

During the first year the BSc program offers introductory and advanced courses of Mathematics, Physics, Informatics, Materials Science, Chemistry that provides a basis for the next step in Advanced Professional Module, where the accent is on the Electronics, Programming, Digital Technics, Automotion, Electricity and Magnetism, Measuring Technology and Energetics. Optional Professional Subjects are selected according to the two specializations (Infotechnology and Automotion) which start in the last three semesters: Photonics, Nanotechnology and Nanoelectronics, Digital Signal Processing, Electric Drives, Sensors, PLC, Power Electronics. The courses of Environmental Studies, Economics and Management, Civil Law and Intellectual Properties support the development of management skills. In the last three semesters students work in elective laboratories, have a four-week training at factories and make their thesis research, based on different research programs and co-operation with industrial partners.

**Graduate Study Opportunities**

various engineering MSc programs (in development)

**Background**

The Institute of Physics in Debrecen has about 40 staff members. Half of

them are professors and associate professors with fluent English, with extensive educational and research experience. The Institute is well equipped with physics, electronic and computer laboratories. We emphasize quality in education and research by creating platforms for learning and through targeted research excellence, for example in the nanotechnology field. We have industry partners who participate in research and educational programs, providing much needed input and resources with positive impact on student training and strengthening research relationship. Advanced students also have access to the resources of the nearby Institute of Nuclear Research of the Hungarian Academy of Sciences with laboratories and an excellent research library.

## Biology, BSc

**Objectives and Perspectives**

Our aim is to provide students with basic knowledge in the most important biological fields, to attain skills in fundamental methods of laboratory and applied biology, and acquaints them with the most important processes of biochemistry, cytology, components of living organisms. The Biology BSc program covers a broad range of biological science



including the most important concepts in modern biology; the levels of biological organization; the fundamental principles of structure and function and the development of ecosystems.

**Requirements**

Duration of studies: 6 semesters

Number of teaching (contact) hours: 1,800

Number of required ECTS credits: 180

**Major Subjects**

During the first year the basic elements of Basic Environmental Sciences, Elementary Mathematics and Informatics, Basics in Biochemistry and Chemistry, Basic Physics and Geology, Basics of Botany and Zoology are gained. Then deeper studies follow such as Basic Ecology and Biogeography, Plant-physiology and Animal-physiology, Molecular biology and Biotechnology, Ethnology, Hydrobiology and Soil Science, Advanced Ecology. The last year is devoted to Human biology, Environmental protection and Nature conservation, Advanced Botany and Zoology, Advanced Biochemistry and Cytology, Advanced Microbiology and Biotechnology, Advanced Genetics and Molecular biology, Conservation Genetics. This is supplemented with a series of elective courses.

## Background

The Institute of Biology and Ecology at the University of Debrecen has about 50 staff members, a third of whom are professors and associate professors with fluent English, established educational and research experience and regular research publication.

The institute is well equipped and has an almost complete new Life Sciences library with more than 20000 books and about 200 journals in biology and ecology. Our libraries also enjoy the technical support and database of the National University Library of Debrecen. The institute is located in the two newest buildings of the Faculty of Science: the Life Sciences Building and the Ecological Building, with well equipped, spacious and computerized lecture rooms and laboratories.

## Graduate Study Opportunities

### *MSc programs in development:*

- Molecular Biology
- Biology
- Bioengineering
- Environmental Science

## Chemistry, BSc

### Objectives and Perspectives

Bachelor of Chemistry degrees are awarded to students who have a good grounding in the core areas of chemistry: inorganic, organic, physical, biological and analytical chemistry; and in addition the necessary background in mathematics and physics, while also possessing basic knowledge in several other more specialized areas of chemistry. They build up practical skills in chemistry during laboratory courses in inorganic, organic and physical chemistry. The development of generic skills in the context of chemistry which are applicable in many other contexts and attaining a standard of knowledge and competence will give them access to second cycle course units or degree programs (such as MSc and further on PhD). Such graduate will have the ability to gather and interpret relevant scientific data and make judgments that include reflection on scientific and ethical issues. They will communicate information, ideas, problems and solutions to informed audiences and have skills which fit them for entry-level graduate employment in the general workplace, including the chemical industry.



## Requirements

Duration of studies: 6 semesters

Number of teaching (contact) hours: 1,800

Number of required ECTS credits: 180



Compulsory subjects	Credits
<i>General and scientific foundations</i> (mathematics, physics, informatics, environmental science, management, quality assurance)	28
<i>General chemistry</i> (principles of chemical disciplines, calculations, and laboratory practice)	8
<i>Inorganic chemistry</i>	10
<i>Physical chemistry</i> (inclusive colloid chemistry and radiochemistry)	28
<i>Organic chemistry</i> (inclusive biological chemistry and biochemistry)	29
<i>Analytical chemistry</i> (inclusive spectroscopic methods and separation techniques)	22
<i>Applied chemistry</i> (inclusive chemical technology, environmental technology, and macromolecular chemistry)	20
<i>Practical chemistry module</i> (applied spectroscopy, project work, and bachelor thesis)	20
Elective subjects	
<i>Optional courses</i> (e. g. reaction kinetics, environmental analytical chemistry, application of radioactive isotopes, pharmaceutical chemistry, bioinorganic chemistry, green chemistry, etc.)	15

#### Graduate Study Opportunities

*MSc programs in development:*

- Chemistry
- Chemical Engineering
- Molecular Biology

#### Background

The Institute of Chemistry consists of five departments (Inorganic and Analytical Chemistry, Physical Chemistry, Organic Chemistry, Colloid and Environmental Chemistry and Applied Chemistry) and two academic research groups

(homogeneous catalysis; carbohydrate chemistry) with more than 50 staff members of high scientific and teaching qualifications. The Institute is equipped with state-of-the-art scientific instruments (for instance, several NMR and mass spectrometers, X-ray diffractometer, UV-VIS and IR spectrophotometers, GC and LC instruments also coupled with MS, etc)

## Mathematics, BSc

#### Objectives and Perspectives

The aim of the program is to provide students with knowledge of basic elements of most important mathematical fields, attain skills in fundamental methods of applied mathematics, useful for technical, economical, statistical and computer modeling. The Mathematics BSc. Program provides a standard of knowledge and competence to the students, which will give them access to second cycle course units or degree programs.

#### Requirements

Duration of studies: 6 semesters
Number of teaching (contact) hours: 1,800
Number of required ECTS credits: 180

#### Main Subjects

During the first year the basic elements of linear algebra, algebra, number theory, combinatorics, geometry and calculus are

gained. Then deeper studies follow such as measure and integration, functions of complex variable, differential equations, convex geometry. The last year is devoted to applicable mathematics, like differential geometry, probability theory, statistics, numerical methods, informatics, computer algorithms in algebra, calculus and statistics. This is supplemented with a series of elective courses.

### Background

The Institute of Mathematics in Debrecen has about 40 faculty members, half of them are professors and associate professors with fluent English, having educational experiences and publishing research papers regularly. The institute is well equipped, having several computer laboratories and an almost complete research library with about 30000 books and about 250 journals in mathematics.



### Graduate Study Opportunities

- MSc in Mathematics
- MSc in Applied Mathematics (see p. 18)
- MSc in Software Engineering (see p. 17)

## Physics, BSc

### Objectives and Perspectives

Students of the Physics BSc program obtain a thorough training in physics from mechanics to particle physics. They learn about the physical laws governing our environment, and get acquainted with the basic constituents and structure of matter. During the BSc program they acquire practical knowledge in physics, computing and technology. They uncover the secrets of the physical world, learn the methods of understanding these. Apart from learning about physics, students will learn how to think and plan logically and solve problems efficiently. A solid basic education in natural sciences that our BSc in Physics program provides is a foundation for further studies not only in physics, chemistry, and biology, but also in engineering, informatics and economics.

### Main Subjects

The Physics BSc program offers introductory and advanced courses that provides a thorough training in the usual graduate courses in physics: Introductory Physics

### Requirements

Duration of studies: 6 semesters
Number of teaching (contact) hours: 1,800
Number of required ECTS credits: 180



#### Graduate Study Opportunities

- MSc in Physics
- various engineering MSc programs (in development)

in the first four semesters including: Mechanics, Heat, Electromagnetism, Quantum, Atomic, Solid State, Nuclear and Particle Physics). In parallel students study Mathematics (2 semesters), Introduction to Chemistry, Introduction to Electronics, Introduction to Informatics, European Union Studies, Entrepreneurship, Introduction to Environmental Sciences, Quality Control, Solid State Physics, Environmental Physics, Digital Electronics, Laboratory Coursework (Mechanics, Heat, Optics, Atomic Physics, Nuclear Physics, Electronics, Solid State Physics, Radioactivity, Dosimetry). In the last two semesters student can specialize in a number of different fields, where we offer courses in from environmental and biophysics to electronics, computational physics and theoretical physics. The Faculty of Natural Sciences provides infrastructural background for a wide range of student laboratory activities throughout the BSc in Physics program.

# Faculty of Music

## Undergraduate Degree Programs

The Faculty of Music, the former Conservatory of Debrecen was accredited on its 40 years anniversary in November, 2006.

The past decades brought about the ability and the possibility of education in English language. Greek, Persian, Japanese students have already finished their studies in different musical fields in the college or the university section. The faculty has foreign graduates from Switzerland, Finland, Denmark, Japan and the USA, some of them obtained PhD or DLA qualifications by now. The new, talented young colleagues – performers or teachers – have jobs in Hungary or in other European countries as teachers, professors, performers, orchestra members, singers in theatres, tutors, etc.

Education in the Bologna system is just in development now, the BA specializations are successfully accredited, the accreditation of MA specializations is currently in progress. The building of the Faculty is equipped with the necessary instruments, isolated classrooms, concert hall, library, digital studio and electronic infrastructure providing good conditions for lectures, lessons and practice. Students are accommodated in our boarding house for 110 persons.

### Performing Arts, BA

**Specialized fields:** classical piano, organ, guitar, violin, viola, cello, double bass, recorder, flute, oboe, clarinet, saxophone, bassoon, French horn, trumpet, trombone, tuba, percussions, voice, conducting of orchestra and choir, church music – organ with specializations of church music-choir conducting

#### Main subjects

**Basic knowledge:** philosophy, aesthetics, ethics, studies of history of culture and art, general and Hungarian history of music, folk music, studies of works of music, acoustics

**General technical knowledge and skills according**

**to specialization:** theory of music, solfeggio, piano, chamber music/singing, contemporary music, orchestral/choir practice, thesis (diploma concert)





*Differentiated technical knowledge:* techniques of the instrument/voice/conducting/church music activities, productive analysis of works, repertoire studies, concert practice, stylistic courses, technical knowledge required for the degree.

## Creative Art and Musicology, BA

**Specialized fields:** music theory and musicology

### Main subjects

*Basic knowledge:* philosophy, aesthetics, ethics, studies of history of culture and art, general and Hungarian

history of music, folk music, studies of works of music, acoustics

*General technical knowledge and skills according to specialization:* theory of music, solfeggio, counterpoint, piano, score reading, transposing, chamber music/singing, contemporary music, orchestral/choir practice, music pedagogy, history of music education

### Differentiated technical knowledge:

*Specialization in theory of music:*

harmony of higher level, studies of counterpoint and musical form, stylistic studies, history of theory of music, high standard of score reading skills, continuo playing

*Specialization in musicology:*

harmony of higher level, studies of counterpoint and musical form, folk music and history of music, stylistic studies, high standard of score reading and musical hearing skills, voice training, choir conducting, Kodály's music pedagogy, spreading musical knowledge

### Objectives and Perspectives

To educate musicians who – with their performing skills, theoretical knowledge, and highly developed musical abilities – enrich and spread Hungarian and European music culture. They can enrich the repertoire of musical knowledge with their sophisticated musical taste and are able to work in musical institutions, professional performing ensembles, religious ensembles and in other occupations which require musical education. With their high standard of knowledge, they can continue their studies in one of the MA specializations.

### To enter into the education:

The applicants take part in an entrance audition, where they demonstrate their musical talent and knowledge. The committee of professors decides giving the possibility to take part in the education program.

### Requirements

Duration of studies: 6 semesters

Number of teaching (contact) hours: 1,800

Number of required ECTS credits: 180



# Faculty of Informatics

## Graduate Degree Program

### Software Engineering, MSc

#### Objectives and Perspectives

The aim of the program is to train IT professionals who, possessing the solid theoretical grounding necessary to further develop their skills over the long term, are capable of performing, at an advanced level, the typically software-oriented development, implementation and servicing tasks related to IT equipments and systems, working either independently or as part of a team. Participants in this course will also learn the interaction and modeling skills required to solve IT tasks in all the main areas of application.



#### Requirements

Duration of studies: 4 semesters

Number of teaching (contact) hours: 1,200

Number of required ECTS credits: 120

	Credits
<b>Scientific foundation</b>	<b>30</b>
Applied mathematics	6
Computer science	6
Applied statistics	6
IT algorithms	6
Data and system models	6
<b>Vocational core subjects</b>	<b>48</b>
compulsory vocational block	20
compulsory vocational block of choice	28
<b>Advances vocational core subjects</b>	<b>16</b>
optional block	16
<b>Elective vocational subjects</b>	<b>6</b>
<b>Thesis</b>	<b>20</b>

**Specializations:** Health-care IT management, Information management systems, Information systems, Image processing and computer graphics, Artificial intelligence, Computer science

# Faculty of Science

## Graduate Degree Programs

### Applied Mathematics, MSc

#### Objectives and Perspectives

The main aim of the program is to provide the students with effective knowledge what they can successfully apply both in the mathematical modelling and in the solution of problems arising in practice. Emphasis is put on the capability of working cooperatively in groups with experts of other fields (computer science, engineering, economics, etc.). The quality and the quantity of the knowledge what the students can gain make the entrance possible to the PhD program of the Institute.

#### Requirements

Duration of studies: 4 semesters

Number of ECTS credits: 120

Number of teaching (contact) hours: 1,200

#### Main Subjects

*Basics in the following subjects for all students:* Algebra and number theory, Analysis, Geometry, Probability and statistics, Informatics and operational research.

*Specific subjects for all students:* Discrete mathematics, Operations research, Applied analysis, Stochastic processes, Theory of algorithms.

*Specific subjects in the different subprograms:*

Mathematics of Engineering:	Numerical analysis, solutions of differential equations Linear models and applications Numerical mathematics Stochastic processes
Mathematics of Finance:	Statistics Stochastic systems Financial science
Mathematics of Computer Science:	Data mining Mathematical theory of networks Theory of complexity Design, analyzing and implementation of algorithms and data structures Cryptography and data security Information theory Codes and symmetric structures

Beside these subjects the students can choose from a variety of elective courses.

## Chemistry, MSc

### Objectives and Perspectives

Graduates of the MSc programme have significant knowledge in all major fields of chemistry including inorganic, organic, physical, biological, analytical, structural, theoretical and technical chemistry. They acquire high level practical skills in chemistry during laboratory courses with special emphasis on synthetic and structural chemistry and for the application of the most common analytical techniques. Possessing broad knowledge in the use of chemical literature, they work successfully in both the chemical industry and chemical laboratories including research and development areas.

MSc graduates have the appropriate skills to continue their studies in doctoral schools of chemistry at the University of Debrecen or at any university throughout the world.

#### Requirements

Duration of studies: 4 semesters

Number of teaching (contact) hours: 1,200

Number of required ECTS credits: 120

**The Master of Chemistry degree can be obtained with three different specializations:**

#### *Synthetic chemistry:*

30 credits (minimum) are used to develop specialized knowledge in the field of organic and inorganic synthesis, spectroscopic methods and separation techniques focusing on their application in pharmaceutical and polymer chemistry;

#### *Analytical chemistry:*

30 credits (minimum) are used to develop specialized knowledge in the field of modern analytical chemistry including the major electrochemical, spectroscopic and separation techniques and the principles of production process control and quality insurance;

#### *Without specialization:*

35 credits (minimum) can be used for advanced studies in the most common fields of chemistry.



Module	Credits
<b>Basic natural sciences</b> including mathematics, physics, biology, geology, informatics (further 25 credits are required from previous BSc studies)	<b>6</b>
<b>Obligatory chemistry courses covering</b>	<b>43</b>
inorganic chemistry	6
physical chemistry (including radiochemistry, quantum theory and colloids)	11
analytical chemistry (including spectroscopies)	10
organic and biochemistry	10
industrial chemistry	6
<b>Optional chemistry courses</b>	<b>35</b>
<b>a/ Synthetic specialization</b> The major subjects include synthetic methods, reaction mechanisms, separation techniques and spectroscopies	35
<b>b/ Analytical chemistry specialization</b> The major subjects include chemometry, quality insurance, sampling, spectroscopies and environmental analysis	35
<b>c/ Without specialization</b> Advanced courses can be selected from all major fields of chemistry (e.g. organometallic chemistry, bioinorganic chemistry, coordination chemistry, catalysis, theoretical physical chemistry, chemical kinetics, carbohydrates, pesticides, biocolloids, etc.)	30+5
<b>Optional courses</b> (e.g. management, philosophy, etc.)	<b>6</b>
<b>Thesis</b>	<b>30</b>



# PhD Degree Programs

Our Doctoral schools provide high quality education in scientific research. Doctoral candidates are welcome to join the following programs:



<b>Biology, PhD</b> Head: Prof. György Borbély Email: gborbely@delfin.klte.hu	Biodiversity, Molecular and physiological organization of bio-regulation, and its application
<b>Chemistry, PhD</b> Head: Prof. Ferenc Joó Email: fjoos@delfin.unideb.hu	Reaction kinetics and catalysis, Coordination chemistry, Environmental instrumental and analytic chemistry, macromolecular and surface chemistry, Chemistry, biochemistry and structural study of carbohydrate-containing natural and synthetic materials, Synthesis and structural study of natural heterocyclic compounds and their analogs
<b>Earth Sciences, PhD</b> Head: Prof. Attila Kerényi Email: kerenyi@delfin.klte.hu	Geomorphology and society, Landscape protection and climate, Human Geography
<b>Environmental Sciences, PhD</b> Head: Prof. Béla Tóthmérész Email: tothmerb@delfin.klte.hu	Hydrobiology, Quantitative ecology, Water environment protection
<b>Mathematics and Computer Science, PhD</b> Head: Prof. Zoltán Daróczy Email: daroczy@math.klte.hu	Mathematical analysis, functional equations, Group algebras and its applications, Diophantine and constructive number theory, Informatics, Probability theory, statistics and applied mathematics, Digital communication, and sign processing, Information systems and networks, Operational research, and numerical mathematics, Knowledge management and its applications
<b>Physics, PhD</b> Head: Prof. Dezső Beke Email: dbeke@delfin.klte.hu	Atomic and molecular physics, Nuclear Physics, Solid State Physics, Interdisciplinary applications, Particle Physics



