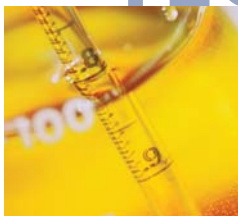




SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA

FACULTY OF CHEMICAL AND FOOD TECHNOLOGY



Information
for visitors and prospective students

Bratislava

Slovak University of Technology in Bratislava
Faculty of Chemical and Food Technology

Information for visitors and prospective students

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FACULTY SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
OF CHEMICAL AND FOOD
TECHNOLOGY














Information
for visitors and prospective students

Bratislava

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Foreword

Dear Ladies and Gentlemen,



I am honoured that I, the Dean, have been invited to introduce you to the Faculty of Chemical and Food Technology, as one of the seven Faculties of the Slovak Technical University, Bratislava.

The Faculty of Chemical and Food Technology holds the unique position within the system of Slovak University Education. It is the only Faculty, which provides tertiary education based on excellence in chemical-engineering and science-theoretical fundamentals, educating engineers for all sectors within the chemical and food industries.

The faculty has a broad-based and comprehensive program in place, which provides for education of high-quality professionals, not only for the chemistry and food industry, but also within the specific areas such as preservation of cultural heritage, environmental protection and nutrition and health protection. The attractiveness also means the possibility to participate in interdisciplinary projects where chemistry overlaps with physical, biological and medical sciences. Professional and scientific-research institutes and departments of the faculty orientation allow such education and training of students, which facilitate their rapid adaptation to the manufacturing process and practice requirements. That is why our graduates have wide possibilities of employing both at home and abroad. Their minimal unemployment has also evidenced the need for our graduates, and the faculty helps the best students early in their career.


The Faculty of Chemical and Food Technology has successfully co-operated in the scientific-research and educational projects with many foreign universities and research institutions. It has contributed to solving the framework EU projects, NATO research tasks, international projects of bilateral cooperation. The Faculty has also been successful in dealing with domestic research projects by VEGA and APVV agencies and the state research and development programmes.

The FCHPT STU has worked intensively with industry, for which it addresses a number of specific tasks. This activity allows the Faculty to confront the focus of scientific research with the needs of industry and update the educational process in accordance with the practical requirements.

The Slovak Chemical Library forms part of the Faculty. The Library has been the top nationwide establishment and provides for unique chemically-oriented information to the general professional public. The Faculty has also been involved in publishing professional journal literature, for example, the Chemical Papers and Acta Chimica Slovaca.

The scope and quality of science activity maintains the Faculty at the level comparable with the results of other leading research and educational worldwide centres. The evaluation results by the Accreditation Commission of the SR, or those by ARRA, the academic ranking and rating agency, prove that our faculty has not only been the long-term best engineering faculty in Slovakia, but it has also been rated among the best departments of all the universities in Slovakia, which prove this claim. The very good results appear to be attributable to mainly traditionally good performances in science and the success of doctoral study. This fact confirms the success of the grant, the organization of and participation in international conferences, but also a membership of our staff in renowned international professional organizations. The Faculty has had long term co-operation with the partner institutions abroad, which reflects in the increasing mobility of students and teachers.

Ladies and gentlemen, Dear colleagues and students, I believe that teachers, researchers and the Faculty staff will do their best to further credit the Faculty of Chemical and Food Technology even more reinforced. We want to be an integral part of the European university environment and a sought-after partner for open collaboration. For more than 70 years, the FCHPT has tried its best not only in education and research, but also to raise pride in their school or workplace. Our ambition is not only to study and learn, but above all to fulfil the main mission of the university: Find the truth and spread the good in terms of humanistic traditions of university education.



Ján Šajbidor
Dean

Management of the Faculty



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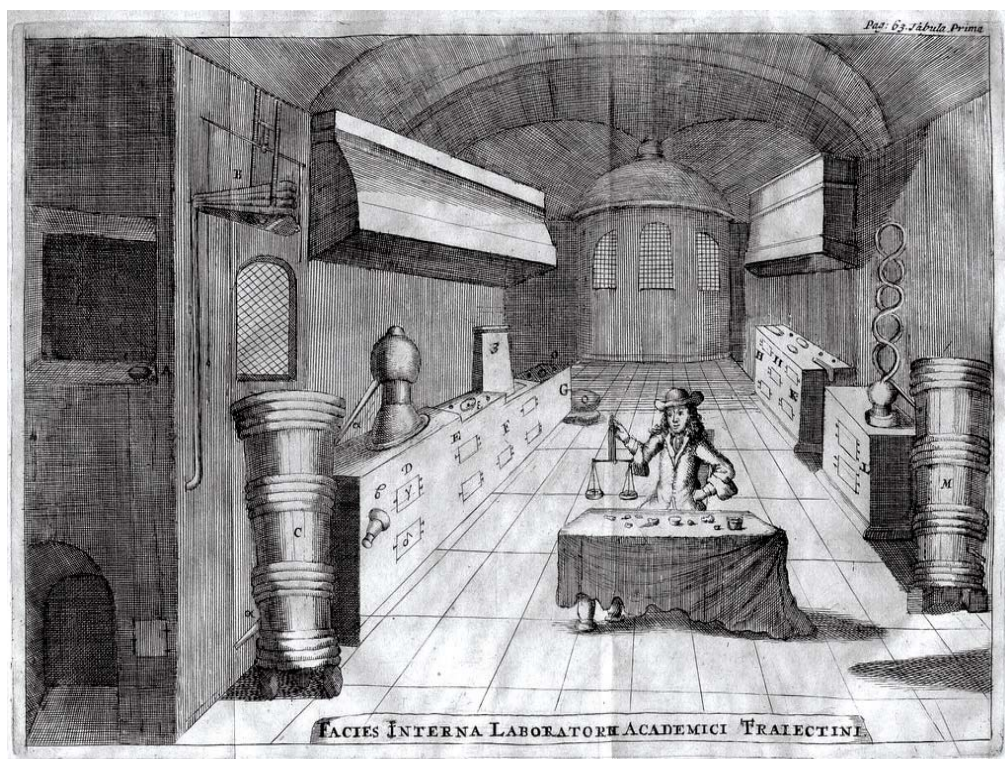
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The Faculty of Chemical and Food Technology (FCHPT) is one of the seven faculties of the Slovak University of Technology. The history of the Faculty dates back to 1939, when Act. 188 of 25 July 1939 allowed the establishment of a chemical engineering branch at the Slovak University of Technology. The specialization profile of the Faculty has developed steadily in accordance with the needs of the community.

The higher education in Slovakia has its rich history. Faculty follows in the footsteps of its famous predecessor in the education of technical chemistry, i.e., the famous Mining Academy in Banská Štiavnica constituted by the empress Maria Theresa in 1762. The establishment of the Dr. M. R. Štefánik College of Technology in 1937 and subsequently the Slovak College of Technology in 1939 succeeded in keeping the high standard of technical education in Slovakia.

Within the time of its existence, the Faculty has educated several generations of graduates in both chemical and food engineering and graduates in postgraduate doctorate courses in chemical sciences and engineering. Thus, the Faculty has helped considerably to increase the level of scientific knowledge in industry, education system, scientific and research institutes, and administrative services.



The Faculty of Chemical and Food Technology is accredited as a university type of institution. FCHPT offers courses in accredited programmes at all three levels of study:

Bachelor Study Programmes

Automation, Information Engineering and Management

The study programme Automation, Information Engineering, and Management in Chemical and Food Technologies is mainly indented for students interested in technical engineering study integrating natural sciences with information technologies, computers, management and economic sciences. The graduates from the Programme profit from knowledge in development and use of automation in technological industries, in information technologies, in control of processes, control and management in companies and have knowledge of technologies in chemical and food industries. They can be employed in chemical, food industries but also in other branches and in research. They possess knowledge in automation (modelling of technological processes, control of technological processes, optimisation, measurement and control instruments, industrial control systems, design and development of automated control systems); in information technologies (operating systems Microsoft, Linux, Solaris, programming languages C, MATLAB, PHP, database systems, web technologies, office suites); in economics and company management (foundations of economic theory, control theory, company management, logistics, company finances, financial management, personal management, and quality management).



Biotechnology and Food Technology

The study programme provides fundamental knowledge and laboratory skills in chemistry, biology, biochemistry, microbiology, molecular biology, genetics, bioanalytical methods or food analyses, and chemistry of food. Students become familiar with hygiene and health prevention or toxicology, fermentation technology or food technology, fundamentals of human nourishment, information technology. A part of the study programme trains in laboratory research practice in a particular area. Students concentrating on Biotechnology can choose to study fermentative production of organic acids, lipids, pigments, beer, wine or bioethanol fermentation, environmental or pharmaceutical biotechnology, transformation of saccharides, production of metabolites for pharmaceutical, medical or food purposes, as well as genetic manipulations. Students concentrating on Food technology can choose the topical research areas in nourishment and health prevention, food microbiology and technology, food preservation and food assessment, dairy products, fats and oils, saccharides and cereals, meat products, nutritional supplements and novel foods, as well as cosmetics, hygiene and public health prevention products. The students awarded the Bachelor's degree will get appropriate qualifications for further studies in Master programmes, and they may be employed in various fields of the biotechnology or food - industry, science and marketing areas.



Engineering of Chemical and Environmental Technologies

The study programme provides fundamental chemical-technological and environmental knowledge and laboratory skills. Theoretical knowledge is closely connected to solution of practical technological problems. The study programme belongs to the category 5B (according to ISCED97) and students of this programme are educated for industrial applications. The study subjects are divided into two groups: basic and common subjects, as Mathematics, Physics, Informatics, General and Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Analytical Chemistry, Biotechnology and Biochemistry, Chemical Engineering, and specialized subjects, namely Fundamentals of Ecology and Environmental Sciences, Environmental Engineering, Water Treatment, Wastewater Treatment, Waste Engineering, Inorganic Materials and Technologies, Organic Technology and Petrochemistry, Energetic Raw Materials and Technologies, Recycling of Raw Materials, Computer Processing of Data, Apparatus of Chemical Technologies). The study programme is lectured in English or in Slovak/English version. The graduates from the Programme that have been awarded Bachelor's degree will get an appropriate qualification to be employed in various fields of chemical, biochemical and environmental technologies, as design of technologies, operation and control of technologies, monitoring of environmental problems, marketing, etc.



Chemical Engineering

The study programme Chemical Engineering trains in fundamental knowledge and skills of chemistry, biochemistry, microbiology for practical applications that are built on mathematical and physical principles.

The study programme enables the student to more deeply understand basic unit operations involved in certain technologies and their effective combination with optimal material and energy flows. The studied subjects are based on fundamental natural laws, as conservation of mass, energy and momentum, principles of fluid flow, mass and energy transfer, applied for equipment ensuring mass and energy transport, chemical and biochemical modifications of molecules, their separations (mechanical separation and diffusion) and formulations (crystallization, drying, etc.). A part of the study programme educates in utilization of available computer programs which represent effective engineering tools in mathematical modeling and evaluation of unit operations, as well as of entire technologies and their integration.

The graduates of the Programme are well-prepared for positions in industry, especially for analysis and intensification of existing technologies and processes in chemical or food technologies and biotechnologies in chemical and pharmaceutical industries. The graduates are also prepared for the design of unit operations and optimization of flow diagrams respecting environmental protection and minimization of environmental impact.



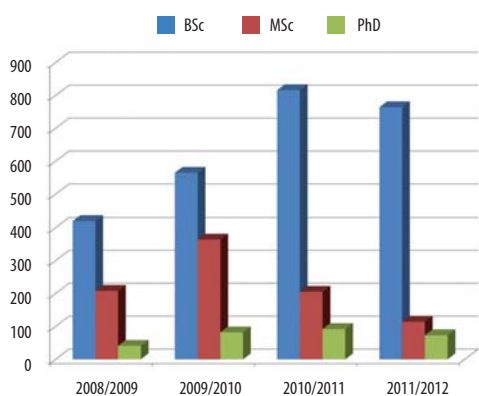
Chemistry, Medicinal Chemistry and Chemical Materials

The undergraduate study programme aims at training highly qualified and creative chemists with solid engineering basis knowledge, well-versed in chemistry, biochemistry, informatics, preparation of special chemical materials, as well as possessing basic knowledge about polymers. The connection of strong general scientific basic knowledge with an engineering approach to chemical materials is responsible for the all-round qualities of graduates both in scientific and industrial positions. They are capable of creative assessment of basic chemical and natural raw materials from the point of view of a chemist, they can propose suitable procedures for utilization of such materials and are able to design and carry out synthesis of required compounds - bioactive, macromolecular compounds, or analogues of natural compounds.

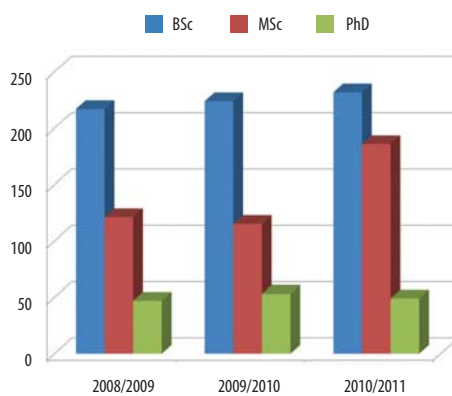
Nutrition, Cosmetic, and Health Protection

The aim of this Bachelor's study programme is to train professionals for production, marketing and safe food, snacks, beverages, nutritional supplements, cosmetic and prophylactic preparations as one of the key commodities for protection of human health. Graduates of this Programme receive basic natural science, biological and chemical training necessary for the practical production, distribution and evaluation of the quality of those commodities, as well as raw materials for their production. Into the basic knowledge of biotechnology, medicinal chemistry and chemical specialities daily life. The graduates will be qualified to lead staff with secondary education in production facilities, government laboratories and private control. As the focus of the study programme is primarily on practical applications, the graduates of the Programme with Bachelor's degree will be able to continue in Master studies at the Faculty of Chemical and Food Technology STU.

Number of accepted students in academic year



Number of graduates in academic year



Master Degree Programmes

- Automation and Information Engineering in Chemical and Food Technologies
- Biotechnology (moduls: Biotechnology, Medical Engineering)
- Environmental Chemistry and Technology
- Chemical Engineering
- Chemical Technologies
- Materials and Heritages Protection
- Technological Processes Control in Chemistry and Food Chemistry
- Food Industry, Hygiene, Cosmetics
- Natural and Synthetic Polymers (moduls: Plastic materials and Rubber, Polygraphy and Photography, Fibres and Textile, Wood, Cellulose and Paper)
- Technical Chemistry (moduls: Analytical Chemistry, Physical Chemistry, Organic Chemistry, Inorganic Chemistry)
- Nutrition and Health Protection

Doctoral Degree Programmes

- Chemical Physics
- Inorganic Chemistry
- Organic Chemistry
- Analytic Chemistry
- Physical Chemistry
- Macromolecular Chemistry
- Theoretical and Computing Chemistry
- Biochemistry
- Environmental Engineering
- Process Control
- Chemical Engineering
- Inorganic Technology and Materials
- Organic Technology and Fuel Technology
- Technology of Polymer Materials
- Food Chemistry and Technology
- Biotechnology (moduls: Biotechnology, Medical Engineering)

Study System and Organization

The credit system introduced at STU has been implemented into all three forms of degree programmes of university education at FCHPT STU, in compliance with the law and accreditation requirements.

The first level of the study is completed by a Final state examination and defence of a semestral project. The students earn the title “bakalár” (**Bachelor of Science, BSc**).

The Master’s course requires the students to take a final state examination and defend a diploma thesis. The students earn the title “inžinier” (**Master of Science, MSc**).

The highest form of education and training at the Faculty of Chemical and Food Technology STU is currently the postgradual study. The students earn the title “philosophiae doctor” (**Philosophiae Doctor, PhD**).

In addition to the natural-science basis, students are educated also in technological and engineering subjects, such as Chemical Engineering, Environmental Engineering, Processes Control, Basics of Chemical and Food Processing Techno-

logy, as well as subjects on Biotechnology, Biochemistry, Economy, Law and Ecology, etc. The Faculty offers widely oriented programmes, supportive to the development of basic scientific fields in chemistry, chemical engineering, chemical technology and food processing. The wider scientific orientation of the Departments and study programmes allows for goal-oriented training of undergraduates and postgraduates, and their faster transition to industry.

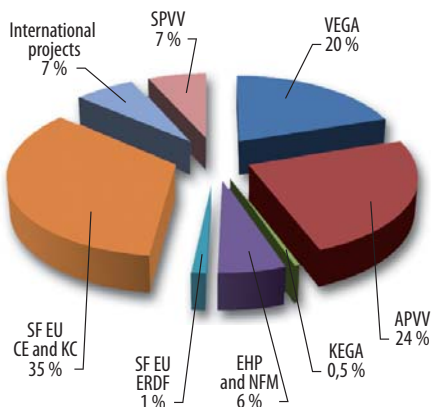
For international students the Faculty of Chemical and Food Technology offers bachelor, master and postgraduate study programmes. The Bachelor’s degree programme lasts three years and is the first level, the Master’s degree programme lasts two years and represents the second level of university education. The current study programmes for international students are accredited also in English. All study programmes are standardly lectured in Slovak, but can be lectured also in English.

Science and Research

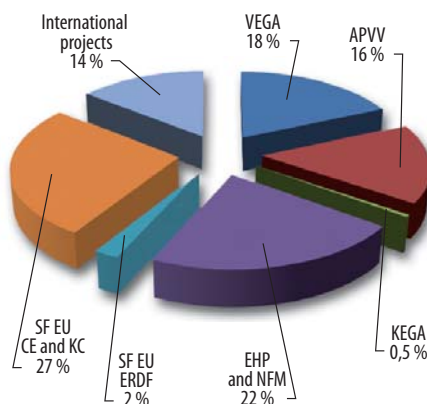
The Faculty has a widely oriented scientific potential, able to work on and develop basic scientific fields of chemistry, chemical and biochemical technology, food processing and applied physics, informatics and mathematics. This wide scientific orientation of the Institutes at the Faculty allows for targeted training of undergraduates, graduates and postgraduate students in 16 branches of the doctoral study and their smooth transition to industry and research. There are several scientific schools at the Faculty which are successful in organizing scientific meetings and in winning grants from the domestic and international sources and grant schemes:

- VEGA – Research Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic
- APVV – Agency for Support of Research and Development (Slovak Research and Development Agency)
- KEGA – Cultural and Education Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic
- SPVV – State Programme for Science and Research
- EHP and NFM – Grants from the European Economic Area and Norwegian Structural Mechanism

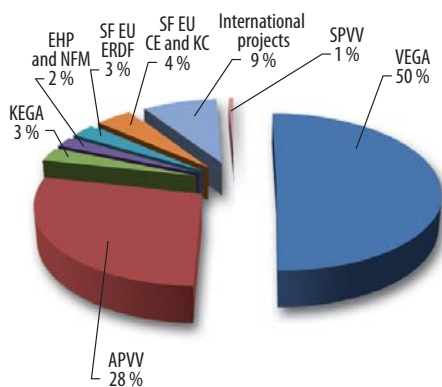
Financial structure of 2010 projects



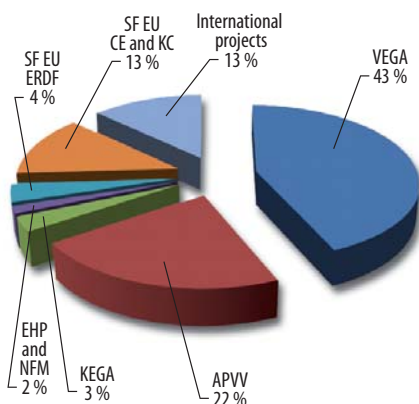
Financial structure of 2011 projects



Project types in 2010



Project types in 2011



- ERDF – Structural funds of the EU from the European Regional Development Fund
- CE and KC – Structural funds of the EU from the Operational Programme Research and Development for Building Excellence Centers and Competence Centers
- 6th and 7th Framework Programmes, COST, NIL, NATO, EUREKA, DAAD, Intergovernmental agreements, etc.

The particular projects at FCHPT STU by percentage and financial covering in the last two years can be seen in the following graphs.

The research and development at FCHPT STU is oriented towards the following fields:

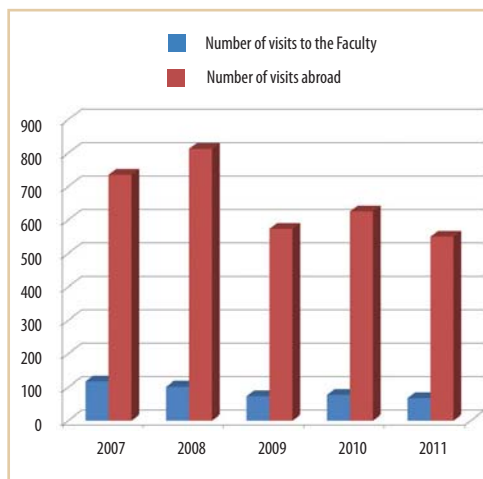
- physical-chemical methods of analysis and structure and property description of chemical systems and biosystems,
- preparation and research of functional materials and material technologies using micro- and nanoscopic methods,
- biotechnologies and study of natural materials and biologically active substances,
- catalytic and enzymatic processes applicable in chemistry and chemical technologies and energetics,
- study and development of chemical and biological processes for protection of environment and cultural heritage materials,
- food technologies with the emphasis on functional and safe foods,
- reaction-transport chemical-engineering systems and their dynamic behaviour, modelling and control of chemical and biotechnological processes.

Besides the basic research, the Faculty participates in applied research for industry and develops almost one hundred cooperation projects. The cooperation with many producers and companies allows for a swift application of research results to production.

The quality of the scientific results from the projects has been documented by almost 200 articles published in Current Contents, more than 100 publications published in other journals and over 500 contributions in the form of conference abstracts. The Faculty participates in issuing specialized scientific journals: Acta Chimica Slovaca, Chemical Papers, Fibres and Textile, as well as Plastics and Rubber.

Cooperation with Foreign Academic and Research Institute

Traditionally, the Faculty maintains an important international position. The scope and quality of scientific activities at the Faculty keep it at a level that is comparable with other top research and training university centers in the world. Its reputation can be proved by the above mentioned number of grants, staff invitations to participate in international conferences, cooperation with foreign universities and institutions, and memberships of international organizations.



School activities for prospective students

Summer School of Chemical and Environmental Engineering

Students from secondary schools all over Slovakia can attend the Summer School of Chemical and Environmental Engineering that takes place during the summer holidays. Besides interesting lectures they can get familiar with the University environment and the city itself. As part of its programme the Summer School covers Ecology Day that allows the students to take part in professional excursion to a waste-water treatment plant, to the premises of Bratislava Water Resources and to the Water Museum. The participants will also attend classes in

standard laboratory practice, with presentations on the principles of laboratory chemical-process modelling and analysis of compounds. The participating students along with their teachers evaluate the laboratory practice and present their results in a seminar – the best presentations are awarded a prize. To boost variability of the Summer School, the programme offers sports competitions, informal meetings with teachers and students of the Faculty, knowledge quizzes, etc.



Open Doors Day and Chemistry Fair

This event is a presentation of chemistry as a science transforming experience. In addition to colorful video production and presentations that represent a sample of ongoing research at the Faculty, the participants can enjoy the true atmosphere of such a fair. Stalls offer a wide variety of different chemical processes and 'products' of

chemistry. The participants can actively engage themselves in direct actions. Simultaneously with the stall presentations and demonstrations a knowledge contest is going on, the answers to which can be found right at the stalls. Many participants can win attractive prizes.



Student Activities

At FCHPT the highest representative body of the students is the Youth Parliament of the Faculty of Chemical and Food Technology Guild of Students (FCHFTGS). It has been established to provide services, support and representation to the students at the Faculty. Its members, office bearers are students, advocate and enforce the rights of students and deal with their problems and needs. The Youth Parliament has its representatives in the Academic Senate of FCHPT STU and also in various committees of the Faculty. Thus, the representation of students has been given a chance to play an active role in the welfare of students and contribute to the development of the Faculty, and the whole University. The objectives of the FCHFTGS is:

- to unite and organize students on the basis of their professional qualification and specialization studied at FCHPT,
- to represent the interests and promote welfare of the students at the Faculty,
- to establish and maintain contacts and cooperation with higher education organizations in Slovakia and abroad,
- to articulate the needs and aspirations and defend the academic rights of students,
- to improve social and educational conditions of students at the Faculty.

For more than 15 years the FCHFTGS has published a student magazine "Radikál" to inform the staff and students about what is going on at the Faculty, at other faculties in Slovakia and abroad.

In organizing leisure and social activities the FCHFTGS cooperates with other universities, institutes, associations, foundations and government organizations. The activities include organizing and creating new social, sporting, educational, cultural and other events that enrich events with a long tradition. Currently, FCHFTGS helps to organize events, such as Beania for Chemists, Sports Day, Student Scientific and Professional Competition, Summer University for Secondary School Students and others.



Wide range of sports activities for students provide the Department of Physical Education and Sports. These copper than the regular student sports competitions:

- The vintage sports competitions
- Higher education faculty in Bratislava school competition: basketball, soccer, swimming, volleyball
- Championship STU Bratislava: basketball, soccer, swimming, volleyball
- Academic Championships in Slovakia in winter and summer sports
- World Universiade

Single sport – recreational activities of students:

- Rafting Morava, the Little Danube, Hron
- Cycling trips
- Winter and summer physical education focus
- Vintage competition in selected sports

Traditional sports students versus employees: basketball, soccer, swimming, tennis, volleyball



The Slovak Chemistry Library

The Slovak Chemistry Library – Study and Information Centre serves as a source of up-to-date information on chemistry, chemical technologies, and natural sciences. The Chemistry Library exists to support the research and teaching at the Faculty of Chemical and Food Technology and offers services to the students and staff in the departments, as well as to the community of the Slovak University of Technology. The library is open to the public and loan privileges are granted to residents of the Slovak Republic and visiting students and scientists.

The library was founded in 1955 as the Library Centre at the Slovak Technical University in Bratislava. Over the years the library was extensively remodelled and enlarged between 1962 and 1974. The present quarters were occupied during the remodelling and expansion of the Faculty of Chemical and Food Technology and from 2004 the library has become a part of the Faculty and is known under the name Slovak Chemistry Library. The library has modern reading rooms offering modern scholar electronic resources. It provides a pleasant environment for learning and information retrieval. The Slovak Chemistry Library is currently the only library that has the most complete collection of chemical information in Slovakia and serves as the main library for the chemical industry.

The library provides the following collections and services:

Collections

- Databases
 - Current Contents
 - Chemical Abstracts
 - CA on CD and Beilstein Cross Fire
- Journals in print and electronic
- Chemistry Library Computer Resources
- Research Reports
- Reservation of Books

Services

- Loan, Renew, Request
- Reprographic Services
- Study from Electronic Resources:
 - internet access
 - free access to electronic information sources
 - access to licensed electronic information resources
 - editing of own documents
- Instructional services
- Interlibrary Loan
- Reference and Research Services
- Services for Users with Disabilities





Institute of Analytical Chemistry

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The Institute of Analytical Chemistry was formed in 2006 and consists of two departments: Department of Analytical Chemistry (created in 1941 among the first five chemistry departments at the University) and the Department of NMR Spectroscopy and Mass Spectrometry (created in 1982 by integration of the Central NMR Laboratory, Faculty Laboratory of Röntgen Microanalysis and Faculty Laboratory of Mass Spectrometry). Both departments represent highly qualified education and research environment with extensive teaching and publication activities. The pedagogical process is performed by 2 full professors, 9 associate professors, 3 assistant professors, 10 scientific researchers. Moreover, 5 professors emeriti are included into the research projects and PhD education. The Institute concentrates on operative branches of development of theoretical approaches and new analytical procedures aimed to solve the problems of various subjects, predominantly of chemical, food and pharmaceutical industries and the environment. These topics have safeguarded the Institute the top-position in Slovakia

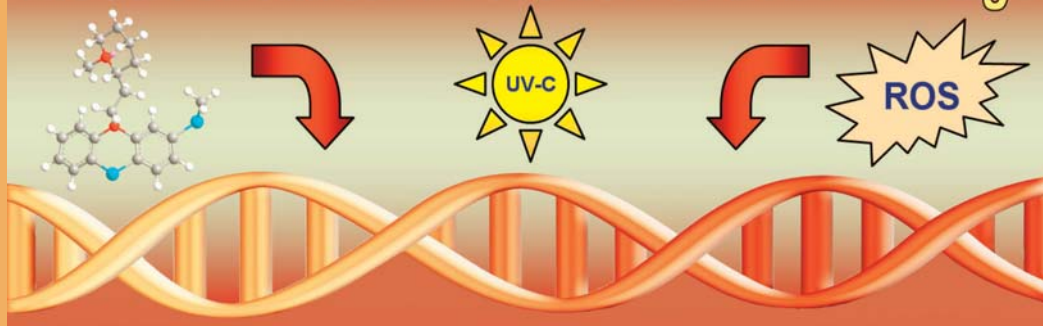
Education

Analytical Chemistry is one of the basic subjects at the Faculty which is part of all Bachelor study programmes (about 250 students) fully provided by the Institute of Analytical Chemistry. In Bachelor study the Institute guarantees also the subjects Analytical Methods in Clinical Practice and Testing and Quality Control. Students actively participate in research activities of the Institute laboratories via numerous Bachelor projects in all fields of Analytical Chemistry. In the graduate study programmes, the Institute provides almost full teaching activities for the study programme Technical Chemistry, module Analytical Chemistry. Moreover, with the help of qualified senior lecturers it supports also other 7 subjects for other modules of the study programme Technical Chemistry and actively participates in teaching activities for other study programmes. The study of Technical Chemistry (about 40 students) integrates theoretical and practical aspects of analytical, inorganic, organic

and physical chemistry. The study of Analytical Chemistry trains knowledge on separation methods, electroanalytical chemistry, atomic and molecular spectroscopy, bioanalytical chemistry, chemometry, as well as on trace analysis and complex sample analysis of inorganic and biological origin, clinical and environmental analysis.

In the PhD study, the Institute guarantees the doctoral study programme Analytical Chemistry. Presently, the Department of Analytical Chemistry is preparing about 10 internal PhD students and the Department of NMR and MS about 3 postgraduate students. The knowledge of students is based on advanced mathematics, modern separation, electroanalytical and spectroscopic methods of analysis, chemometry and general aspects of analytical chemistry. The graduate is an expert in analytical chemistry who knows methods of scientific research and development of analytical methods. The Institute participates in several mobility projects within the Erasmus programme.

Electrochemical Detection of DNA Damage



Research activities

The Institute permanently participates in scientific and applied-science research projects of national research agencies as well as in EU and NATO research projects. The research at the Department of Analytical Chemistry concentrates on the development of methods for

- trace and ultratrace analysis of volatile and semivolatile analytes in complex organic systems utilising isolation and preconcentration techniques in combination with fast GC and MS,
- separation and determination of enantiomers, particularly by GC and HPLC methods,
- characterisation of organic compounds in complicated matrices (e.g. food, waste waters, sediments, biological fluids etc.) by advanced separation methods, particularly by GC-MS, GCxGC-TOF-MS, GCxGC-FID(ECD),
- development of new selective sorbents in HPLC,
- trace and ultratrace electrochemical and spectroscopic determination of elements and biologically active compounds as well as speciation analysis in complex matrices,
- development and utilisation of biosensors, particularly based on nucleic acids as biorecognition elements,
- determination of quality and authenticity of food samples by chromatographic and spectroscopic methods.

The research at the Department of NMR Spectroscopy and Mass Spectrometry concentrates on the topics of:

- in-vitro and in-vivo study of metabolism using NMR,
- study of structure and chemical interactions of natural and synthetic compounds using NMR and MS.



Cooperation

The Department of Analytical Chemistry has fruitful cooperation particularly with all departments of analytical chemistry in Slovakia and the Czech Republic. It cooperates also with many accredited analytical testing laboratories within the Slovak National Accreditation Service. The teaching and research development of new analytical methods and procedures for chemical, food, pharmaceutical industry and environmental protection cooperates particularly with the Department of Analytical Chemistry, Faculty of Natural Sciences, Charles University in Prague, Czech Republic, Department of Pharmacy, Faculty of Pharmacy, Comenius University in Bratislava, Slovakia, Department of Analytical Chemistry, Faculty of Chemistry, Kazan (Volga Region) Federal University in Kazan, Russia, Texas University in Arlington, USA, Faculty of Science, Copernicus University in Torun, Poland, Institute of Analytical Chemistry, Faculty of Chemistry, University of Bucharest, Romania, Analytical Chemistry Laboratory, Faculty of Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece, Department of Analytical Chemistry, Chemical Faculty, Ivan Franko National University of Lviv, Ukraine, Department of Environmental Engineering, Faculty of Technical Sciences, University of Novi Sad, Serbia, Development and Investment Department, Public Utility Company Waterworks and Sewerage Novi Sad, Serbia.



The NMR Laboratory as a leader of National NMR Laboratories cooperates with partner labs at the Slovak Academy of Sciences, Comenius University in Bratislava, Pavol Jozef Šafárik University in Košice and Technical University in Košice. It also has long term cooperation with Blaise Pascal University in Clermont Ferrand and University of Edinburgh focuses on the development of new NMR methods.

Institute of Inorganic Chemistry, Technology and Materials

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The Institute is organized into three departments – Department of Inorganic Chemistry, Department of Inorganic Technology and Department of Ceramics, Glass and Cement.

Education

The Department of Inorganic Chemistry is a guarantor of several teaching subjects within the Bachelor's and Master's study programmes, as Inorganic Chemistry, Laboratory Practice in Inorganic Chemistry, Chemical Calculations, Applied Photochemistry, Bioinorganic Chemistry, Chemical Bond and Chemical Structure, Chemistry of Coordination and Organometallic Compounds, Crystallochemistry.

The Department of Inorganic Technology is a guarantor of the Master's degree study programme in Chemical Technologies and the doctoral study programme Inorganic Technology and Materials. The programmes are accredited and focused on inorganic industry, thermodynamics, kinetics and electrochemistry of aqueous solutions and molten salts, namely in electrochemical engineering and technology, corrosion protection, surface treatment of metals. The Department provides teaching of technological courses in several Bachelor's study programmes.

The staff of the Department supervise several teaching subjects within the study programme Chemical Technologies. These include the subjects Technology of Special Inorganic Materials, Inorganic Materials, Industrial and Inorganic Chemistry, Technology of Silicates, and Technical Mineralogy.

The staff participates in teaching of the subject Inorganic Chemistry.

Staff from all the departments mentioned supervise bachelor, diploma and PhD students.



Research activities

The following topics have been developed under research activities:

- mutual influence of ligands, consequences and impact on spontaneous, photochemical, and catalytic redox behaviours of copper and nickel complexes,
- plasticity of coordination polyhedra, its relation of degeneracy of the ground electronic term of copper(II) complexes, existence of distortion polymers,
- knowledge and relationships between the composition, structure, spectral and magnetic properties, and bio-activity of copper(II) complexes containing bio-ligands,
- classification of bonding modes and stereochemical arrangement of complexes containing pseudohalides, existence of co-ligand isomerism,
- equatorial-axial interactions of ligands in copper and nickel complexes,
- magnetic behavior of manganese(II), iron(II), iron(III), cobalt(II), nickel(II), and copper(II) complexes (magnetic anisotropy, spin crossover, molecular magnetism, nanomagnetism),
- distortion isomerism,
- chemistry and electrochemistry of molten salts, theoretical problems of electrowinning of aluminium,
- spent nuclear fuel treatment,
- surface treatment of metals,
- corrosion study,
- preparation of filling powder to polymer composite,
- low-waste technologies, waste disposal,
- modern fertilizers,
- development of new types of bioceramics based on hydroxyapatite and its composites, bioactive materials and biocomposites ceramics-biopolymers, evaluation of bioactivity
- 3D optical crystals with inverse opal structure and new types of inorganic phosphors for HB-LED,
- development of environmentally friendly cements and utilization of municipal and industrial waste for cement production,
- ceramic foams.



Cooperation

The Institute has cooperation with the following institutions:

- coordination and magneto chemistry (Technical University, Vienna, Austria; Sherbrook University, Sherbrook, Canada; York University, Toronto, Canada; Helsinki University, Helsinki, Finland; Martin Luther University, Halle, Germany; Wroclaw University Wroclaw, Poland; Georgia University, Georgia, USA; KwansaiGakuin University, Gakuin, Japan; Okayama University, Tokyo, Japan; Ochanomizu University, Tokyo, Japan; Szeged University, Szeged, Hungary; Aoyama University Tokyo, Japan),
- experimental and theoretical aspects of aluminium electrowinning (Alcoa, Inc., USA; NTNU, Trondheim, Norway),
- spent nuclear fuel treatment (NRI, Řež, Czech Republic; VUJE, Trnava, Slovakia),
- corrosion of metals in molten salts (VUJE, Trnava, Slovakia; Energov ýzkum, Brno, Czech Republic),
- material science (Technical University, Darmstadt, Germany),
- solar collectors (Thermosolar, Žiar nad Hronom, Slovakia),
- fertilizers (Duslo, Šaľa, Slovakia),
- development of environmentally friendly cements and utilization of municipal and industrial waste for cement production (Cemmag Ladce),
- development of non-oxide bioceramics (IIC SAS),
- 3D optical crystals with inverse opal structure and new types of inorganic phosphors for HB-LED (IIC SAS, TnU AD).



Institute of Biochemistry, Nutrition and Health Protection

tel.: +421 (2) 59 325 250, fax: +421 (2) 52 496 920

Head of Institute – Prof. Ľudovít Varečka, DSc., e-mail: ludovit.varecka@stuba.sk

The Institute was formed by fusion of two departments – Department of Biochemistry and Microbiology (DBM) and Department of Nutrition and Food Quality Assessment (DNFQA). Both departments provide independent study programmes and, in part, cooperate in research.

Education

The Department of Biochemistry and Microbiology guarantees the Master study programme Medical Engineering. Members of the staff teach several basic courses (Biology, Microbiology, Biochemistry, Molecular Biology and Genetics, etc.) in this programme, as well as in both the Bachelor and Master study programmes of other departments, such as study programmes Biotechnology, Chemistry and Medicinal Chemistry, etc. The DBM guarantees the PhD study programme Biochemistry.

The objective of these programmes is to provide theoretical background for the study of living organisms in academic research, but also for more specialized areas, e.g. biotechnology, clinical biochemistry, or pharmaceutical business.

The Department of Nutrition and Food Quality Assessment administers the Master study programme Nutrition and Health Protection (NHP), participates as a guarantor of the doctoral study programme Chemistry and Technology of Foodstuffs (CTF). The Department staff lecture on various subjects in Bachelor's study programmes that cover the area of food science. Within the Bachelor's degree courses the study programmes train in the following subjects: Food Chemistry, Food Analysis, Toxicology and Human Nutrition. In the Master degree courses the following subjects are taught: Food Microbiology, Food Hygiene, Xenobiotics, Principles of Catering, Nutrition and Immunity, Physiology and Pathophysiology of Human Nutrition, Food Legislation, and many others.

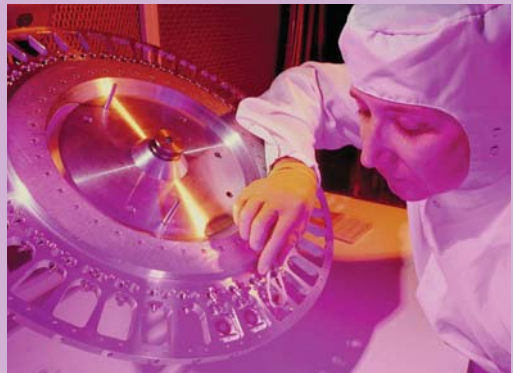
The objective of the programmes is to provide students with theoretical and practical knowledge necessary for becoming experts in food processing, control and inspection of catering institutions, research and development or in the trade sector and state administration.

Research activities

Research activities of DBM that cover topics of microbial and animal cell biochemistry and physiology focus on the following areas:

Physiology and genetics of filamentous fungi: This area is a place of activities of several research teams and covers both biochemistry and genetics of these microorganisms. From the topics that are studied at DBM, several should be mentioned: GABA metabolism – an important signaling molecule, secretion of unique proteolytic enzymes, transport of organic acids, Ca²⁺ homeostasis, fungal spore germination and effects of low-temperature plasma on epiphyte fungi, anaerobic hydrogen production. Besides, several applied aspects of mycology are elaborated. These include the study of transporters conferring fungal resistance to antifungal agents and preparing mutants of biocontrol fungi with increased mycoparasitic activities

Animal cell biochemistry: Searching for bioactive substances (natural or synthetic DNA-binding compounds, modulators of glutathione redox system and acetylcholine esterase inhibitors) and study of their effects on both cancer and non-cancer cell cultures, analysis of mechanisms of their cytotoxicity or cytoprotectivity; searching for and characterization of biologically active compounds affecting cancer cells on cellular and molecular levels; evaluation



of health risks of novel biomaterials for tissue engineering; study of the effect of UV-A radiation on biological effects of natural and synthetic compounds related to their potential photodynamic therapy of cancer; study of signaling pathways related to lipid molecules and connected to Ca^{2+} homeostasis and autophagy.

Research activities of the DNFQA focus on the areas as follows:

Nutrition and health research, the main challenges of the subjects are:

- studies of health-relevant food substances including their preventive and therapeutic properties,
- monitoring of the primary food source and preparation of functional foods and dietary supplements,
- bioactive compounds, food additives, nutraceuticals and functional food testing in vitro, ex vivo and in vivo level, including clinical trials.

Qualitative and quantitative comparison of vegetarians and omnivores human microbiome.

Microbiological aspects of food safety and quality:

- evaluation of the role of microorganisms in food science and nutrition, study of some endogenous and exogenous effects on the development of antibiotic resistance,
- study of the responses of relevant populations of microorganisms to the extrinsic and intrinsic factors of food environment including their quantitative description, prediction of the microbial behavior, such as growth, inhibition, survival, food shelf-life testing or challenge testing,
- study of microbiological quality and production hygiene of traditional food products.

Food Chemistry and Analysis – related to the natural flavours preparation through imitation of the enzymatic reactions using an active center of metalloproteins as catalysts, isolation and characterization of physiologically active compounds obtained from the green matter, analysis of antioxidative properties of primary food sources, determination of biological activity (antimicrobial, antimutagenic, genotoxic) of natural and synthetic compounds.

Cooperation

The Institute cooperates with Comenius University, Bratislava, Faculty of Natural Sciences, Leopold-Franzens-University, Innsbruck, Austria, Université Blaise Pascal, Clermont-Ferrand, France, Slovak Academy of Sciences.

Vital STU Ltd., a subsidiary of STU Scientific, Ltd. Adivit, Ltd. in Nitra, Interklinik Services, Ltd. in Bratislava, Rajo, a.s. Bratislava, Partners Slovakia, Brynsyrt Tisovec, Ryba Žilina, Ministry of Agriculture, STOAS Netherland, GTZ Germany/Kirgizstan, EFSA and others.



Institute of Biotechnology and Food Science

tel.: +421 (2) 59 325 719, fax: +421 (2) 52 493 198

Head of Institute – Prof. Michal Rosenberg, PhD., e-mail: michal.rosenberg@stuba.sk

The Institute is organized to two departments – Department of Biochemical Technology and Department of Food Science and Technology.

There are 4 full professors, 8 associate professors, 7 professor assistants and 5 research fellows in the creative staff. The institute prepares more than 25 postgraduate students in the PhD programme, annually graduate around 30 master degree students and 100 bachelors in two main study programs – Biotechnology and Food Science.

The Institute was established by merging of Departments of Biochemical Technology (established in 1984) and Department of Food Science and Technology in 2006. The Department of Food Science and Technology was created by merging the technology parts of the original Department of Milk, Fats and Food Hygiene and the Department of Saccharides and Food Preservation.

Education

The Department of Biochemical Technology (DBT) is a guarantor of the study programme Biotechnology in bachelor, master and doctoral level of study, as well as the bachelor study programme Biotechnology and Food Technology. DBT also provides teaching of Principles of Biotechnology for all other study programmes. The accredited programme Biotechnology integrates theoretical and practical skills in the fields of chemistry, biology, biochemistry, microbiology, molecular biology, genetics, enzyme engineering, gene engineering and bioengineering, xenobiochemistry, pharmaceutical, food and beverage biotechnology as well as pharmaceutical and medicine engineering. Special attention is paid to food quality, safety, nutrition and environmental aspects of biotechnology.



The Department of Food Science and Technology (DFST) covers the study programme Food, Hygiene, Cosmetics, as well as the study programme Food Chemistry and Technology in master and doctoral level of study. DFST also provides teaching of subjects focused on food chemistry and technology in Bachelor's study programmes. The accredited programmes of the Department of Food Science and Technology cover technology of edible oils and fats, surfactants and oleochemistry, cosmetic and household chemistry, hygiene and sanitation, cereal chemistry, sugar industry, candies and chocolate production, food analysis, food authenticity, biopreservation of vegetable products, microbiology of milk and milk products, meat chemistry and technology, food legislation and HACCP principles.



Research activities

Research activities at the Department of Biochemical Technology are oriented to:

- beer, wine, ethanol and microbial biomass production and technology,
- fermentative production of organic acids, lipids, pigments and biotransformation of carbohydrates,
- environmental biotechnology with emphasis on microbial degradation of pollutants, bioremediation,
- bioconversion and biotransformation focused on fine chemicals production,
- biofuels,
- proteomics and enzyme engineering,
- immobilised production systems,
- technology of recombinant DNA,
- overproduction of secondary metabolites used in pharmacy and medicine,
- medical engineering and bioengineering, laboratory scale up

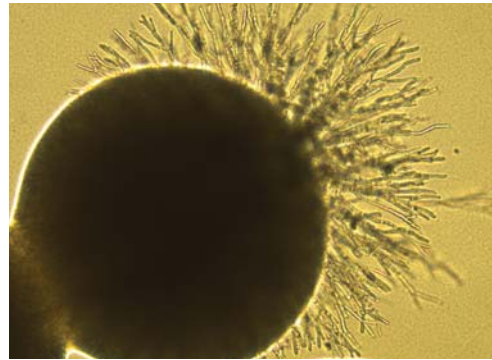
Research activities at the Department of Food Science and Technology are oriented to:

- chemistry and analysis of lipids, natural antioxidants, technology of edible oils and detergents, cosmetic and household chemistry, hygiene and sanitation, analysis of cosmetics products
- technology and microbiology of milk and milk products, cereal chemistry and technology, meat chemistry and technology, sugar-making technology, optimization of processes in sugar industry, innovation technologies for candies and chocolate production
- development of new analytical methods for determination of natural and new compounds present in foodstuffs, biopreservation of vegetable products, authentication of food products
- development of new types of functional food products



Cooperation

Department of Biochemical Technology cooperate with domestic and foreign companies, research institutes and SAV in the field of biotechnology, food and pharmaceutical technology, wine, beer and beverage technology, environmental biodegradation, immobilised biosystems and biotransformations, including high scale production of special microbial biomass, crude enzymes, biofuels, aromas and biocatalysts.



The Department use specific bioreactor procedures and technology for laboratory scale-up of bioprocesses and small-scale production of special chemicals.

The Department of Food Science and Technology cooperate with foreign and domestic research institutes and food manufacturers in the areas of development of analytical methods for determination of natural and extraneous compounds present in food, authentication of various food products, sensory evaluation of food, microbiological evaluation of food products, monitoring of interaction of food components with food additives during food processing, optimization of technological processes in food industry, research, cooperation and analyses for cosmetic industry, development of HACCP systems.



Institute of Physical Chemistry and Chemical Physics

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Head of Institute - Prof. Stanislav Biskupič, DSc., e-mail: stanislav.biskupic@stuba.sk

The Institute participates in all study programmes and provides education in General Physics, Physical Chemistry and Chemical Physics for all three degrees of university study. The institute is organized into two departments – Department of Physical Chemistry and Department of Chemical Physics.

Education

In education, the main effort of the Institute is to develop the abilities and critical thinking of the students. The basic courses in Physical Chemistry and General Physics are fundamentals for the study of other branches of chemistry. Besides the basic courses, The Institute delivers courses also for those students that specialize in Physical Chemistry, Chemical Physics and Theoretical and Computational Chemistry. The Institute provides also advanced courses in Chemical Thermodynamics, Chemical Kinetics and Catalysis, Colloid Chemistry and Quantum Chemistry. The Institute administers the Bachelor study programme Chemistry, Medicinal Chemistry and Chemical Materials. In the second degree of university education, the Institute is a guarantor of the study programme Technical Chemistry consisting of four modules: Physical Chemistry, Analytical Chemistry, Organic Chemistry and Inorganic Chemistry. The Institute also guarantees three PhD. programmes: Physical Chemistry, Chemical Physics and Theoretical and Computer Chemistry. The students that have

studied Physical Chemistry are also educated in modern theoretical chemistry as well as its practical applications. They become familiar with modern spectroscopic and electrochemical methods often employed in combined spectro-electrochemical experiments.

Research activities

The Institute of Physical Chemistry and Chemical-Physics belongs to the most productive institutes at Slovak University of Technology. The staff of the Institute publishes approximately 60 current contents publications yearly and their papers are widely cited counting approximately 1400 times per year. The following research topics have been developed at the Institute: magnetic resonance methods (EPR and NMR), electrical properties of conducting polymers and carbon nanotubes, molecular distillation and alternative fuels, X-ray structural analysis and statistics in the study of monocystals, theoretical and computational chemistry, thermal analysis and chemical kinetics.



The Department of Physical Chemistry specializes in spectroscopic study of natural and synthetic compounds with photochemical and photobiological properties, study of induced electron transfer in natural and synthetic compounds; molecular design of "blue" copper protein model systems, extraction of chemical and physical-chemical properties from diffraction data; synthesis, spectral properties and biological activity of metal-dependent SOD mimetic compounds. Beside the study of naturally occurring or synthesized compounds important in biosystems (antioxidants, pharmaceuticals), the study of physical-chemical properties, stability and degradation of materials represents another significant branch of the research conducted at the Department. Preparation and physical-chemical characterization of alternative diesel fuels and, particularly, the study of possible ways of utilizing used frying oils in fatty acid methyl esters production is another unique field of research with a long tradition.

Research activities at the Department of Chemical Physics are oriented on transport properties of conducting polymers and carbon nanotube networks, study of relationships between the physical properties, energetics and structure of natural and synthetic aromatic compounds with potential antioxidant activity and molecular dynamics study of conjugated systems.

The Institute staff co-operate with research groups in the Czech Republic, Austria, Germany, France and the United Kingdom.

Cooperation

The Laboratory of Thermal Analysis and Calorimetry has a wide cooperation with industrial partners. The Research Institute of Chemical Technology is the most important partner. In a joint project, new antioxidants for rubber and polymers have been synthesized and their efficiency has been tested. Also, the relationship between the antioxidant structure and its efficiency was studied. Natures Ltd. is another important partner. The topic of ongoing collaboration is the increase of immuno-stimulating activity of beta-glucane.

The research team specializing in molecular distillation and alternative fuels co-operates with several domestic and foreign companies in the field of pharmacy, cosmetics, food industry, and also in the field of organic technology. The team develops the technology for preparation and treatment of alternative diesel fuels from vegetable oils and animal fats. Currently, the team is cooperating with foreign partners in the field of catalytic cracking of biomass and waste. The project is supported by the Burgenland government (Austria).

DMPO

trapping oxygen centered radical

weak shielding of unpaired electron
 → short spin adduct half lives (2.9 min)

line splitting caused only by ^1H ($I=1/2$) and ^{14}N ($I=1$)
 → straightforward simulation

rapid spontaneous transformation of
 •DMPO-OOH to •DMPO-OH

5,5-dimethyl-pyrroline-N-oxide

$\bullet\text{O}_2^-$
 a_N
 a_H
 a_H^{γ}

$\bullet\text{OH}$
 a_N
 a_H

$\bullet\text{OCH}_3$
 a_N
 a_H
 a_H^{γ}

$\bullet\text{CH}_3$
 a_N
 a_H

Institute of Chemical and Environmental Engineering

tel.: +421 (2) 59 325 250, fax: +421 (2) 52 496 920

Head of Institute – Assoc. Prof. Jozef Dudáš, PhD., e-mail: jozef.dudas@stuba.sk

The Institute has a unique position among academic institutions in Slovakia being the only one providing full three-stage university education and advanced academic research in the field of chemical and environmental engineering. The Institute is organized into two departments – Department of Chemical and Biochemical Engineering (DCHBE) and Department of Environmental Engineering (DEE).

Education

The Institute administers the following study programmes:

- bachelor's study programme Chemical Engineering,
- master's study programmes Chemical Engineering and Environmental Chemistry and Technology,
- postgraduate study programmes Chemical Engineering and Environmental Chemistry and Technology,

Besides, the Institute provides courses for other study programmes at the Faculty which include Chemical Engineering I and II, Material / Energy Balances, Equipment in Chemical and Food Industry, Thermodynamics, Reactor Engineering, Biochemical Engineering, Safety Engineering and Environmental Science.

The core of the bachelor's study programme Chemical Engineering focuses on the knowledge of material and enthalpy balances and transport phenomena (fluid flow, heat and mass transfer) in chemical reaction systems, material processing, and mixture separations applied to industrial scale production processes. The key application subjects in-

clude separation processes, reaction engineering, engineering thermodynamics, process equipment, process control, engineering design.

The master's study programme and the postgraduate study programme Chemical Engineering guaranteed by DCHBE provide education in more advanced topics of the field. Both study programmes focus on the design and optimization of more complex systems (multicomponent, multiphase) requiring advanced methods of numerical mathematics and sophisticated computer programs. Besides the common core, the students can choose optional subjects from biochemical, environmental and safety engineering profiles. The experimental or computational research conducted by students is an integral part of the education.

The master's and postgraduate study programmes Environmental Chemistry and Technology supervised by DEE train in water and atmosphere chemistry, water technology (treatment of municipal and industrial wastewater, water treatment, sludge treatment), air protection technology, waste processing, biogas production, environmental monitoring and management, ecology, environmental legislation, soil protection, radioecology, etc.



Research activities

The Department of Chemical and Biochemical Engineering and Department of Environmental Engineering carry out both basic and applied research in the areas of chemical and biochemical engineering, food engineering, safety engineering and environmental engineering and technology. The research in the field of chemical engineering has been focused on:

- renewable energy sources (kinetics of pyrolysis of renewable raw or waste materials, design, operation and modelling of both catalytic and non-catalytic reactors),
- chromatographic separations of proteins and oligosaccharides: (a) the investigation of equilibrium and kinetic processes of proteins on ion exchangers with grafted polymer layer or on hydrophobic membranes and (b) the optimization of recycle and simulated moving bed chromatography for the separation of fructooligosaccharides; enzymatic transglycosylation of sucrose to fructooligosaccharides and lactose to galactooligosaccharides in the area of biocatalytic production of prebiotic compounds,
- hybrid reaction-separation processes for specialty chemicals, novel extraction methods for organic acids (experimental and mathematical modelling of biotechnological production, reactor/separator system – pervaporation or reactive distillation),
- modelling of liquid-liquid (equilibrium and mass transfer in extraction processes using phosphonium ionic liquids immobilized on a membrane support) and vapour-liquid (V-L) equilibria (equilibrium and non-equilibrium models of extraction and extractive distillation of alcohol/hydrocarbone mixtures),
- pollution dispersion (the atmospheric pollution dispersion using CFD modeling),
- energy savings and exergoeconomic analysis of combined electricity, heat and mechanical energy production.

The research in the field of environmental engineering and technology is conducted in the areas:

- progressive processes and technologies of wastewater treatment, water treatment and sludge treatment
- detection, separation and removal of specific environmental pollutants (heavy metals, selected organic compounds, radioecological substances, organic substrates biodegradability, etc.)
- processes and technologies of biogas production

Cooperation

The Department of Chemical and Biochemical Engineering has had a rich cooperation in both education and research. A number of companies cooperate in summer practical training of students, fund scholarships for the best students, help with promotion of chemical engineering education, etc. The most significant role in this support has been taken by Slovnaft, but the contribution of SCP Mondi, Duslo, Fermas, Fibrochem, Heineken, Euro milk, Leaf, and Noving must be specifically appreciated too. Besides the cooperation with other faculty departments, the most significant cooperating partners in research are industrial companies. These include Electrotechnical R&D Company in the field of biomass pyrolysis, Sartorium Stedim Biotech in membrane chromatography of proteins, Fermas in purification of amino acids, Axxence Slovakia in specialty chemicals productions, and Grucon in energy savings.

The Department of Environmental Engineering has cooperated with industrial companies, water companies, state institutions etc. on:

- laboratory and pilot-scale modelling of wastewater/water/sludge treatment, anaerobic treatment of organic materials and biogas production, air protection processes, environmental monitoring
- design, optimization and start-up of environmental technologies, mainly wastewater treatment plants and biogas plants,
- mathematical modelling and simulation of wastewater treatment processes, and dispersions of the air pollutants,
- separation, capture and utilization of green gas - carbon dioxide as a renewable feedstock for the production of new liquid fuels and chemicals,
- preparation of legislative regulations and decrees, technical standards, feasibility studies etc.



Institute of Information Engineering, Automation and Mathematics

tel.: +421 (2) 59 325 367, fax: +421 (2) 59 325 340

Head of Institute – Prof. Miroslav Fikar, DSc., e-mail: miroslav.fikar@stuba.sk

The Institute is organized into two departments – Department of Information Engineering and Process Control (DIEPC) and Department of Mathematics (DM).

The Department of Information Engineering and Process Control of the FCHPT STU in Bratislava was constituted from the Department of Measuring and Control Technique of the Faculty of Electrical Engineering of the Slovak University of Technology in Bratislava in 1962. Because of the specific control problems of the processes and systems in the chemical and biochemical technologies, the specialization Process Control in the frame of the study branch Chemical Engineering and Process Control has been established and students and postgraduate students have been educated since 1964. So far, more than four hundred specialists and almost thirty PhD students have been graduated here and three professors and nine associate professors have been appointed. Since 2005, the Department of Information Engineering and Process Control and the Department of Mathematics have formed the Institute of Information Engineering, Automation and Mathematics.

Education

The Department of Information Engineering and Process Control guarantees the following three study programmes:

The Bachelors study programme Information Engineering, Automation and Management in Chemical and Food Industry that trains students in using automation and process controlling in chemical and food technologies.

The Masters study programme Information Engineering, Automation and Management in Chemical and Food Industry and the PhD study programme Process Control focus on modelling, controlling and optimization of processes in chemical and food industries.

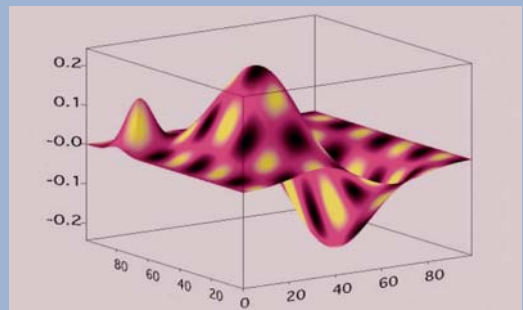
The Department of Mathematics provides basic and advanced courses of Mathematics, Informatics, Mathematical Statistics and Numerical Mathematics in all study programmes.



Research activities

The Department of Information Engineering and Process Control has concentrated research activities on the following areas: modelling and simulation, system identification, optimisation and process control in chemical and food industries, design and projection, measurement and data processing, neural networks and fuzzy control, modelling and control of chemical reactors, biochemical reactors, distillation columns and heat exchangers, process automation and visualisation, information technologies.

The research activities at the Department of Mathematics are oriented to mathematical statistics, fuzzy sets and fuzzy logic, measure and integration theory, non-standard methods of uncertainty, theory of aggregation operators, neural networks, evolutionary algorithms, artificial intelligence, ordered algebraic structures, real functions, multifunctions, graph theory, algebraic and differential topology. All listed items are included in research project VEGA, APVV and KEGA.



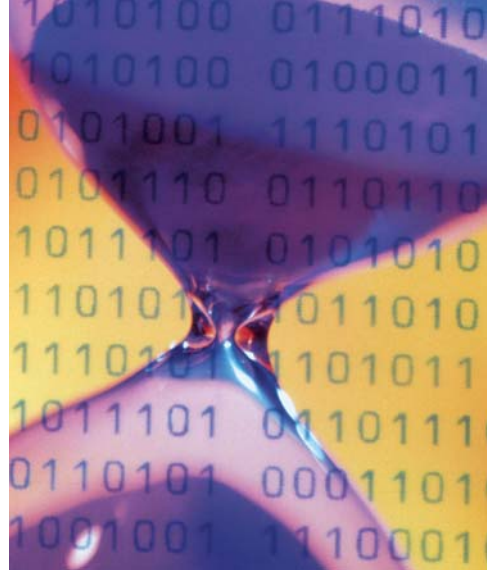
Cooperation

The Department of Information Engineering and Process Control cooperates with domestic and foreign research institutes and companies in the following areas:

- control system design, adaptive control, robust control, polynomial synthesis, model predictive control, dynamic optimisation and control, neural networks, learning automata, modelling, analysis, and control of hybrid systems, closed-loop identification, modelling of chemical processes, environmental engineering, bioengineering projects.

The Department of Mathematics cooperates with domestic and foreign research institutes and SAV in the following areas:

- mathematical statistics, fuzzy sets, and fuzzy logic, information technologies, partially ordered groups and semigroups, graph theory.



Institute of Organic Chemistry, Catalysis and Petrochemistry

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Head of Institute – Prof. Ľubor Fišera, DSc., e-mail: lubor.fisera@stuba.sk

Institute of Organic Chemistry, Catalysis and Petrochemistry consists of three departments: Department of Organic Chemistry (DOC), Department of Organic Technology (DOT) and Department of Petroleum Technology and Petrochemistry (DPTP). It covers a wide area of theoretical and applied organic chemistry and offers interesting undergraduate and graduate courses as well as PhD studies in this field.

Education

The Institute warrants the MSc study programmes and PhD study programmes in the field of organic chemistry, organic technology and petroleum technology from theoretical point of view through laboratory practice and analysis to industrial realizations and projecting.

DOC also warrants the engineering study programme Technical Chemistry, the specialization Organic Chemistry, and a doctoral study programme Organic Chemistry. The Institute also provides teaching of all subjects covering Organic Chemistry and Organic Technology in Bachelor's study programmes. DOT and DPTP are guarantors of the engineering study programme Chemical Technologies

and a doctoral study programme Organic Technology and Technology of Fuels. The accredited programmes specialize on: Organic Synthesis, Asymmetric Synthesis, Mechanisms of Organic Reactions, Organometallic Chemistry, Medicinal Chemistry, Bioorganic Chemistry, Chemistry of Natural Compounds and Heterocycles, Organic Technology and Petrochemistry, Chemical Specialties, Computer Processing of Data, Industrial Organic Chemistry, Process Design, Chemical Kinetics and Reactor Design, Optimization, Manufacturing of Pharmaceuticals, Modeling of Chemical Kinetics, Technology of Crude Oil, Optimization in Petroleum Industry, Catalysis, Petrochemistry, Gas Industry, Fuels and Lubricants, Recycling of Raw Materials, Sophisticated Materials, etc.



Research activities

■ The research interests of DOC are devoted to: Stereoselective syntheses and chiral compounds, chemistry of natural compounds and drugs, particularly on effective synthesis of bioactive natural compounds and their analogues, stereoselective palladium catalyzed cyclizations and cross-coupling reactions in natural product synthesis, new effective strategies for stereoselective syntheses of analogues of biologically active indolizidine and pyrrolizidine alkaloids, substituted oxoamino acids and their derivatives, pure amino acids and their functional derivatives as well the preparation, biological and physico-chemical properties of novel heterocyclic compounds with potential application, among others, in medicine, nanotechnologies, protection of wood and paper.

■ The research activities of DOT are focused on technological development of utilization of renewables by selectively catalyzed green processes (e.g. glycerol to diols, ethers, ketalethers, carbonate, or chosen carboxylic acids, natural polyols to diols, etc.), and on challenging catalyzed one step transformations of commodity compounds to valuable specialties (e.g. methane to methanol or formaldehyde, propene to methyloxirane, cyclohexane to cyclohexanone, etc.). Besides the mentioned scientific topics, DOT solves technological and scientific problems of industry and SME (e.g. topic of industrial antioxidants, vulcanization accelerators, PET recycling, and etching agents for marking cars, etc.)

■ The research activities of DPTP can be divided to three basic fields:

Heterogeneous catalytic processes based mainly on zeolite catalysts in the treatment of different petroleum fractions and products to valuable petrochemicals and fuels; catalytic treatment of used plastics, wastes, vegetable oils and biomass to fuels

Thermal processes oriented to the conversion of used plastic, used tires and biomass to fuels and basic gaseous petrochemicals

The characterization and use of heavy petroleum fractions and wastes into valuable hydrocarbon fraction

Cooperation

■ From 1991 to 2011 DOC in the cooperation with the Departments of Organic Chemistry in Vienna, Budapest, Ljubljana and Brno organized the Blue Danube Symposia on Heterocyclic Chemistry. The scientific collaboration in the field of heterocyclic chemistry and synthesis of natural compounds and their analogues runs especially with departments in Austria, Germany, France, Poland and Hungary. Based on the bilateral cultural agreement between the French and the Slovak party, a student exchange programme between the IUT – Institut Universitaire de Technologie at University Paris-Sud and FCHPT STU has been running for over 30 years now. Under the agreement French undergraduate students complete (at STU) and defend (at UPS) a thesis at conclusion of their two-year university study, and obtain the title D.U.T.

■ DOT cooperates with universities, chemical industry and SME in the Slovak Republic and abroad solving their technological and scientific problems. Main partners in Slovakia are: VUCHT plc (Research Institute of Chemical Technology) mainly in the field of industrial antioxidants and vulcanization accelerators, VUP plc (Research Institute of Petrochemistry) in the field of chemical specialties, VURUP Slovnaft (Research Institute of Petroleum and Petrochemistry) in the field of identification and determination of VOC in soil, water and air, a SME Carcode (etching agents for safety marking of cars), etc. The collaboration with the Chulalongkorn University in Bangkok (Thailand) focuses on 6-12-month exchange of PhD students. DOT in cooperation with Institute of Catalysis and Surface Chemistry of the Polish Academy of Sciences, J. Heyrovsky Institute of Physical Chemistry of the Academy of Sciences of Czech Republic, Faculty of Science and Informatics, University of Szeged and Faculty of Technical Chemistry, University of Vienna organize the Pannonian International Symposium on Catalysis every second year from 1990.

■ The cooperation of DPTP is concentrated to modification and characterization of synthetic zeolites and mesoporous molecular sieves with the aim to prepare shaped acid and bifunctional heterogeneous catalysts, the application of zeolitic heterogeneous catalysts in the conversion of waste plastic, vegetable oils and biomass to fuels in laboratory reactors and pyrolytic reactors for thermal conversion of different feeds to fuels.

Institute of Polymer Materials

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Head of Institute – Prof. Ivan Hudec, PhD., e-mail: ivan.hudec@stuba.sk

The Institute of Polymer Materials consists of four departments: Department of Plastics and Rubber, Department of Fibres and Textile Chemistry, Department of Graphic Arts Technology and Applied Photochemistry, Department of Chemical Technology of Wood, Pulp and Paper.

The history of the Institute dates back to 1943, when the Department of Wood Technology and the Department of Technology of Organic Substances were established and first lectures on polymer chemistry and polymer technology started. The Institute occupies a specific position within the Slovak Republic and relates to the wide spectrum of chemical, wood, paper, textile, rubber, plastics and graphic arts industries.

Education

The Institute of Polymer Materials has a widely oriented programme leading to the development of basic scientific fields, as polymer chemistry, production and processing technology of plastics and rubber, fibre and textile technology, wood, pulps and paper technology and graphic arts and printing technology. The Institute participates on Bachelor study programme Chemistry, Medical Chemistry and Chemical Materials, where it provides courses on Macromolecular Chemistry, Chemical Materials and optional courses on Renewable Sources and Materials and Basics of Photography and Graphic Arts Technology.

The Institute guarantees two graduate Master study programmes:

1. Natural and Synthetic Polymers consisting of four study modules:

- Plastics and Rubber,
- Wood, Pulp and Paper,
- Graphic Arts Technology,
- Fibres and Textile
and

2. Heritage Materials Conservation

The graduate of the MSc programme Natural and Synthetic Polymers is a chemical engineer knowledgeable in manufacturing, processing, structure, properties and application of natural and synthetic polymer materials. The graduate is able to analyze technical problems, develop new technological processes, simulate and optimize processes in technological units, develop new polymeric materials, new technical and technological processes in the area of production, processing and applications of polymer materials. The graduate is a specialist in production and processing of plastics, rubber, chemical fibres and textile materials and their finishing treatment. The graduate

is a specialist in pulping and papermaking, as well as in structural and chemical composition of lignocellulosics, that is familiar with biomaterials from plant raw materials, their properties and possibilities of utilization as a renewable material and/or source of energy. Graduates are prepared for the carrier of technologists and managers in printing and packaging industry, movie and still pictures laboratories, publishing houses and graphic studios and private enterprises.

Graduates of the study programme Heritage Materials Conservation are chemical engineers that specialize in conservation and preservation of heritage materials and objects. They gain advanced knowledge on composition, structure and properties of chemical compounds and traditional and advanced materials, they are able to interpret the analytical results and thus contribute to the diagnosis of defects. The study provides also courses on information technologies, history of art, ethics of heritage, law, marketing and communication. Being a member of interdisciplinary team, the graduate contributes to revealing defects of heritage objects and proposes their correction using the most suitable preservation and conservation procedures.

The Institute offers two PhD study programmes: Macromolecular Chemistry and Technology of Polymer Materials.



Research activities

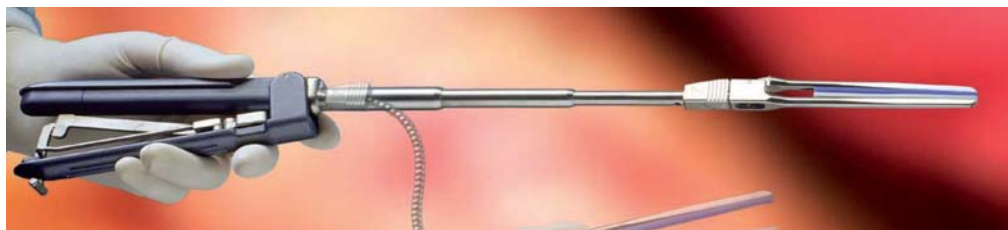
The Institute currently develops the following topics:

- study of degradation of graphical objects of cultural heritage, elucidation of the relations between the properties of color and writing layer (inks, colorants, and pigments) on paper and parchment support on the course of degradation during ageing, influence of polluted environment on degradation,
- development of methods of examination and evaluation of properties of documents and their components for forensic analyses based on molecular spectroscopy in the IR, UV-VIS and NIR region,
- employment of chemometric methods of multicomponent analysis to enhance resolution of complex spectra,
- study of printing methods for deposition of conductive structures onto coated papers and plastic films,
- study of treatment of polymer surfaces by low temperature plasma at atmospheric pressure, plasma treatment and modification of wood, reinforcing materials, textile materials and plastic films,
- development of innovative processes and technologies in field of LCF biorefineries (materials biofuels and biochemicals), cellulose technology, pulping and papermaking,
- conservation science and technology, forensic determination of documents,
- polymer blends and composite materials based on biopolymers and biodegradable polymeric materials,
- polymer nanocomposites and composite materials based on rubber with magnetic fillers,
- application of biopolymers and natural polymers as components of rubber blends,
- modification of fibres for multifunctional textiles,
- renewable resources - materials and energy,
- recycling of polymer waste.

Cooperation

The Institutes cooperates in following areas:

- surface analysis of polymeric and other solid materials by absorption spectroscopy in infrared (FTIR) and UV Vis. region including all reflectance techniques (ATR, DRIFT, PAS),
- surface analysis of materials by atomic force microscopy (AFM, STM),
- colorimetric evaluation of properties and quality of printed images,
- spectral analysis of writing and drawing means and printing inks in structures of images,
- evaluation of light stability of materials,
- thermal, chemical, biochemical and mechanical conversion of plants to the materials (pulp, paper, cellulose composites), biochemicals and biofuels,
- products analysis of thermal and chemical degradation from renewable resources,
- surface plasma treatment and modification of polymeric materials,
- research for pulping and papermaking technology and industry,
- evaluation of rheological properties of plastics materials, fibres and rubber blends,
- preparation of polymer blends and composites materials in labor and pilot scale,
- testing of mechanical, thermal and thermo-mechanical properties of polymer materials and products from polymers,
- study of structure of polymers by scanning electron microscopy and by atomic force microscopy,
- testing of process ability of polymers by extrusion and chill-roll technology,
- surface modification of reinforcing materials for rubber products by plasma,
- modification of polymer blends and composites containing biodegradable polymers and biopolymers from renewable sources,
- study of pyrolysis process of rubber scrap,
- modification of fibre-forming polymers by nanoadditives for the preparation of multifunctional fibres utilizable in technical and garment areas.



Department of Languages

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Head of Department – Magdaléna Horáková, M.A., e-mail: magdalena.horakova@stuba.sk

The Department of Languages supports the Faculty's training in chemical and food technology with tuition in foreign languages: English and German aimed at students at intermediate and advanced levels.

Classroom teaching focuses on reading, writing, and study skills, including those required for vocabulary development and for undertaking research.

Education

The English or German language represents a compulsory subject for each student of the Faculty.

The course is taught in two semesters in the first year of the study and ends with a 4-credit exam. The objective of the Department of Languages to teach specific language for professional purposes. The participants will be able to use the language in the study of their specialist area literature, to further develop all the language skills actively with the aim of mastering extensive reading and listening to texts, academic writing, poster and conference skills, presentations in English.

In the final exam students are expected to prepare a poster, or a power-point presentation on a scientific topic, present and support the topic in a class discussion.

Besides the above-mentioned compulsory courses, there is a wide range of recommended subjects offered, such as English conversation, preparatory courses for false beginners, Spanish, Russian, de-

pending on the interest of students in the current year. These recommended courses are also available to STU employees.

Postgraduate students can attend seminars for academic English in which they study and train academic skills, such as presentation techniques, writing reports, summaries and abstracts. Postgraduates are obliged to pass an examination in which they defend their scientific work results, prove their communication, discussion and other academic skills in English.



Department of Physical Education and Sports

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Head of Department – Prof. Miroslav Bobřík, PhD., e-mail: miroslav.bobrik@stuba.sk

The Department of Physical Education and Sports at FCHPT STU was founded in 1964 by atomization of the whole-school department at SVŠT in Bratislava. By this change the creation and development of sport facilities had better conditions at particular faculties and also specific methods and means of educational process regarding the study character could better develop. This process was running parallel with the process of constituting particular faculties at SVŠT. In that time many influential persons of educational process performed their sport acting at KTV. They contributed not only to the national character but also to the international meaning.

Education

The subject Physical Education and Sport is compulsory for all students in the Bachelor's study for 6 semesters. Students can choose from the following sports activities:

- Aerobic
- Harmonic gymnastics
- Healing gymnastics
- Basketball
- Swimming
- Floorball
- Canoeing and kayaking
- Winter sports camp (skiing, snowboarding)
- Summer sports camp (rafting, canoeing)
- Athletic sport
- Football
- Handball
- Futsal
- Volleyball
- Karate

The Department can offer students and staff a gym-ground for volleyball, basketball, football, two room for body building, two rooms for table tennis, one room for spinning, and an outside roof-protected sport hall with artificial grass ground.



Research activities

The Department works on the following projects:

- State of Physical and Motor Development of Undergraduates of FCHPT STU in Bratislava
- In the Shadow of Totalitarianism: Sport and the Olympic Movement in Countries of Central Europe 1945 - 1989 International Research Project of Visegrad Fund
- Swimming Ability of University Students in Slovakia
- Intensity of Movement Load during Aquaerobic of University Students
- Health-weakened Students and their Adaptation to Physical Programme in the Conditions of Integrated Physical Education at STU
- Creation of Criteria for Intensity Assessment of Match and Training Load in Sport Games
- Internal Load of Organism of Players and its Response Depending on Play Functions in Selected Sports Games.

Cooperation

The Department cooperates with:

- Faculty of Physical Education and Sport of the Comenius University, Bratislava;
- Research Institute of Physical Culture, Bratislava;
- History Institute of the Slovak Academy of Sciences, Bratislava









SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA
FACULTY OF CHEMICAL AND FOOD TECHNOLOGY

Information
for visitors and prospective students