ANNUAL REPORT 2020

STU
FCHPT

Content

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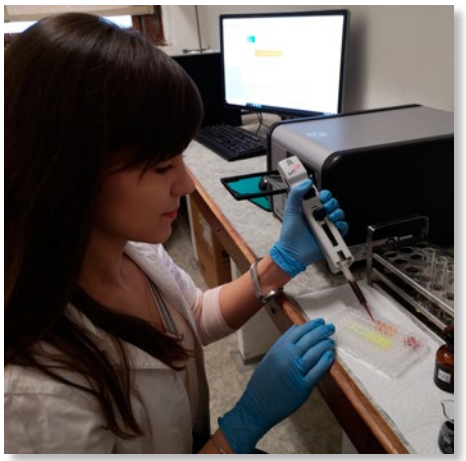


The Faculty of Chemical and Food Technology is accredited as a university type of institution.
FCHPT STU offers courses in accredited programmes at all three levels of study:

Bachelor Study Programmes

Automation, Information Engineering and Management in Chemistry and Food Industry

Bachelor study programme Automation, Information Engineering and Management in Chemistry and Food Industry is focused on education in the field of implementation and exploitation of automation in chemical, biochemical and food industries, in the field of information technologies applied to chemical, biochemical and food industries, in the field of process control and management. The bachelor understands processes of production of chemicals, understands materials and their properties. He/she couples technological and natural knowledge and hence guarantees ability to be successful in industrial practice.

Graduates can continue at master level in the same or similar study programmes. Universality of this study programme makes it possible for the graduate to be employed in all countries of the European Union in chemical, biochemical, and food industries at positions requiring completed education of the first degree. The graduate can focus on methods of process modeling, process control, optimization, instrumentation, industrial control systems, and design of process automation systems. He has above average knowledge in information technologies of computer operating systems, programming languages, database systems, and web technologies. He is versatile due to the knowledge in economics and management, economics theory, control theory, business economy and management, logistics, financial management, personal mangement and quality management. Therefore, he can find employment in lower management positions.

Biochemistry and Biophysical Chemisty for Pharmaceutical Applications

The study programme provides broad knowledge in natural science and technical insight into the use of theoretical knowledge in industrial, medical, pharmaceutical and laboratory practice.

A key outcome of the education is an integrated view on the preparation, resp. isolation of various substances from natural sources, biological mechanism of action at the cellular and tissue level, toxicological profile, pharmacokinetics and drug testing procedures for their introduction into clinical practice. The graduate knows basic principles and techniques of work in various types of biochemical, biophysical, pharmaceutical laboratories. He is able to assess from a chemical point of view the basic properties and biological activity of different synthetic and natural substances, he is able to carry out separation into chemical individuals and to realize the synthesis of the target compound. Using physical-analytical methods, can determine the structure of organic, bioorganic, inorganic and bio-organic molecules, as well as the physico-chemical pro-

perties of low-molecular and macromolecular biomaterials. The graduate is able to carry out biochemical and toxicological analysis of natural and synthetic substances. The graduate knows technical terminology, understands the meaning of technical texts, he communicates at least in one world language at a professional level. He has knowledge in the field of current information technology used in the control and management of technological processes. He knows how to work in the team and present the results.

The graduate of the programme may continue in Master's degrees studies in successive programmes or in programmes related to specialization. He can be employed in the production, storage and sale of various chemical, biochemical and pharmaceutical materials and chemicals, as well as at the positions of the medical device operator in the medical, pharmaceutical, biofuel production and process industries, natural and synthetic biopolymers, in the field of waste recycling and the use of renewable resources, or the production of new products for the cosmetic and pharmaceutical industries. He is a suitable candidate for the quality control positions of pharmaceutical products, design and preparation of potential drugs and the computer prediction of suitable drugs with targeted properties.

Biotechnology

The bachelor's degree study programme provides to students fundamental knowledge and laboratory skills in chemistry, biology, biochemistry, microbiology, molecular biology, genetics, bioanalytical methods, xeno-biochemistry, and chemistry of food. The student becomes familiar with chemical engineering, fermentation and food biotechnology, biotechnological information, food chemistry, hygiene and health prevention, and toxicology. A part of the study programme is focused on laboratory research practice in a particular area. Students can choose 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. This bachelor's degree programme provides graduates to be adaptable when employed either in industrial, laboratory and private practice or to continue in the next study.

Graduate from the bachelors' degree has an appropriate qualification for further master studies in successive or related study programmes, or may be employed in the fields of the industry, science and marketing areas. The knowledge obtained during the study provides the graduate the opportunity to be employed in chemical, biotechnological, fermentation, pharmaceutical, environmental, food and beverage industries, or in research in a position, which requires an undergraduate degree. Graduate may be employed also in the fields of development, production, analysis, storage and sale of various chemical products and materials, food, beverages and bio-fuels. The understanding of the physical principles of various analytical and diagnostic techniques enables the graduate to work as the operator of clinical equipments in hospitals. The skills in technical terminology and the language training enable the graduate to find an application in the sectors dealing with product certification, environmental monitoring, hygiene, metrology, or technical translation.

Chemical Engineering

The study programme Chemical Engineering provides students with knowledge in the field of chemical engineering that enables capability to manage, control and intensify complex production processes ensuring chemical and physical changes of substances inclusive manipulation of material and energy flows from raw materials to commercial products in the field of chemical, food, pharmaceutical, biotechnological processing industries including environmental technologies. It provides the core knowledge from the field of balance theories, transfer phenomena (momentum, heat and mass), (bio)chemical reactors, separation processes, safety and costs engineering, combined with basic knowledge on chemistry, biochemistry and mathematics. An essential part of the education in this study programme are the practical skills from chemical engineering laboratory work which are esential for operating equipments providing transport of liquids, their heating and cooling in preparation for relevant chemical and physical processes of production procedures and equipments for mixtures separation.

A graduate of the study programme can continue at master level in the same study programme Chemical Engineering or similar study programmes. The graduate gains the skills to provide for the operation of chemical, pharmaceutical, food processing, biotechnology industries in all countries of the European Union as an operator, technologist and as a worker at positions requiring completed education of the first degree. The graduate can streamline operation unit by chemical engineering analyzing of chemical and physical processes in the standard types of industrial equipment, to work with research and development facilities, to collect and analyze da-

ta by PC, to participate in the development of new products and to understand basic principles of loss prevention in the process industries.

Chemistry, Medical Chemistry and Chemical Materials

Bachelor's degree programme prepares qualified and creative chemists with the basic knowledge of chemistry, biochemistry, physics, informatics and chemical technologies. During the study students are provided with the knowledge of the physicochemical principles of various analytical and diagnostic methods as well as with the practice necessary for acquiring the skills in the performing of simple synthesis, modification, separation and chemical analysis of fine chemicals, such as biologically active compounds, analogs of natural compounds or macromolecules. Next objective consists of teaching the students to assess the properties of synthetic and natural compounds from the chemical point of view and consequently to estimate the effects of various organic and inorganic compounds on the living organisms. Bachelor's degree programme combines the profound knowledge of science with the technical view on the problems, thus providing great versatility of the graduates for the application in industrial, medical and laboratory practice.

Graduates of the programme may continue in the master's degrees in the follow-up or related study programmes. The versatility of this bachelor degree provides all graduate students the opportunity to work in all countries of the European Union in the chemical, pharmaceutical and food industries in a position, which requires an undergraduate degree. They may be employed also in the fields of production, storage and sale of various chemical products, materials and chemicals. The understanding of the physical principles of various analytical and diagnostic techniques enables the graduates to work as the operators of clinical equipments in hospitals. The graduates can by a proper choice of optional and elective courses oriented on the chemical and energy industries, thus broaden their employment opportunities in the production and processing of biofuels, in natural and synthetic polymer production, printing, packaging production, textile and protective materials, waste recycling and the renewable resources usage and the production of new products for cosmetics and pharmaceutics. Their skills in technical terminology and the language training enable the graduates to find their application in the sectors dealing with product certification, environmental monitoring, hygiene, metrology, or technical translation.

Food, Nutrition, Cosmetics

Bachelor's degree programme prepares graduates to perform basic professional activities in the production and evaluation of food and cosmetic products while respecting the rules of rational nutrition and human health. Programme allows graduates to obtain the basic theoretical knowledge and basic laboratory skill of natural sciences, especially in chemistry, mathematics, physics, toxicology, biology, biochemistry and general microbiology. Special courses in chemistry, technology, analysis, safety and packaging of food and cosmetics, develop in graduates the ability to assess chemical properties of food and cosmetic raw materials and finished products, and to estimate their effects on humans. Part of the study subjects are information technology, chemical and energy engineering, as well as various optional academic disciplines. Therefore, this bachelor's degree programme provides superior adaptability of graduates either for employment in industrial, laboratory and private practice or to continue their studies in the Master's programme.

The graduate of the programme may continue in Master's degrees study in successive programmes or in programmes related to specialization. Universality of this Bachelor's degree programme allows the graduate to find a job in the manufacture of food and cosmetic products, marketing of those finished products, or in the distribution of raw materials needed to produce them. Owint to being skilled in main EU legislation on safety of food and cosmetic products, the graduate may find employment in the state administration (State Veterinary

and Food Administration and its regional administrations, Border inspection posts, State Veterinary and Food Institute, the Public Health Authority of the Slovak Republic and its regional offices, Slovak Trade Inspection and its regional institutions, and others) and through language training also in similar institutions in EU countries. Knowledge of the principles of analytical and diagnostic techniques in the area of this study programme enables graduate employing in control laboratories of the public and private sector, in the development and research.

Master Degree Programmes

- Automation and Information Engineering in Chemistry and Food Industry
- Biochemistry and Biomedical Technologies
- Biotechnology
- Chemical Engineering
- Chemical Technologies
- Conservation of Heritage Materials and Objects
- Food, Hygiene, Cosmetics
- Natural and Synthetic Polymers
- Control of Technological Processes in Chemical and Food Industries
- Technical Chemistry
- Environmental Protection Technologies
- Nutrition and Food Quality Assessment

Doctoral Degree Programmes

- Analytical Chemistry
- Biochemistry
- Biotechnology
- Conservation of Heritage Materials and Objects
- Environmental Chemistry and Technology
- Food Chemistry and Technology
- Chemical Engineering
- Chemical Physics
- Inorganic Chemistry
- Inorganic Technologies and Materials
- Macromolecular Chemistry
- Organic Chemistry
- Organic Technology and Technology of Fuels
- Physical Chemistry
- Process Control
- Processing Technologies and Tools for Processing Polymeric Materials (double-degree with UTB Zlín)
- Technology of Polymer Materials
- Theoretical and Computational Chemistry

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 the Bachelor's thesis. The students earn the title "bakalár Bc." (Bachelor of Science, BSc.).

FCHPT STU has accredited remedial study bachelor programmes, too. The study plan of this study includes courses on mathematics, physics and chemistry that enable to obtain knowledge needed for university.

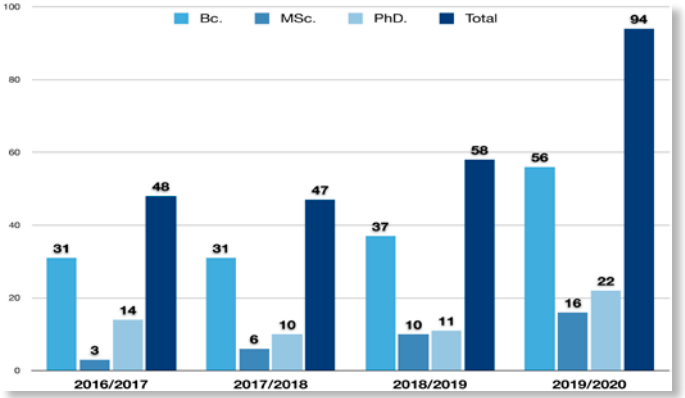
The Master course requires the students to take a final state examination and defend of a diploma thesis. The students earn the title "inžinier" Ing. (Master of Science, MSc.).

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

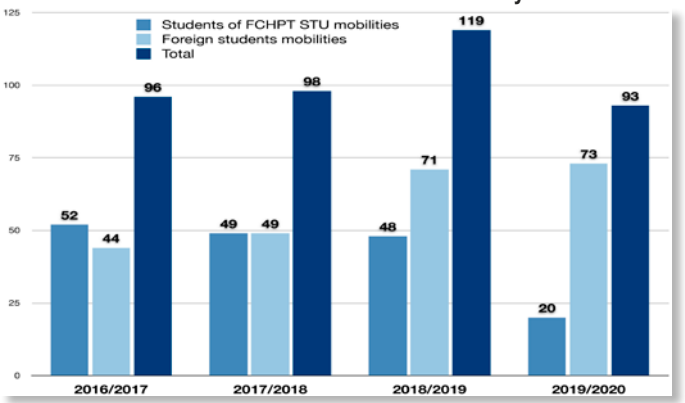
In addition to the natural-science basis, students are educated also in technological and engineering subjects, such as Chemical Engineering, Environmental Engineering, Processes Control, Basics of Chemical and Food Processing Technology, as well as subjects on Biotechnology, Biochemistry, Economy, Law 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 degree programme lasts three/four years and is the first level, the Master 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.

Number of foreign students at FCHPT STU in academic year



Number of student mobilities in academic year



Science and Research

The Faculty is widely oriented on research in multiple fields of science, including chemistry, chemical and biochemical technology, food processing, applied physics, informatics and mathematics. This wide scientific orientation of the Faculty allows for targeted training of undergraduates, graduates as well as postgraduate students in 17 branches of doctoral studies and their fluent transition to industry and research. There are several scientific schools at the Faculty which are successful in organizing international scientific meetings and in securing grants from domestic and international sources and grant schemes. Some of the most important projects of the Faculty have been carried out within the following programs:

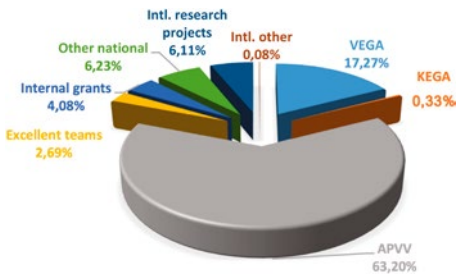
- VEGA Research Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic;
- KEGA Cultural and Education Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic;
- APVV Slovak Research and Development Agency;
- SPVV state program for science and research;
- ERDF Structural funds of the EU from the European Regional Development Fund;
- EC and CC Structural funds of the EU from the Operational Program Research and Development for Building Excellence Centers and Competence Centers;
- International projects funded by the European Union and other benefactors: Horizon 2020, FP7, INTERREG, NATO, COST, EUREKA, DAAD, TEMPUS, ERASMUS, CEEPUS *etc.*
- Young Researchers' Grants of the Slovak University of Technology.

The types and financial structures of projects carried out at the FCHPT STU in the last two years can be seen in the graphs on this page.

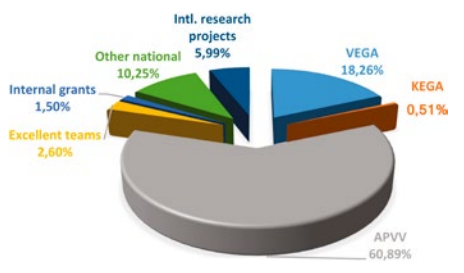
The research and development at the FCHPT STU focuses mainly on the following fields:

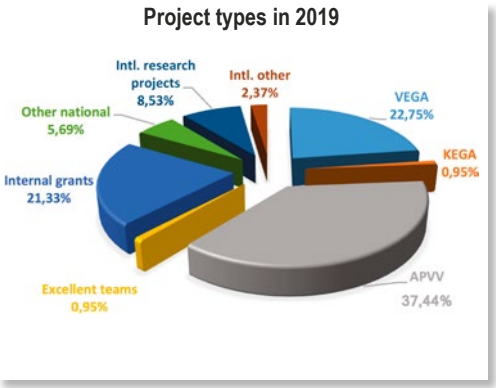
- physical-chemical methods of analysis, structure and property description of chemical systems and bio-systems;
- preparation and research of functional materials and material technologies using micro- and nanoscopic methods;
- biotechnologies and study of natural materials and biologically active substances;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

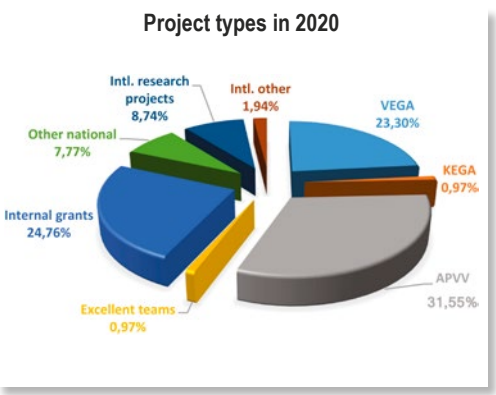
Financial structure of 2019 projects



Financial structure of 2020 projects







systems and their dynamic behavior, modelling and control of chemical and biotechnological processes.

In addition to basic research, the Faculty also participates in applied research for industry and has been active in approximately hundred public-private cooperation projects. Cooperation with many producers and companies allows for a swift implementation of research results in production.

The quality of the scientific results can be documented by annual number of almost 220 articles published in Current Contents-index journals, more than 100 publications published in other journals and over 550 contributions in conference proceedings.

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 Institutes

The Faculty maintains an important international position. Its academicians interact daily with top international universities and research institutes and play an important role in cross-border projects and publications. The scope and quality of scientific activities at the Faculty are comparable with other top research and training university centers in the world. The good reputation of the Faculty can be proved not only by the above mentioned grants, but also by dozens of staff invitations to participate in international conferences, cooperation with foreign universities, memberships in international organizations *etc.*

Project Center

The Faculty operates a Project Center offering administrative support to the Faculty's staff in the fields of preparation and implementation of domestic and international scientific grant projects. The core areas of activity of the Center include informing the academic community about planned/open calls for project proposals, deadlines, rules, changes and possible problems related to the projects, helping lead researchers to prepare interim and final reports as well as to communicate with grant providers, creating and maintaining a complex database of grant projects of the Faculty, offering grant management advice *etc.*

Year	2016	2017	2018	2019	2020
Number of visits to the Faculty	84	69	77	92	115
Number of visits abroad	637	644	720	758	6

School Activities for Prospective Students

Secondary school students can attend the following Faculty events:

- Open Doors Weeks called CHEMWEEK and CHEM(RE)ACTION (organized in February and October)
- chemical exhibition called CHEMSHOW (organized in June)
- summer schools CHEMSCHOOL, School of Chemical and Environmental Engineering, University for Secondary School Students, Minierasmus (organized mostly during the summer holidays)
- fair of companies and institutions from chemical and food industry called CHEMDAY (organized in March)
- educational fairs *Gaudeamus* organized with other STU faculties throughout autumn.

Open Doors Weeks and CHEMSHOW as the most important events introduce chemistry as a science and experience. Lectures, video productions and laboratory presentations inform about ongoing research at the Faculty. Stalls offer a wide variety of chemical processes and products of chemistry. The participants can actively engage in laboratory experiments. Simultaneously with the stall demonstrations knowledge contests are going on, the answers to which can be found right at the stalls. The students can win attractive prizes.

The participants of summer schools (events lasting up to 1 week) attend lectures and laboratory practices presenting the principles of chemical processes and analysis of compounds. The students along with their teachers evaluate the laboratory experiments and present their results in seminars. The best presentations are awarded. To boost variability of the summer schools, the programme offers sport competitions, informal meetings with teachers and Faculty students, knowledge quizes, *etc.* The students also take part in professional excursion to chemical companies and plants.

Student Activities

Organization representing students of the Faculty of Chemical and Food Technology called CHEM publishes student journal Radikal which informs the staff and the students about faculty activities, provides news from the world of science and technology and, last but not the least, amuses the students. The journal has a more than 20 year tradition and it has been published from the very beginning by the faculty students.

Except of the journal publication CHEM in cooperation with other universities, institutes, associations, foundations organizes many social, sporting, educational, cultural and other events. The most popular and successful activities are Chemical Beania (ball for the faculty students and staff with cultural program, dancing, concerts and festive dinner), Sport Day (the day when the students with their teachers can compete in different sport disciplines), Student Scientific and Professional Competition and Summer University (lectures and laboratory exercises organized by the faculty students for secondary school students).

CHEM also co-organizes Night of the Scientists, festival introducing science and technology to the public, mainly to students from elementary schools.

Very popular among the students is the CHEMDAY (exhibition of companies from chemical and food industry connected with their presentation). Students can discuss with people from the praxis and receive information about their future employment.

But CHEM is not just an organizer of the above mentioned annual activities. It organizes also quizzes, talk shows, games, movie nights *etc.* with the main aim to contact the students, to find new friends and to make the student life more attractive.

The Slovak Chemistry Library

Introduction

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 established in 1955 as the Library Center at the Faculty of Chemistry of the Slovak University of Technology in Bratislava. In 1962 it was transformed into the Central Library at the Faculty of Chemistry of the Slovak University of Technology in Bratislava, later the Central Library at the Faculty of Chemical Technology of the Slovak University of Technology in Bratislava and in 1974 into the Study and Information Centre at the Faculty of Chemical Technology of the Slovak University of Technology in Bratislava. By the FCHPT STU Dean's decision no. 4/2004 with effect as of March 3, 2004, the Slovak Chemistry Library was established.

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.

Visitors can comfortably study their own materials or library materials and from equipment supplied or owned in the library during opening hours. They can get comfy under a blanket or just relax in comfortable armchairs and bean bags or on the contrary study hard at study desks. It depends only on preferences how to spend free time in the most useful or enjoyable way.

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
- digital library

- Instructional services
- Interlibrary loan
- Reference and research services
- Services for Users with Disabilities
- Publishing and printing of books and textbooks
- StudyCloud service provides live storage where you can upload anything using a USB flash disk. The difference is that your documents can be accessed anywhere using just a web browser. The documents are worked with very effectively – they can be shared with other service users, borrowed, browsed, downloaded, played directly in this service.
- eStudy service provides digitised study material which is absolutely necessary for study and in the best form for the study on a personal or library computer, tablet or phone. The digitised material is easy to navigate, the necessary articles quick to be found, to any relevant information it is possible to write notes or underline it. All in your personalized area after logging in on service site.
- Print or "Print on demand" is a SCHK service, thanks to which we provide the possibility to print a document, interesting information originated from internet or graduation work from printers in the library or the entry hall of the Faculty.
- eArchive service lets you view a digitised study material, such as theses, which is designed for a long-term archiving. The electronic archive can be searched through with a help of a keyword or be browsed by categories.

Institute of Analytical Chemistry

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Head of Institute – Prof. Ivan Špánik, DSc., e-mail: ivan.spanik@stuba.sk

Introduction

The Institute of Analytical Chemistry (originally created in 1941) was formed in 2006. It represents highly qualified education and research environment with extensive teaching and publication activities. In bachelor study level the Institute provides teaching of analytical chemistry, its theory and practice. Master and doctorate studies concentrate on development of new analytical procedures and theoretical approaches aimed to solve the problems of various subjects, predominantly of chemical, food and pharmaceutical industries and the environment. The Institute organizes various forms of lifelong learning and scientific conferences particularly that entitled "Present State and Perspectives of Analytical Chemistry in Practice - ACP" started in 1979.

Education

Analytical Chemistry is one of the basic subjects at the Faculty which is part of all Bachelor study programmes fully provided by the Institute of Analytical Chemistry. In Bachelor study the Institute guarantees also the subjects Analytical Methods in Clinical Practice. Students actively participate in research projects 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, the Institute participates in teaching activities for other study programmes. The study of Technical Chemistry 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. The study of analytical chemistry is focused on development of analytical procedures and theoretical approaches in modern separation methods, 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.

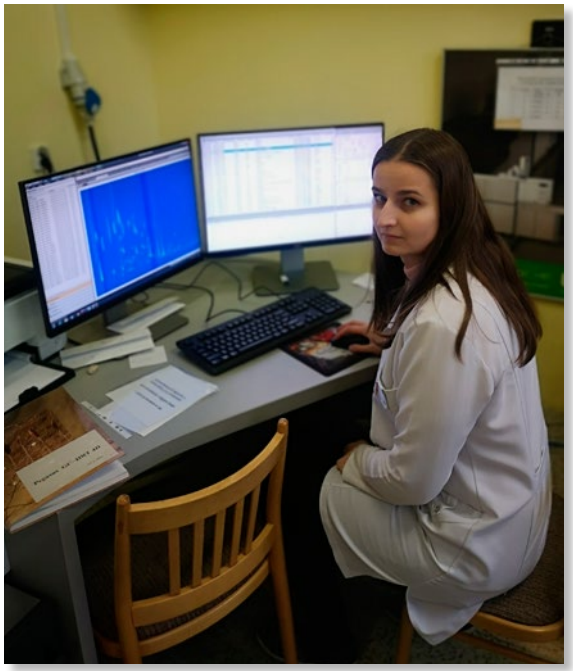
Research Activities

The Institute permanently participates in scientific and applied-science research projects of national grant agencies as well as in EU, NATO and other research projects. The research concentrates on the development of methods and theoretical aspects particularly in:

- trace and ultratrace analysis of organic and inorganic samples utilising isolation and preconcentration techniques in „off-line" and „on-line" systems,
- separation and determination of enantiomers, particularly by GC and HPLC methods,
- determination of quality and authenticity of food samples by chromatographic and spectroscopic methods,
- trace and ultratrace electrochemical and spectroscopic analyses,
- development and utilisation of biosensors, particularly based on nucleic acids,
- structure study of selected compounds.

Cooperation

The Institute of Analytical Chemistry has fruitful cooperation particularly with all departments of analytical chemistry in Slovakia and Czech Republic. It utilizes contacts with Department of Pharmaceutical Chemistry of the Faculty of Pharmacy and Institute of Medical Chemistry, Biochemistry and Clinical Biochemistry, Medical Faculty, Comenius University in Bratislava, Institute of Electronics and Photonics, Faculty of Electrical Engineering and Information Technology, Slovak University of Technology in Bratislava, Water Research Institute in Bratislava, Institute of Chemistry and Polymer Institute of Slovak Academy of Sciences, Department of Analytical Chemistry, Faculty of Natural Sciences, Charles University in Prague, Department of Chemistry and Biochemistry, Mendel University in Brno, 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, 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, and others.



Institute of Inorganic Chemistry, Technology and Materials

tel.: +421 (2) 59 325 468
Head of Institute – Prof. Ján Híveš, PhD., e-mail: jan.hives@stuba.sk

Introduction

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

Education

Department of Inorganic Chemistry guarantees several teaching subjects within the Bachelor´s and Master´s study programmes like 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.

Department of Inorganic Technology guarantees the engineering study programme Chemical technologies and a doctoral study program Inorganic technology and materials. The programs are accredited and focused on inorganic industry, thermodynamics, kinetics and electrochemistry of aqueous solutions and molten salts (electrochemical engineering and technology, corrosion protection, surface treatment of metals). Department provides teaching of technological courses in several Bachelor's study programmes.

The employees of the Department of Inorganic Materials guarantee several teaching subjects within the study programme Chemical technologies. These include the subjects Industrial inorganic chemistry Technology of silicates, Laboratory practice in chemical technology. They participate in teaching of the subjects like Inorganic technology, Laboratory practice in inorganic chemistry, Specialized laboratory practice.

All departments supervise bachelor, diploma and PhD students.

Research Activities

Research activities are focused on:

- Mutual influence of ligands, its consequences for spontaneous, photochemical, and catalytic redox behaviours of copper, iron and nickel complexes
- Distortion isomerism as the most common kind of isomerism in coordination chemistry
- Understanding of 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

- Magnetochemistry of new bi- or multistable compounds with switching between their magnetic states, which can be activated by external triggers (light, temperature, pressure…)
- Magnetic behaviours of manganese(II), iron (II), iron (III), cobalt (II), nickel (II), and copper (II) complexes (magnetic anisotropy, spin crossover, molecular magnetism, nanomagnetism)
- Chemical crystallography of inorganic, coordination and organic compounds
- Study of new copper and manganese complexes as potential anti-inflammatory and anti-cancer drugs
- Chemistry and electrochemistry of molten salts, theoretical problems of electrowinning of aluminium
- Spent nuclear fuel treatment
- Surface treatment of metals
- Preparation of filling powder to polymer composites
- 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 and cement foams

Cooperation

The Institute has cooperation with the following institutions:

- Coordination chemistry, magnetochemistry and crystallochemistry (Karlsruhe Institute of Technology, Karlsruhe, Germany; Laboratories of Coordination Chemistry, CNRS, Toulouse, France; University of Geneva, Geneva, Switzerland; Nikolaev Institute of Inorganic Chemistry, Novosibirsk, Russia; Palacky University, Olomouc, Czech Republic; University of Pardubice, Pardubice, Czech Republic; CEITEC, Brno, Czech Republic; University of SS Cyril and Methodius, Trnava, Slovakia; University of California San Diego, San Diego, California, USA; University of Ljubljana, Ljubljana, Slovenia; Technical University, Vienna, Austria; Martin Luther University, Halle, Germany; Wroclaw University Wroclaw, Poland; Szeged University, Szeged, Hungary; Leibniz Univerzitat Hannover, Nemecko)
- 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; Energovýzkum, Brno, Czech Republic)
- surface treatment of metals (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 print of ceramic materials ((Department of Plastics, Rubber and Fibres FCHPT STU)
- development of new types of inorganic phosphors for HB-LED (TnU AD)..

Institute of Biochemistry and Microbiology

tel.: 421 (2) 59 325 519
Head of Institute – Assoc. Prof. Albert Breier, DSc., e-mail: albert.breier@stuba.sk

Introduction

The Institute of Biochemistry and Microbiology (IBM) developed after the organizational set-up of the Faculty in March 2016 by isolation of Department of Biochemistry and Microbiology from previous Institute of Biochemistry, Nutrition and Health Protection. Even though Institute of Biochemistry and Microbiology belongs to the smallest on the faculty it covers teaching in all bachelor study programmes, several master's programmes and guarantees PhD programme Biochemistry.

Education

Members of Institute of Biochemistry and Microbiology teach several subjects e.g. Biology, Microbiology, Biochemistry, Molecular biology and genetics, Medical/Clinical Biochemistry, Cell Cultures. For most of them we cover also Laboratory practices. These subjects are for students of all Bachelor study programmes provided by Faculty (namely: Biotechnology; Chemical Engineering; Chemistry, Medical Chemistry and Chemical Materials; Food, Nutrition, Cosmetics; Automation, Information Engineering and Management in Chemistry and Food Industry), and Master study programmes (namely: Biochemistry and Biomedical Technologies, Biotechnology, Food, Hygiene, Cosmetics; Nutrition and Food Quality Assessment; Environmental Protection Technologies). Institute guarantees a PhD study programme Biochemistry, which allows the study not only for graduates of our Faculty but also graduates of other Universities. In this field of study Faculty concluded contracts of co-operation with several external educational institutions. The goal of taught subjects is to provide students with strong theoretical basis for the study of living organisms in academic research, as much as for more specialised fields such as biotechnology, clinical biochemistry or pharmaceutical industry.

Research Activities

Research activities of Institute of Biochemistry and Microbiology including fields of biochemistry and physiology of animal and microbial cells are focused on following of areas: *Physiology and genetics of filamentous fungi:* In this domain, the activities of several researchers are interconnected. They are involved in the study of biochemistry as well as genetics of selected filamentous fungi. Research is oriented mainly to the metabolism of important signalling molecule – γ-aminobutyric acid (GABA), study of secretion of unique proteolytic enzymes into extracellular milieu, transport of organic acids into the microbial cells, Ca^{2+} homeostasis, fungal spore germination. In addi-

tion, some application aspects of mycology are studied, especially study of protein transporters conferring fungal resistance to antifungal agents and preparing mutants of biocontrol fungi with increased mycoparasitic activities.

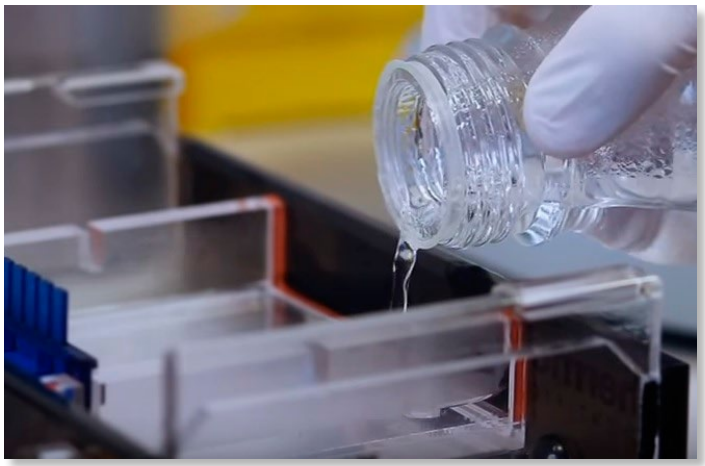
Biochemistry of animal cell: Research in this area is oriented to: *e.g.* search of bioactive compounds (natural or synthetic DNA binding molecules, glutathione redox system modulators or inhibitors of acetylcholine esterase, *etc.*) and the study of their effects on cancer and non-cancer cell cultures, analysis of the mechanism of their cytotoxicity or cytoprotectivity. We are also focusing on the study of molecular mechanisms of resistance of cancer cells against chemotherapeutics. In this field, we are specifically oriented on the function of membrane transporters and detoxification enzymes. We also study the effect of UV-A radiation on cytotoxic effects of natural and synthetic compounds in context of their possible use in photodynamic therapy aimed for cancer treatment. In our research, special attention is paid to the study of signal transduction pathways involved in lipid metabolism and calcium homeostasis which can lead to the cell death (autophagy or apoptosis).

At our Institute, several topics of oriented basic research with defined line for possible future applications are studied too. Among them the study of low-temperature plasma effects on epiphyte, phytopathogenic and toxicogenic microflora of agricultural plant seeds before and during storage, possibilities of anaerobic hydrogen production or the evaluation of health risk of new biomaterials for tissue engineering.

Cooperation

The Institute cooperates with Comenius University, Bratislava, Faculty of Natural Sciences,

University of Pavol Jozef Šafárik in Košice, Leopold-Franzens-University, Innsbruck, Austria, Université Blaise Pascal, Clermont-Ferrand, France, Slovak Academy of Sciences.



Institute of Biotechnology

tel.: +421 (2) 59 325 331
Head of Institute – Prof. Michal Rosenberg, PhD., e-mail: michal.rosenberg@stuba.sk

Introduction

There are 3 full professors, 5 associate professors, 7 PhD. and Msc. employess in the institute´s staff. The institutes is currently preparing more than 10 postgraduate students in the doctoral study programme. Yearly, about 25 master students and 30 bachelor students study in the study programmes of branches of Biotechnology.

Education

The Institute of Biotechnology guarantees the study programme Biotechnology in all three levels of the study. The Institute also provides teaching of Principles of Biotechnology for all other study programmes. The accredited programme Biotechnology integrates theoretical and practical skills of the fields chemistry, biology, biochemistry, microbiology, molecular biology, genetics, enzymology and enzyme engineering, gene engineering and bioengineering, biosynthesis and transformation of metabolites, bioanalytical methods, xeno-biochemistry, pharmaceutical, food and beverage biotechnology as well as pharmaceutical and medicine engineering.

The integral part of the study programmes is the laboratory and scientific praxis on the selected theme of applied biocatalysis, exploitation of degrading abilities of microorganisms in the bioremediation in the frame of the environmental biotechnologies, the study of production of bioactive compounds, organic acids, lipids, pigments production by fermentation, saccharides transformations, metabolites production with pharmaceutical and medical utilisation. Production of traditional fermented beverages (beer, wine).

Students and PhD students of the Institute of Biotechnology participate in the scientific and research projects. A number of students reali-

sed their projects at foreign universities and research institutes in the frame of the ERASMUS, CEEPUS, and The National Scholar programmes.

Research activities

Research activities at the Institute of Biotechnology 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 with emphasis on aroma and sensory active compound 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.

Cooperation

Institute of Biotechnology cooperates with domestic and foreign companies, research institutes and Slovak Academy of Sciences in the field of biotechnology, food and pharmaceutical technology, wine, beer and beverage technology, environmental biodegradation, immobilised biosystems and biotransformations, including production of specially developed biomass, its constituents, products, biofuels, aromas and biocatalysts.

The employees utilise specific procedures and technology for laboratory scale-up of bioprocesses and small-scale production of fine chemicals.

Institute of Physical Chemistry and Chemical Physics

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Introduction

The Institute participates in all study programmes and provides education in General Physics, Physical Chemistry and Chemical Physics at all three levels 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 of Physical Chemistry and General Physics are fundamental for the further study of other branches of chemistry. Besides the basic courses, the Institute delivers courses for the students who specialize in Physical Chemistry, Chemical Physics and Theoretical and Computer Chemistry as well. The Institute provides advanced courses in Chemical Thermodynamics, Chemical Kinetics and Catalysis, Colloid Chemistry and Quantum Chemistry. The Institute administers the Bachelor study programme in Chemistry and Medicinal Chemistry. In the second level of university education, the Institute is a guarantor of the study programme Technological 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 Computational Chemistry. The students attending the Physical Chemistry study program are educated in modern theoretical chemistry as well as in the practical applications of physical chemistry. They become familiar with modern spectroscopic and electrochemical methods often employed in combined spectroelectrochemical experiments.

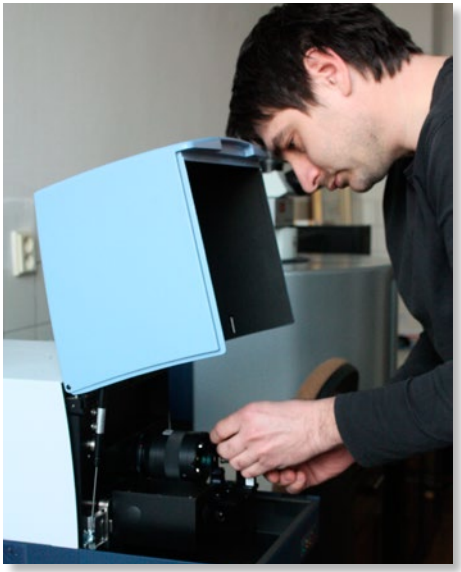
Research Activities

The Institute of Physical Chemistry and Chemical Physics belongs to the most productive institutes at the Slovak University of Technology in Bratislava. The staff of the Institute publishes approximately 50 Current Contents papers annually and their contributions are widely cited with approximately 2400 SCI per year. The following represent main scientifically active research groups at the Institute: the EPR spectroscopy group, the group of theoretical and computational chemistry, the group of thermal analyses, the group of X-ray crystallography, the scientific group focused on electrical properties of materials, and the

group of molecular distillation and alternative fuels. The research objectives of the Institute are mainly focused on the organic molecules with potential applications in sensors and optoelectronic devices, natural and synthetic drugs, antioxidants as well as new materials for catalysis. The EPR spectroscopy group investigates the structure and reactivity of paramagnetic species in chemical, biological and photochemical systems, particularly in the field of radical chemistry. Photochemically initiated processes of a variety of biologically active compounds as well as photochemically induced processes in homogeneous and heterogeneous suspensions of photocatalysts are intensively investigated. In addition, the role of oxidative stress in the development of various human diseases is studied in detail within the EPR group. A large part of the studies is oriented on the reduction and oxidation of selected redox active coordination compounds and modern materials for optoelectronics using unique in situ EPR/UV-vis-NIR spectroelectrochemical methods. The group of theoretical and computational chemistry concentrates on the theoretical prediction and interpretation of experimental outputs from cooperating groups in Slovakia and abroad. The X-ray group, in addition to the structural analyses, investigates also the charge density distribution, which enables the determination of electron density distribution in the investigated molecules. Beside the study of naturally occurring and synthetic compounds with essential roles in biosystems (antioxidants, pharmaceuticals), the study of physical-chemical properties, stability and degradation of materials represents an important field of research conducted at the Institute. In particular, in the field of thermoanalytical study attention is devoted to the kinetics of processes taking place in different materials. The group of thermal analyses investigates the thermo-oxidative stability of a variety of liquid and solid materials (e.g. natural antioxidants, stabilisers for synthetic rubbers and food supplements). Unique new techniques for the modelling of processes in condensed phase have been developed at both isothermic and nonisotermic conditions. Research activities of the theoretical group are oriented on theoretical modelling of antioxidants, conducting polymers and oligomers, nanocomposites and carbon nanostructures including also the molecular dynamics studies. Preparation and physical-chemical characterization of alternative diesel fuels and, particularly, the study of possible ways to utilize used frying oils in fatty acid methyl esters production is another unique subject of the research with a long-term tradition at the Institute.

Cooperation

The Institute staff cooperates with research groups in the Czech Republic (Heyrovsky Institute, Czech Academy of Science, University of Chemistry and Technology, Prague), Austria (University of Vienna, TU Graz), Germany (IFW Dresden, MPI Stuttgart), Denmark (University of Copenhagen) France (Grenoble), Portugal (Technical University of Lisbon), USA (Northwestern University, Chicago) and the United Kingdom (University of Liverpool, Manchester University). The Laboratory of Thermal Analysis and Calorimetry has a wide cooperation with industrial partners.



Institute of Chemical and Environmental Engineering

tel.: +421 (2) 59 325 250
Head of Institute – Prof. Ľudovít Jelemenský, DSc., e-mail: ludovit.jelemensky@stuba.sk

Introduction

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 Protection Technologies,
- 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 Sciences.

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 include 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 Protection Technologies and Environmental Chemistry and Technology supervised by DEE train in water and atmosphere chemistry, water technology (treatment of municipal and industrial waste-

water, water treatment, sludge treatment), air protection technology, waste processing, biogas production, environmental monitoring and management, ecology, environmental legislation, soil protection *etc.*

Research activities

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),
- adsorption and chromatographic processes for the separation of therapeutic proteins, specialty enzymes, prebiotics, glycosides, flavors and fragrances: single- and multicolumn process design; batch, recycle and continuous operation,
- enzymatic production of prebiotic saccharides and glycosides with pharmaceutical potential: biocatalyst design and process development,
- whole-cell biotransformation oxidations using directly oxygen for the production of chiral lactones: experimental and mathematical modeling,
- 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) equillibria,
- pollution dispersion (the atmospheric pollution dispersion using CFD modelling),
- 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, 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, Evonik Fermas, Fibrochem, Heineken, Euromilk, 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 Sartorium Stedim Biotech in membrane chromatography of proteins, Evonik 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 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) 59 325 352
Head of Institute – Assoc. Prof. Michal Kvasnica, PhD., e-mail: michal.kvasnica@stuba.sk

Introduction

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 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.

Education

The Department of Information engineering and Process control co-guarantees the bachelor study programme Automation, information engineering, and management in chemistry and food technologies, which prepares students to use automation and process control in chemical and food technologies. The department also guarantees the masters study programme Information engineering, automation, and management in chemical and food industries, as well as the doctoral study programme Process Control. Both focus on modeling, control, and optimization of processes typical for chemical and food industries. The Department of Mathematics provides basic and advanced courses in general mathematics, information technologies, mathematical statistics and probability, as well as in numerical and applied statistics for all bachelor and masters study programmes. Moreover, it also teaches a mathematical course for doctoral students focused on methods of modern optimisation and mathematical statistics.

Research activities

In research, the Department of Information engineering and Process control focuses its activities on modeling, simulation, and identification of processes of chemical technology, such as chemical and biochemical reactors, rectification columns, and heat exchangers. The department also conducts research in various control methods, ranging from optimal and adaptive control, through application of artificial neural

network and fuzzy approaches, up to predictive control and dynamic optimisation.

The research activities of the Department of Mathematics are focused on mathematical statistics, fuzzy sets and fuzzy logic, theory of measures and integrals, non-standard methods of uncertainty, theory of aggregation operators, neural networks, evolutional algorithms, artificial intelligence, ordered algebraic structures, real functions, multifunctions, and theory of graphs and numbers.

All aforementioned research areas are funded by research grants from the VEGA, APVV, and KEGA agencies.

Cooperation

The Department of Information information engineering and Process control conducts joint research with domestic and foreign research institutions in the following areas: control system design, adaptive control, direct control, polynomial control synthesis, system modeling, dynamic optimisation, neural networks, self-learning automata, modeling and analysis of hybrid systems, closed-loop identification, modeling of processes of chemical technology, environmental engineering, and bioengineering projects.

Domestic partners include, but are not limited to, the Department of control and industrial informatics at FEI STU in Bratislava, the Department of automation, measurements and applied informatics at SjF STU in Bratislava, the Slovak Academy of Sciences, Faculty of electrical engineering at TU Kosice, the BERG faculty of TU Kosice, Slovnaft, a.s., Bratislava, NCHZ, a.s., Nováky, and ProCS, s.r.o., Šaľa.

International cooperation involves University of Pardubice, ČR, VSCHT, Praha, ČR, UTB Zlín, TU Brno, ČR, Czech Academy of Sciences, Praha, ČR, Czech Technical University Praha, ČR, LSGC-CNRS, Ecole Nationale Superieure des Industries Chimiques (ENSIC), Nancy, France, Ecole Nationale Superieure des Ingénieurs de Génie Chimique-Chemin de la Loge, Toulouse, France, ETH Zurich, Switzerland, Ruhr University of Bochum, Germany, University of Dortmund, Germany, Budapest Technical University, Hungary, and the Veszprem University, Hungary.

The Department of Information engineering and Process control motivates its students to get involved in international cooperation as well. For more than 10 years, students regularly go abroad to conduct their masters thesis in universities in Germany (Dortmund), Norway (Trondheim), Spain (Bilbao), Netherlands (Eindhoven), Sweden (Linkoping), Switzerland (Lausanne), or Hungary (Budapest).

The Department of Mathematics collaborates with domestic and international research organizations in the following areas: mathematical statistics, fuzzy sets and fuzzy logic, theory of aggregation operators, information technologies, partially ordered groups and

semigroups, as well as in theory of graphs and theory of numbers. The list of partners includes other math departments of the Slovak University of Technology in faculties of civil engineering, mechanical engineering, electrical engineering, and the faculty of information technologies, as well as mathematical departments of the Comenius University in Bratislava, Czech University of Technology in Prague, University of Technology in Kosice, University of J. Selye in Komarno, and University of Ostrava. Moreover, it cooperates with foreign instututions, such as the Czech Academy of Sciences in Prague, University of Opava, Public University of Navarra in Pamplona, Johannes Kepler Universität in Linz, University of Alcalá, Alcalá de Henares in Madrid, Jean Monnet Université v St. Etienne in France, Université de Provence, CMI in Marseille, France, and the South-West University in Blagoevgrad, Bulgaria.

Institute of Organic Chemistry, Catalysis and Petrochemistry

tel.: +421 (2) 52 495 410
Head of Institute – Prof. Viktor Milata, DSc., e-mail: viktor.milata@stuba.sk

Introduction

Institute of Organic Chemistry, Catalysis and Petrochemistry consists of two departments: Department of Organic Chemistry (DOC) and Department of Organic Technology Catalysis and Petroleum Chemistry (DOTCPC). 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. DOTCPC is a guarantor of the engineering study programme Chemical Technologies and a doctoral study programme Organic Technology and Technology of Fuels. The study programme Chemical Technologies is accredited by ENAEE as a European-accredited Engineering Master Degree Programme. 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, 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, photovoltaics, protection of wood and paper, exploiting classical and non-classical methods (microvawe, ultrasound, etc.).
- The research activities of DOTCPC are focused on technological development of utilization of renewables by selectively catalyzed green processes, and on challenging catalyzed one step

transformations of commodity compounds to valuable specialties. In the field of petroleum chemistry the research activities can be divided into the following 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. Research in the field of new biofuels, their preparation and properties in the mixtures with fossil fuels, thermal processes oriented to the conversion of unconventional hydrocarbon feedstocks, used plastic, used tires and biomass to fuels and basic petrochemicals, characterization and use of heavy petroleum fractions and wastes into valuable hydrocarbon fraction. Besides the mentioned scientific topics, DOTCPC 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.*).

Cooperation

- DOTCPC 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 in the field of biofuels and NO_x reduction, *etc.* The collaboration with the Chulalongkorn University in Bangkok (Thailand) focuses on 6–12-month exchange of PhD students. DOTCPC 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 in the field of petroleum chemistry 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. Cooperation with VŠCHT Prague in mathematical modelling of hydrocarbon pyrolysis, with Gent University. Continuation of existing cooperation with University of Calgary, in research of products formulation from pyrolysis of scrap tires into asphalts in terms of the study of their rheological properties and possibility of utilization of waste polymers in material recycling. Cooperation with ABO Akademi University (Finland), Laboratory of Industrial Chemistry and Reaction Engineering and the long-term cooperation with Academy of Science of Czech Republic.
- Since 1991, DOC regularly organizes international conference Blue Danube Symposium on Heterocyclic Chemistry in cooperation with Departments of Organic Chemistry in Vienna, Budapest, Ljubljana and Brno. Simultaneously, an intense scientific cooperation in the field of heterocyclic chemistry and planned synthesis of natural compounds and their analogues appears in the nationwide territory with many Departments and Institutes of the FCHPT. To the other participating institutes also belong the Institute of Chemistry and the Polymer Institute of the Slovak Academy of Sciences.From the view of pedagogic cooperation, DOC is in close connection with Faculties of Natural Sciences of the Comenius University in Bratislava and of the Pavol Jozef Šafárik University in Košice and their institutes of organic chemistry.Foreign partnerships are established especially with universities in Austria, Germany, Netherlands, France, Czech Republic, Poland and Hungary. In the field of applied research, DOC maintains collaboration with companies such as Biosynth, s.r.o., Synkola, s.r.o., Tau-chem, s.r.o., Georganics, s.r.o., A1Synth, s.r.o., Auchem, s.r.o. and Saneca Pharmaceuticals, a.s. Furthermore, the detached office of DOC which actively operates at the lastly mentioned pharmaceutic company has to this day already trained almost a hundred engineering graduates.

Institute of Food Science and Nutrition

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Head of Institute – Prof. Štefan Schmidt, PhD., e-mail: stefan.schmidt@stuba.sk

Introduction

The Institute is organized into two departments – Department of Food Technology and Department of Nutrition and Food Quality Assessment.
The institute is preparing more than 25 postgraduate students in the doctoral study programme. Yearly, about 40 master students and 100 bachelor students study in the study programmes Foodstuffs, Hygiene, Cosmetics and Food, Nutrition, Cosmetics.

Education

The Department of Food Technology covers the study programme Foodstuffs, Hygiene, Cosmetics, as well as the doctoral study programme Food Chemistry and Technology. It also provides teaching of subjects focusing on food chemistry and technology in Bachelor's study programmes. The accredited programmes of the Department of Food 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 chemistry and analysis, food engineering, food authenticity, biopreservation of vegetable products, microbiology of milk and milk products, meat chemistry and technology, food legislation and HACCP principles.

Department of Nutrition and Food Quality Assessment leads the study program Nutrition and Food Quality Assessment. The members of the Department teach several subjects of the bachelor degree study programmes (Principles of human foods, Toxicology, Analysis of foods, Microbiology of foods and cosmetics, including the corresponding practical trainings) covering the field of nutrition, food quality and safety assessment. In the Master degree study programme they quarantee the teaching of the subjects: Contaminants and addivites in foods, Food microbiology, Hygiene and safety of foods, Reaction mechanisms in foods, The systems of foreign compounds assessment in the eatables, Quality and safety assessment of the foods, Predictive microbiology and risk assessment, Dietology, Nutrition and immunity, Physiology and Patophysiology of human nutrition, Food legislation, and the corresponding practical trainings and seminars. The aim of the study programme Nutrition and food quality assessment is to provide theoretical knowledge and practical skills so the graduate students are prepared to act in a capacity at the production, assessment, regulation of food quality and safety in the food industry. The graduates of this study program can also find the job in the public catering, food administration and control authorities (State Veterinary and Food Administration of the Slovak Republic, Public Health Authority of the Slovak Republic), in the food reseach and development or in the field of business.

Research activities

Research activities at the Department of Food 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.

The research projects at the Department of Nutrition and Food Quality assessment are performed by the employees of the laboratories:

A. Of microbiological analysis of food quality and safety

The laboratory focuses on the mathematical description of behavior of microorganisms in the food determining food safety and quality. It has solved the relationships among the food environmental factors and the growth, proliferation, surviving of the microorganisms as well as their mutual relationships among competitive and/or antagonistic groups of microorganisms for a long time.

B. Of nutrition and environmental microbiology

The priority topic of the laboratory is the characterization of bacterial resistance against antimicrobial compounds form different points of view. It deals with the study of exogenous factors (compounds present in the foods, or in the environment) on the development of this phenomenon as well as on the study of mechanisms of resistance, while not only microbiology is used, the knowledge from chemistry, molecular biology and/or genetics are also used.

C. Of acid-lactic fermentations of cereal substrates

The laboratory focuses on the development of new products suitable for the nutrition of healthy handicapped groups of inhabitants, on acid-lactic fermentations of probiotic and potentially probiotic bacteria and on the biologically active compounds from the plant raw materials with antioxidant, antimicrobial and antimutagenic effects.

D. Of food chemistry and analysis

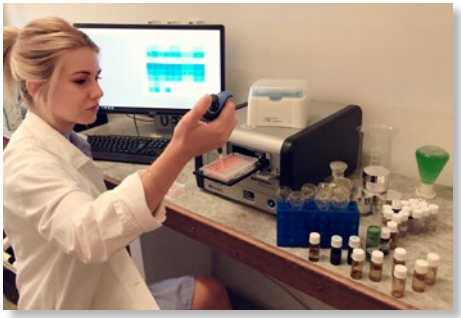
The group focuses on the isolation, characterization and transformation of natural compounds that are primary used in the food industry.

E. And consulting group for nutrition

That focus on the assessment of nutrition constitution of the foods (proteins, lipids, saccharides, organic acids) and the calculation of their energic value.

Cooperation

The Department of Food Technology cooperates 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 customers in the sphere of cosmetic chemistry and technology, development of HACCP systems.

Department of nutrition and food quality assessment cooperates with national as well as international institutes: National Agricultural and Food Centre, Research Food Institute (NPPC VÚP) (Bratislava), Ministry of Agriculture and Rural Development of the Slovak Republic (MPRV SR) (Bratislava), University of Chemistry and Technology, Prague, (VŠCHT), Czech University of Life Sciences Prague (ČZU), European Food Safety Authority (EFSA) (Parma) and food industry companies such as RAJO a.s. Bratislava, Ryba s.r.o. Žilina, *etc.*

Institute of Natural and Synthetic Polymers

tel.: +421 (2) 52 926 053
Head of Institute – Prof. Ivan Hudec, PhD., e-mail: ivan.hudec@stuba.sk

Introduction

The Institute of Natural and Synthetic Polymers consists of four departments: Department of Plastics, Rubber and Fibres, Department of Polymer Processing, Department of Graphic Arts Technology and Applied Photochemistry, Department 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 Natural and Synthetic Polymers 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, pulp 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 knowledgable in manufacturing, processing, structure, properties and application of natural and synthetic polymers in materials as are rubber, plastics, textile fibers and textile, pulp and paper. 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 carreer 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

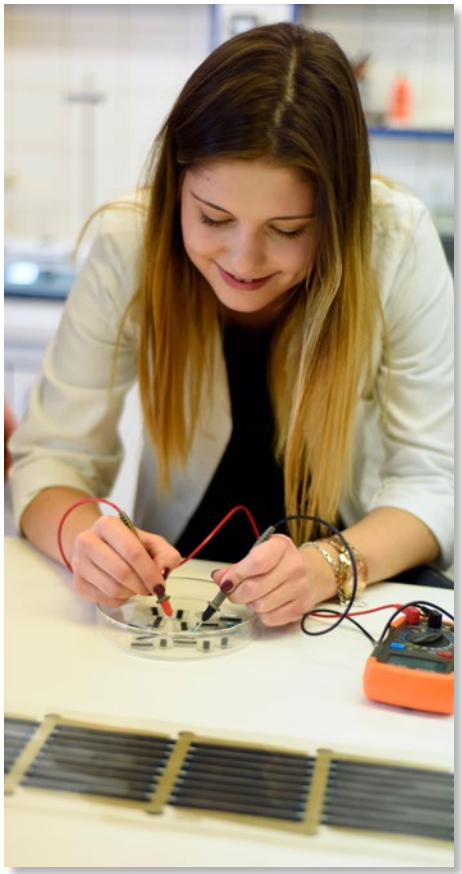
that specialize in conservation and preservation of heritage materials and objects. They gain advanced knowledge on composition, structure and properties of chemical compounds and traditional and advanced materials, they are able to interpret the analytical results and thus contribute to the diagnosis 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 three PhD study programmes: Macromolecular Chemistry and Technology of Polymer Materials, and Heritage Materials Conservation.

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 lignocellulosic 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,
- evaluation of thermal, dynamic-mechanical and barrier properties of polymers
- 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 on the capillary and oscillatory rheometers,
- 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 with the possibility of using EDX analysis, analysis of cryo conditions and by atomic force microscopy,
- testing of process ability of polymers by extrusion, blow molding, thermoforming, injection molding, compression 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,
- plasma modification of the surface properties of the fiber, textile and foil materials at atmospheric pressure.

Department of Languages

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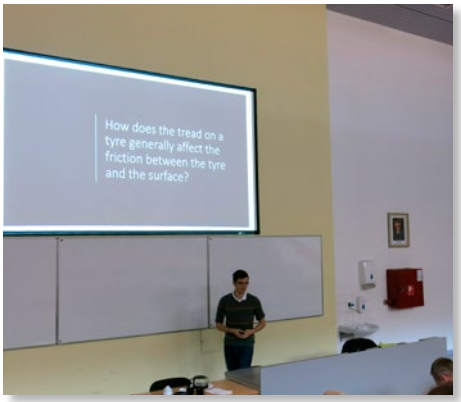
Head of Department – Mgr. Magdaléna Horáková, e-mail: magdalena.horakova@stuba.sk



Introduction

The Department of Languages supports the Faculty's training in chemical and food technology with tuition in the foreign language: English 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 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 closes with an 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, Russian, depending 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. Dr. Miroslav Bobrík, PhD., e-mail: miroslav.bobrik@stuba.sk

Introduction

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

The Department can offer students and staff a gymground 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

Our research concentrates on solving questions of fitness, bodily performance, physical ability and the physical education of undergraduates as well as on the history of physical education and sports. The lecturers at our department have published more than 250 scientific, specialist and methodological in both domestic and foreign publications. The members of our department have proven their specialization working as trainers and national trainers in top physical educational bodies in our country and abroad. The staff and the

technical and sports facilities for scientific research enable the lecturers of our department to become involved in projects, to publish their presentations at home and abroad and to take an active part with their scientific results in the training process at a top level.

The Department works on the following projects:

- State of Physical and Motor Development of Undergraduates of FCHPT STU in Bratislava
- In the Shadow of Totalitarism: Sport and the Olympic Movement in Countries of Central Europe 1945 – 1989

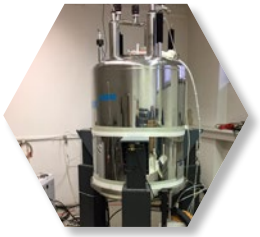
International Research Project of Visegrad Fund

- 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.



Central Laboratories

tel.: +421 (2) 59 325 777
Head of Central Laboratories – Ing. Michal Kaliňák, PhD., e-mail: michal.kalinak@stuba.sk

Central Laboratories (hereinafter CL) is a department of FCHPT STU, which is equipped with high-tech research infrastructure for investigation of structure and physical and chemical properties of various samples. These high-cost and operation demanding instruments were purposely gathered into one department in order to facilitate their effective exploitation for all departments of the faculty.
CL was established in 1982. Its structure, name and affiliation have changed several times since then. In 2006 it was included into the Institute of Analytical Chemistry as Department of NMR and Mass Spectrometry. In 2016 it was integrated into the structure of the faculty as independent faculty department.

CL consists of four laboratories:

NMR Laboratory
NMR Laboratory is equipped with 2 modern NMR instruments. One of the devices (300 MHz NMR spectrometer Varian Unity-Inova) is mainly used for routine analysis of samples prepared (synthesized) at other departments of the faculty, in order to check their composition as well as to confirm the structure of the end products. Second instrument (600 MHz NMR spectrometer) is intended primarily for advanced research projects. It is equipped with several specific probes and allows measurement of liquid and solid samples. This spectrometer is used to solve the structure and interactions of complex organic samples, to study dynamic processes, to identify isolated natural compounds, to develop new NMR methods.

In-vivo NMR Laboratory
In-vivo NMR laboratory is our external facility located at the Department of Radiology, University Hospital Bratislava Kramáre. It has a modern equipment for NMR spectroscopy and imaging of small laboratory animals (rats, mice, birds…). It allows to track biological processes directly in vivo. The laboratory is specialized for the long-term studies (in living animals) aimed at monitoring the state of the same individual, particularly suitable for studying the effect of drugs.

Laboratory of Mass Spectrometry
Laboratory of mass spectrometry is equipped with two modern mass spectrometers in combination with gas chromatography. Its research is focused on the analysis of complex mixtures of environmental samples, food quality control and analysis of biological samples (metabolomics).

Laboratory of Single Crystal Structure Analysis
Single crystal Stoe Stadi Vari diffractometer with two X-ray micro-sources (Ag and Cu) and Cobra cooling is used for solving the crystal structures of organic, inorganic and coordination compounds, as well as for studies of electronic structures of small molecules.

Education

CL participate in the teaching of basic subjects at the faculty (inorganic chemistry, analytical chemistry, physical chemistry, organic chemistry

and biochemistry) in their area of specialization. Teaching is mainly concentrated in the second and third stage of university study.

The CL staff are intensively involved in student theses (bachelor, master and doctoral) both as their supervisors and advisers. Also, they provide qualified service for other theses using equipment located in CL.

NMR laboratory regularly organize training sessions and specialized seminars in their area of specialization.

Research

Laboratories of CL are constantly involved in scientific and research projects of national research institutions, just as in research projects of the EU and NATO. Research projects are focused on the perspective of the development of new analytical methods to solve the problems of the chemical, food and pharmaceutical industry and the environment :

- In-vitro and in-vivo study of metabolism by NMR
- Study of the structure and chemical interactions of natural and synthetic compounds using NMR
- Trace analysis of volatile and semi-volatile analytes in complex organic systems using a preconcentration techniques, combined with rapid capillary gas chromatography and mass spectrometry
- Enantioselective GC and HPLC separation using molecular modelling, separation and determination of enantiomers in environmental samples, in pharmaceuticals and in biological material
- Identification and determination of authentication markers in food commodities
- Trace and ultra-trace electrochemical and spectrophotometric analysis
- RTG structural analysis of crystalline samples

In addition to their own research projects, the departments of CL participate in solving other faculty projects in the form of professional services in their area of specialization.

Cooperation

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

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Final Theses, Publications and Active Projects
can be found at www.fchpt.sk/AR