



ROAD MAP STU IN BRATISLAVA INNOVATION OF A STUDY PROGRAM

Bratislava, April 7, 2017



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The most important skills for future researchers (results of SQA)

Scientific and technical skills

- ▶ product development
- ▶ organic chemistry
- ▶ health, safety and environment
- ▶ analytical chemistry (including spectroscopic techniques)

Business skills

- ▶ innovation management
- ▶ quality management
- ▶ understanding of suppliers and customers

Personal skills

- ▶ ability of creative thinking and problem solving
- ▶ foreign languages and intellectual skills
- ▶ ability to work independently and in the team



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Key skills for future researchers

- ▶ **good theoretical foundations**, mainly in organic, inorganic, physical, analytical (including spectroscopic techniques) chemistry, chemical engineering, process control
- ▶ **business skills** – **management of innovation and quality** (in what areas and how efficiently at the lowest cost to upgrade products and to improve their quality)



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The most important skills for future engineers (results of SQA)

Scientific and technical skills

- ▶ health, safety and environment
- ▶ organic chemistry
- ▶ product development

Business skills

- ▶ cost optimization
- ▶ understanding of suppliers and customers
- ▶ innovation management

Personal skills

- ▶ ability of creative thinking and problem solving
- ▶ foreign languages and intellectual skills
- ▶ decision making skills



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Key skills for future engineers

Engineers should be able to **improve existing technology or to develop new technology/products:**

- ▶ to propose a new large scale operation based on the results of the pilot plant
- ▶ to propose logistics of the manufacturing process
- ▶ to develop product lifecycle with smallest negative impact on the environment

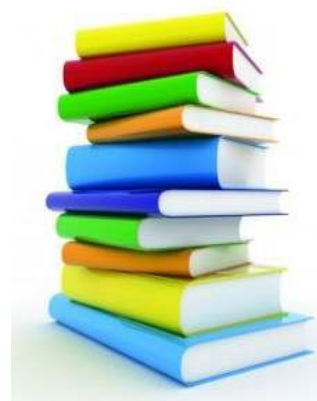


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The overall strategy of tertiary education of young talents in chemistry

Bachelor's degree study programs at the FCHPT STU

- ▶ Chemistry, Medical Chemistry and Chemical Materials
- ▶ Chemical Engineering
- ▶ Automation, Information Engineering and Management in Chemistry and Food Industry
- ▶ Biotechnology
- ▶ Food, Nutrition, Cosmetics

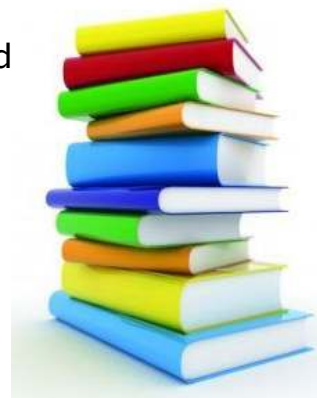


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The overall strategy of tertiary education of young talents in chemistry

Engineer's degree study programs

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

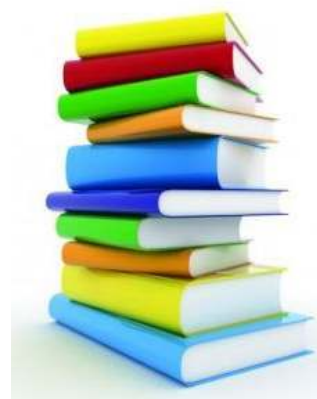


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The overall strategy of tertiary education of young talents in chemistry

Basic features of Engineer's degree study programs at the STU are:

- ▶ **carefully prepared by guarantors and accredited**
- ▶ created to offer advanced knowledge **with good theoretical fundamentals** particularly in the field of organic, inorganic, physical and analytical chemistry
- ▶ extended to obtain **technological skills** in inorganic, organic technology, design and production optimization, including special analytical methods for quality control of raw materials and products, and environmental protection



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The overall strategy of tertiary education of young talents in chemistry

Additional features of tertiary education at the STU are:

- ▶ courses aimed at the acquisition of **soft skills** including entrepreneurial skills and personal skills
- ▶ encouragement to participate in students' mobility
- ▶ supporting the talented students (Socrates Club, Students' Scientific Conference, students' research and professional activities)
- ▶ awarding the best theses by industrial partners
- ▶ deeper contact with practice through
 - lectures given by specialists from industry
 - professional practice in industry
 - theses oriented on solving practical problems



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The overall strategy of tertiary education of young talents in chemistry

- ▶ The key seems to be for students **to carry out professional practice in companies/SMEs** during their studies.
- ▶ The students in all Engineer's degree study programs have compulsory **Professional Training** (120 hours).
- ▶ STU provides students information about the possibilities to pass **Professional Training** in companies or SME operating in the chemical, pharmaceutical or food industry in Slovakia and actively seeks partners for Professional Training.



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Professional Training

The purpose of the Professional Training:

- ▶ knowledge about fundamental principles of the production, development or research
- ▶ familiarity with specific tasks and problems in industry
- ▶ ability to use in practice theoretical and methodological knowledge acquired during the university studies



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Key objectives and supporting objectives for implementing innovations into strategy of tertiary education of young talents in chemistry

Innovation of the engineer's degree study program

Control of Technological Processes in Chemical and Food Industries

Basic information:

- ▶ Field of study: Chemical Technologies
- ▶ Level of study: 2nd
- ▶ Standard length: 2 years
- ▶ Form: full-time
- ▶ Language of instruction: Slovak or English
- ▶ Number of credits needed for successful finishing the study: 120
- ▶ Academic title: "Inžinier", abbreviation "Ing."

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Characteristics of the study program and the courses in the study plan

► Characteristics of the study program:

- It provides the technical and economic education aimed at the control, management and economy of production processes, especially in the chemical and food-processing industry.
- It is the unique study program in the Slovak Republic integrating the knowledge of all areas of chemistry, chemical and food technologies related to the economic and managerial education.
- It provides knowledge in
 - enterprise economy, human resources management, corporate finances, marketing, management of the production and logistical processes, strategic control in technologies, mathematical models in decision-making, information technologies, labor and industrial law.
- From technological aspects it
 - enlarges the education in inorganic and organic technologies, bioelectrochemistry, technology of modern materials.
- For graduates it provides complete expert, technologic, economic and managerial knowledge in correlative relationships which the industry expects and demands on the present day.

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Characteristics of the study program and the courses in the study plan

► Characteristics of the study plan:

- The study plan is an interdisciplinary one.
- It includes:
 - courses oriented on understanding of the natural sciences
 - courses in control theory in the field of technology and production processes
 - design of production and technological processes for managing of production
 - control, economic management and corporate governance
 - courses on specific problems of production management in the chemical, biochemical and food technologies

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Characteristics of the study program and the courses in the study plan

- ▶ The most important areas of core expertise in the field of study Chemical Technologies are:
 - Special chemical technologies: Advanced Inorganic Technology (2 credits), Advanced Organic Technology (3 credits)
 - Technology of material processing: Alternative Energy Sources (2 credits), Advanced Materials Technology (3 credits)
 - The laboratory of the study field: Laboratory of Technological Processes Management (4 credits)
 - Optimization and management of technological processes: Management in the Production and Logistics Processes (4 credits), Strategic Management in Technology (4 credits), Budgeting in Technology (4 credits), Financial Management (5 credits), Management of Small and Medium-sized Enterprises (2 credits)
 - Mathematics: Mathematical Models in Decision (5 credits)
 - Applied thermodynamics, kinetics: Applied Thermodynamics (3 credits), Separation Processes (5 credits), Laboratory Practice in Separation Processes (1 credit).

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Characteristics of the study program and the courses in the study plan

- ▶ The most important areas of core expertise in the field of Management are:
 - Strategic management
 - Budget management and financial management
 - Management of the Production and Logistical Processes,
 - Simulation Training in Management Activities

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Key outcomes of education of the graduate

- ▶ The graduate of the engineer's degree study program ***Control of Technological Processes in Chemical and Food Industries*** is engineer:
 - with large technological ground
 - he/she knows the methods and technologies of inorganic, organic chemistry, separation processes, technology of modern materials and alternative energy sources
 - he/she is competent to design the conception of production process, to manage production technological units and devices and to take into account ecological aspects.
 - he/she is able to manage economics and managerial processes, technological and production processes as well
 - he/she has knowledge from areas of marketing, human resources management, financial management, production management and investment development
 - he/she is competent to IT application and in-plant information system for correct decision-making and control
 - he/she has knowledge in the business and financial planning
 - he/she has also know-how for starting business activities

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Scope of the graduate

- ▶ The graduate of the engineer's degree study program ***Control of Technological Processes in Chemical and Food Industries*** is engineer:
 - he/she is technologically and economic oriented
 - he/she has wide ability for application in many areas of
 - production management
 - technologic processes
 - human resource management
 - Marketing
 - other economy spheres
 - he/she can work as a leader in the business management
 - he/she can work in the public administration
 - he/she can work in the engineering-investor and consultant organizations
 - he/she is qualified to be a teacher in the educational institutions
 - he/she can be a businessman

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Recommendations for innovation of the study program *Control of Technological Processes in Chemical and Food Industries*

Study program will stay multidisciplinary, combining technical, technological and managerial skills.

Mostly theoretical orientation should be changed to achieve better balance between theory and practice:

- ▶ increasing the number of hours of professional training; students will have more possibilities to use in practice theoretical and methodological knowledge acquired during the university studies.
- ▶ *modification of existing courses and including several new courses* oriented on strategic and visionary management, understanding customers and suppliers, project management, team work, soft skills: entrepreneurial skills, personal skills, as well as scientific and technical skills.
- ▶ *involvement practitioners in the educational process* – directly from industry and businesses

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Actions to achieve the objectives

Innovations of the study program *Control of Technological Processes in Chemical and Food Industries* and also the other study programs in the future will be achieved via following actions:

- ▶ Modification of content of existing courses according to the results of the survey (SQA analysis in SMEs).
- ▶ Inclusion of new courses for training various soft skills that include mainly managerial skills, personal skills, as well as scientific and technical skills.
- ▶ Involvement of practitioners in the lectures.
- ▶ Extension of offers for professional training in SMEs not only during summer but also during the term, in close cooperation with the ZCHPF SR.
- ▶ Support of solving problems from practice in theses.
- ▶ Motivation of students by awarding the best theses and works in the students' scientific and professional activities at the university and by enterprises from the chemical and the pharmaceutical industries.
- ▶ Make a deeper innovation of the study program "Process control technology in the chemical and food industries."
- ▶ Support of international mobilities of students.

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*Thank you
for your attention !*



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